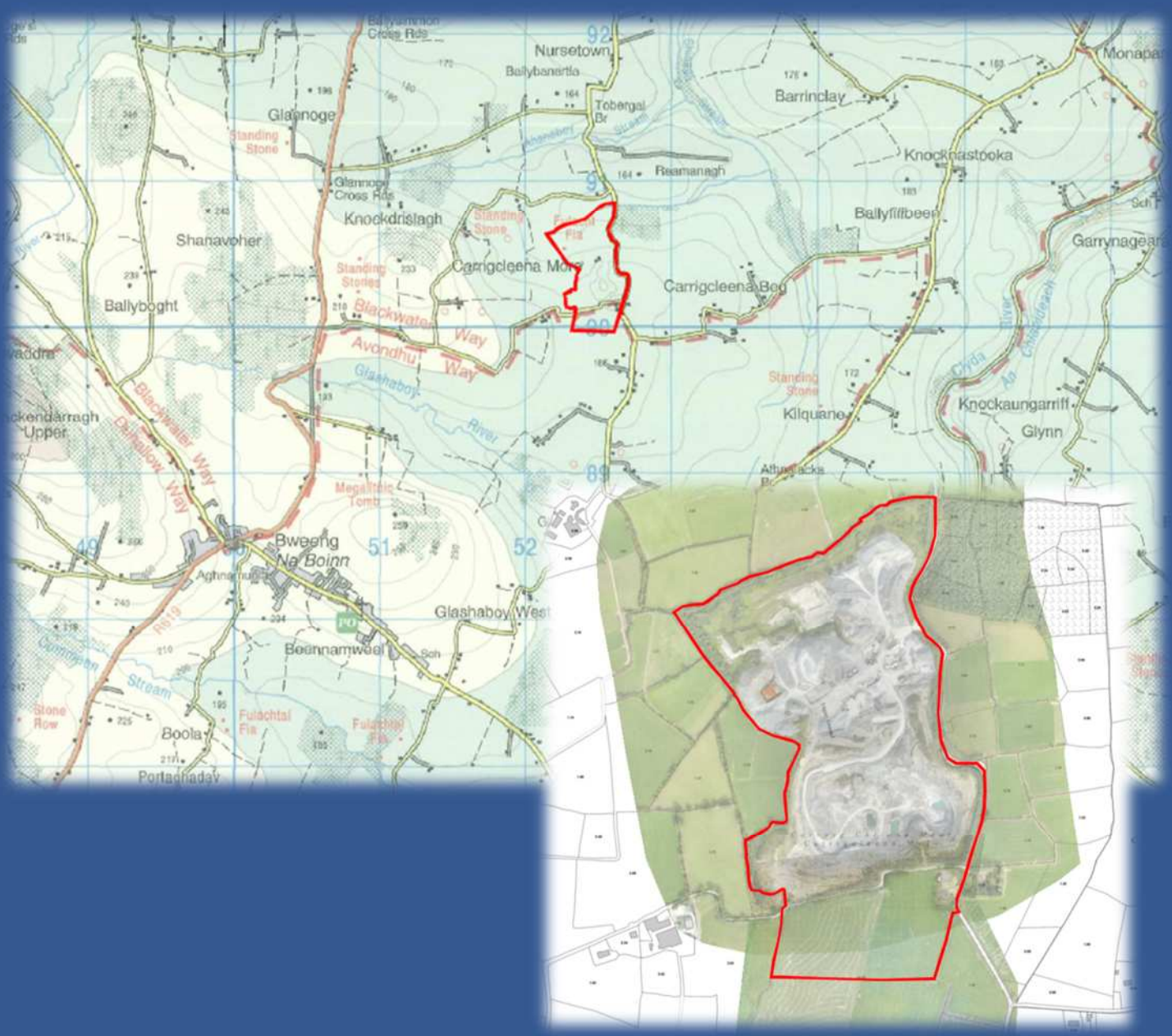
Breedon Ireland

Continued Use and Extension of
Existing Quarry at Carrigcleena, Bweeng, Co. Cork

Environmental Impact Assessment Report



BREEDON

SLR

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DECEMBER 2024

Continued Use & Extension of Existing Quarry at

Carrigcleena, Bweeng, Co. Cork

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

December 2024

Prepared By:

SLR Consulting Ireland

With contributions from:

Dr. Charles Mount
PMCE

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Introduction

1.1 This Environmental Impact Assessment Report (EIAR) provides supporting information to accompany a planning application to Cork County Council submitted by Breedon Materials Ltd., trading as Breedon Ireland, in respect of a proposed development at their existing quarry at Carrigcleena More, Bweeng, Co. Cork. This application follows on from withdrawal of the original application under Plan. Ref. 24/04069.

1.2 The proposed development will consist of:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c. 3.7 hectares;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Overburden storage;
- Operation landscaping including perimeter screening berms around the proposed extension area; and
- Restoration of the quarry to natural habitat after-uses.

All related ancillary site works within an overall application area of c. 28.8 hectares, for a period of 20 years and a further 2 years to complete final restoration of the site.

1.3 Further information on the proposed development, site activities, environmental management systems and controls at the application sites are provided in the Chapter 2 of this EIAR.

1.4 The application is made in accordance with the requirements of the Planning and Development Regulations 2001-2015 (as amended).

The Site

Site Location

1.5 The application site is located within the townland of Carrigcleena More, Bweeng Co. Cork, approximately 2.5 km northeast of Bweeng village, refer to Figure 1-1. The land ownership and application area are shown on Figure 1-2 and Figure 1-3.

Site Description

1.6 The existing high polished stone value (PSV) quarry commenced operations in c. 1978 under P. Ref. No. 1863/75. The site occupies ground with elevations ranging between c. 190m in the south and c. 160m OD in the north, with current planning permission authorising extraction to 115m OD, with a central sump to 110m OD.

1.7 The existing quarry operations comprise extraction of stone using conventional blasting techniques; processing (crushing, screening and washing) of the fragmented rock to produce high PSV aggregates for use in the production of value added products, surface dressing of roads, road construction and site development works.

1.8 There is an existing readymix concrete plant located within the existing quarry (P. Ref. No. 19/5902), which commenced operation in c. 2021.

1.9 Ancillary facilities at the site include mobile processing plant, portacabin offices with staff facilities, weighbridge and wheelwash, which will continue to be used.

Site Access

1.10 The proposed development will use the permitted access to the existing quarry. This access is located on the local road L1214 along the eastern site boundary. Passing bays have been constructed along the local road to ensure satisfactory two-way flow of heavy goods vehicles (HGV's) – refer to EIAR Chapter 14 - Traffic.

Surrounding Landuse

1.11 The application site and the overall site are located within undulating rural agricultural landscape. There are isolated private residential property and agriculture farms located throughout the surrounding rural landscape, predominantly along the local road network.

1.12 Two local roads bound the quarry at its southern and eastern boundaries. Access to the quarry is from local road L1214 approximately mid-way at the eastern site boundary. The Reamanagh Stream bounds the quarry to the north and flows in an easterly direction into the Lyre River a tributary of the River Blackwater.

1.13 The lands surrounding and within the application site predominantly comprise farm fields. The application site is not subject to any statutory or non-statutory nature conservation designations.

The Applicant

1.14 Breedon Materials Ltd., trading as Breedon Ireland is a leading supplier of aggregates and added-value construction materials products, principally concrete and asphalt, across the island of Ireland. The company is part of Breedon Group plc, a public company with ordinary shares traded on the London Stock Exchange.

1.15 Across Ireland, the UK and America, the company employs approximately 4,200 colleagues and operates 2 cement plants, >110 quarries, >50 asphalt plants and >200 ready-mixed concrete plants.

1.16 Breedon trades in the Republic of Ireland as Breedon Ireland, a fully integrated aggregates and downstream products business headquartered in Dublin. It comprises all Breedon's construction materials and contracting services businesses (aggregates, asphalt, ready–mixed concrete, bitumen, contract surfacing highway maintenance, civil engineering and airfield construction) in the Republic of Ireland.

1.17 Breedon are fully committed to sustainability and social responsibility. This commitment is one of the six pillars of the company's growth strategy. In September 2020, Breedon committed to achieving net zero carbon emissions by 2050.

EIA Screening

1.18 Part 1 and Part 2 of Schedule 5 of the Planning and Development Regulations 2001 (as amended) set out the forms of development that require an environmental impact assessment report (EIAR).

1.19 Paragraph 19 of Part 1 of Schedule 5 states that the following form of development requires an EIA

> *"Quarries and open-cast mining where the surface of the site exceeds 25 hectares.*

1.20 Paragraph 2 of Part 2 of Schedule 5 refers to extractive industry and part (b) of that section states that the following requires an EIA

> *"Extraction of stone, gravel, sand or clay, where the area of extraction would be greater than 5 hectares."*

1.21 The proposed development relates to the continued use and extension to an existing quarry within an application area of c. 28.8 ha. The extraction area of the quarry will be greater than 5 hectares. On this basis the extraction area of the quarry exceeds the area stated under Part 2 and an EIAR is required.

EIA Scoping & Consultation

1.22 A pre-planning consultation meeting in respect of the proposed development at Bweeng was held between officials of Cork County Council and the Applicant in March 2021 (Ref. PPN21/204). Staff from the environment, planning and roads departments of Cork County Council were in attendance. Further consultations were held with the Roads Section, Cork Co. Council in relation to the proposed realignment of a section of the local road.

1.23 In preparing the original Environmental Impact Assessment Report a Preplanning Consultation document was issued to statutory consultees. Responses were received from:

- Development Applications Unit at the Department of Culture, Heritage and the Gaeltacht;
- Transport Infrastructure Ireland (TII);
- Uisce Éireann/Irish Water.

1.24 A public consultation day was held in Bweeng on the 30th June 2022 where proposals for the road realignment were presented to members of the local community.

1.25 The Applicant has liaised with Cork County Council's Local Area Engineer to identify any traffic queries in relation to the proposed development. These issues have been addressed in the current submission, or will be addressed at the next design stage, when the level of design specification (i.e. detail design) is sufficient to demonstrate compliance with design and local authority expectations. The Applicant shall continue to liaise closely with the Local Area Engineer, and the Roads Department within Cork County Council.

1.26 In March 2024 the author of the cultural heritage section submitted the draft cultural heritage chapter of the EIAR to the Cork County Archaeologist and requested comments. The Archaeologist replied recommending archaeological testing of the anomalies identified in the archaeological geophysical survey of the application area and some additional trenches to test the reliability of the scan. In compliance with the request archaeological testing of the application area by Ewelina Rondelez for Rubicon Heritage

was commissioned by Breedon Ireland and carried out under Licence No: 24E0539 issued by the National Monuments Service.

1.27 The IFI were consulted by Cork County Council (CCC) with respect to original planning application for the continued use and extension of the quarry (Plan Ref. 24/04069) which was subsequently withdrawn by Breedon in March 2024.The IFI consultation response (12th March 2024) stated that while they were not opposed to the proposed development in principal, there had been historical issues at the site regarding water and more detail regarding expansion of the water management systems seemed worthy in light of conservation objective site connectivity and biodiversity of water dependent species.

1.28 Following the withdrawal of the application, a review of the consultation response from the IFI was undertaken and 2 no. site meetings were held between representatives of Breedon Ireland, IFI and Cork County Council on 22nd October 2024 and 22nd November 2024 respectively. The purpose of the site meetings was to discuss improvements across the site, specifically relating to the quarry water management, silt source control and management, and potential impact on the receiving water environment and the aquatic species it supports.

1.29 During the first meeting with IFI and Cork County Council on 22nd October, a number of measures were proposed with the aim of ensuring continued environmental improvement at the site in respect of the surrounding water environment and silt source control internally within the site and on the public road. These measures were implemented prior to the second meeting on 22nd November, during which the measures were inspected by Cork County Council and IFI.

1.30 The issues raised by the IFI in their correspondence to Cork County Council relating to the original planning application (Plan Ref. 24/04069) are addressed in detail in the Hydro-G and Envirologic Water Management report for the Bweeng site - see copy of report in **Error! Reference source not found.**.

Difficulties Encountered with EIAR Compilation

1.31 This Environmental Impact Assessment Report was compiled on the basis of published regional and local data and site-specific field surveys. No difficulties were encountered in compiling the required information.

Environmental Impact Assessment Report (EIAR)

1.32 An Environmental Impact Assessment Report (EIAR) “means a statement of the effects, if any, which the proposed development, if carried out, would have on the environment”. As such, it is a systematic analysis and assessment of the potential effects of a proposed project on the receiving environment.

- The principal objectives of an Environmental Impact Assessment Report are to:
- Identify and / or predict the significant effects impacts of a development.
- Identify what mitigation measures should be incorporated into the development to eliminate or reduce the perceived impacts.

- Interpret and communicate the above information on the impact of the proposed development, in both technical and non-technical terms.
- Assist the Local Planning Authority in the decision making process with respect to the associated planning application.

Format of the Environmental Impact Assessment Report (EIAR)

1.33 To facilitate clarity, this EIAR has been prepared in accordance with the Environmental Protection Agency (EPA) Guidelines (2022). The EIAR is sub divided into fifteen parts. As an overview, they comprise:

Chapter 1: Introduction / Screening / Scoping

1.34 An introduction to the development and a brief explanation of the aims and format of the EIAR. It also identifies the various professional consultants who have contributed to this EIAR and the screening / scoping process carried out.

Chapter 2: Project Description

1.35 Chapter 2 provides:

- details of the physical characteristics of the whole project, including, where relevant, demolition works, the land-use requirements during construction and operation as well as other works that are integral to the project; and
- the main characteristics of the operational phase of the project e.g. nature and quantity of materials and natural resources.

Chapter 3: Alternatives

1.36 Chapter 3 provides a description of the reasonable alternatives studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.

Chapters 4 - 15

1.37 These Chapters provide detailed information on all aspects of the existing (baseline) environment, identifies, describes and presents and assessment of the likely significant impacts of the proposed project on the environment, recommends mitigation and monitoring measures (where required) to reduce or alleviate these impacts and describes the residual impacts and conclusions. They are grouped under the following Chapters:

- Chapter 4: Population and Human Health
- Chapter 5: Biodiversity
- Chapter 6: Land, Soils and Geology
- Chapter 7: Water
- Chapter 8: Air
- Chapter 9: Climate
- Chapter 10: Noise and Vibration

- Chapter 11 : Material Assets
- Chapter 12: Cultural Heritage
- Chapter 13: Landscape
- Chapter 14: Traffic and Transport
- Chapter 15: Interactions

1.38 The associated references, plates, figures and appendices are provided at the end of each Chapter 1 – 15.

1.39 A "Non-Technical Summary of the Environmental Impact Statement", incorporating all of the above chapters, is provided as a separate and self-contained document.

Contributors

1.40 Breedon Ireland appointed SLR Consulting Ireland to prepare this Environmental Impact Assessment Report (EIAR) in support of its Planning Application for the proposed development at Bweeng, Co. Cork.

1.41 The contributors who have assisted in the preparation of this EIAR are identified in Table 1-1 below. Each contributor has the appropriate qualifications, experience and competence for their topic.

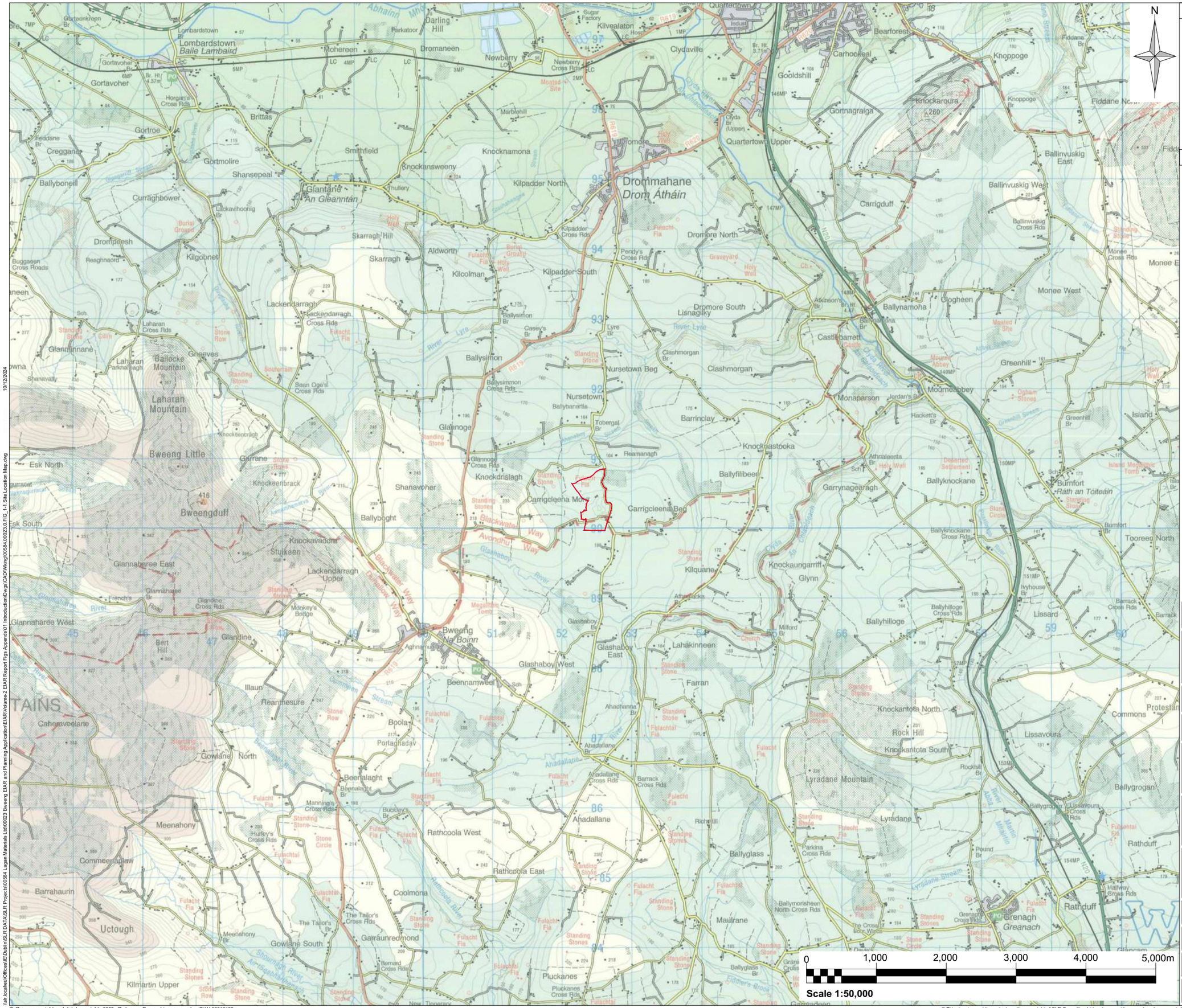
Table 1-1 List of Contributors

TOPIC	CONTRIBUTOR	COMPANY
Introduction	Tim Paul MSc., CEng, MIEI, MRICS, MIQ	SLR Consulting
Description of Development	Tim Paul MSc., CEng, MIEI, MRICS, MIQ	SLR Consulting
Alternatives	Tim Paul MSc., CEng, MIEI, MRICS, MIQ	SLR Consulting
Population and Human Health	Edward Goulding Tim Paul MSc., CEng, MIEI, MRICS, MIQ	SLR Consulting
Biodiversity	Michael Bailey BSc MSc MCIEEM	SLR Consulting
Land, Soils and Geology	Peter Glanville BA, MSc, EurGeol, PGeo; and Nikolina Bozinovic BSc, MSc.	SLR Consulting
Water	Nikolina Bozinovic, BSc., MSc. Dominica Baird (Hydrogeology) BSc., MSc., CGeol, EurGeol. Dr. Peter Glanville (Hydrology) PhD, PGeo, EurGeol.	SLR Consulting
	Pamela Bartley Ph.D. (Hydrogeology)	Hydro G

TOPIC	CONTRIBUTOR	COMPANY
	Colin O'Reilly Ph.D. (Hydrology)	Envirologic Ltd.
	Ross Macklin	Tritirus Ltd.
Air	Tim Paul MSc., CEng, MIEI, MRICS, MIQ	SLR Consulting
Climate	Conor Hughes MSc. Tim Paul MSc., CEng, MIEI, MRICS, MIQ	SLR Consulting
Noise and Vibration	Tim Paul MSc., CEng, MIEI, MRICS, MIQ	SLR Consulting
Material Assets	Tim Paul MSc CEng MIEI MRICS MIQ	SLR Consulting
Cultural Heritage	Dr. Charles Mount M.A., Ph.D.	Consultant
Landscape	Anne Merkle MSc, Dipl. Ing (FH) MILI	SLR Consulting
Traffic and Transport	Aly Gleeson BSc MEng MBA RSA Cert CEng FIEI	PMCE Consultants
Co-ordination of EIA	Tim Paul MSc., CEng, MIEI, MRICS, MIQ	SLR Consulting

1.42 Each contributor has been fully briefed about the proposal and the background to it. They have also visited the site and are familiar with the local environment.

FIGURES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Drommahane
Drom Áthain
Glantane
An Gleanntán
Dromore
Dromore North
Dromore South
Kilpadder North
Kilpadder South
Kilpadder Cross Rds
Pendy's Cross Rds
Quartertown Upper
Clydaville
Gortnagralga
Knockaroura
Knoppoge
Ballinvuskig East
Ballinvuskig West
Carrigduff
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Barrinclay
Clashmorgan
Nursetown Beg
Nursetown
Ballysimon
Ballysimmon Cross Rds
Lisnagilky
Kilcolman
Aldworth
Skarragh
Skarragh Hill
Lackendarragh
Lackendarragh Cross Rds
Kilgobnet
Drompeesh
Curraghbower
Ballyboneill
Smithfield
Knocknamona
Knockansweeny
Shansepeal
Gortmolire
Brittas
Gortroe
Gortavoher
Lombardstown
Baile Lambaird
Darling Hill
Parkatoor
Moheree
Dromaneen
Newberry
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Glannaharee West
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Knockavaddra
Stukeen
Ballyboght
Knockeenbrack
Shanavoher
Garraunredmond
Garrane
Bweeng Little
Laharan Mountain
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Athnaleenta
Hackett's Br
Jordan's Br
Ophan Stones
Greenhill Br
Clashmorgan Br
Lyre Br
Ballysimon Br
Casey's Br
Atkinson's Br
Ballynamona Br
Pound Br
Rockhill Br
Ballyhilloge Br
Milford Br
Glashaboy Br
Ahadallane Br
Ahadallane Cross Rds
Barrack Cross Rds
Parkina Cross Rds
Ballymonisheen North Cross Rds
Ballyglass Br
Grenagh Cross Rds
Halfway Cross Rds
Hurley's Cross Rds
Manning's Cross Rds
Buckley's Br
Beenalaght Br
Meenahony Br
The Tailor's Cross Rds
The Tailor's Br
Bernard Cross Rds
Sean Oge's Cross Rds
Ballysimmon Br
Tobergal Br
Glannoge Cross Rds
Kilpadder Cross Rds
Pendy's Cross Rds
Atkinson's Br
Ballynamona Br
Lyre Br
Casey's Br
Clashmorgan Br
Jordan's Br
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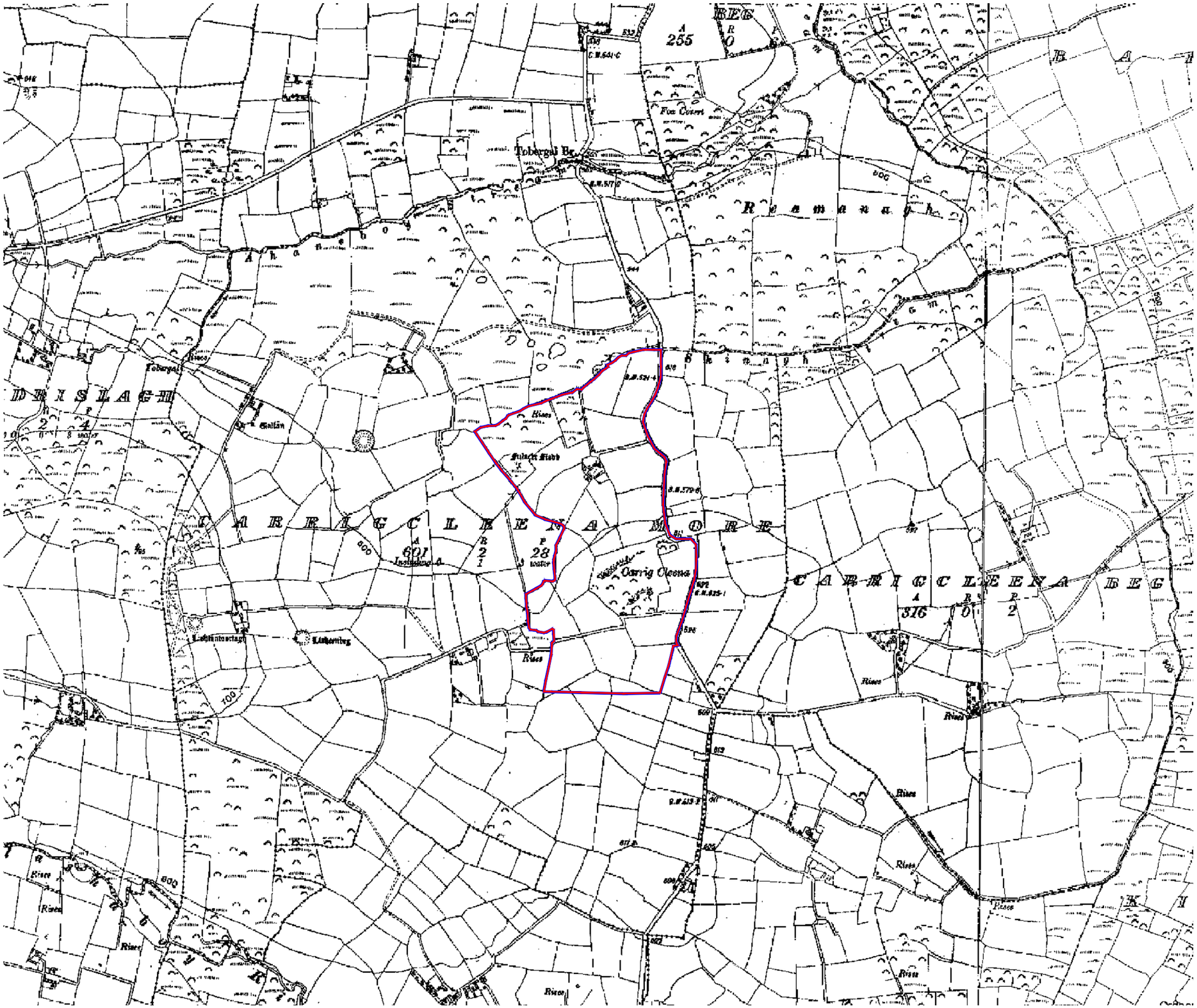
Ballyhilloge Cross Rds
Barrack Cross Rds
Ahadallane Cross Rds
Parkina Cross Rds
Grenagh Cross Rds
Halfway Cross Rds
Monee Cross Rds
Ballygrogan Cross Rds
Ballysimmon Br
Buckley's Br
Beenalaght Br
Meenahony Br
Manning's Cross Rds
Hurley's Cross Rds
The Tailor's Cross Rds
The Tailor's Br
Bernard Cross Rds
Sean Oge's Cross Rds
Laharan Cross Rds
Lackendarragh Cross Rds
Buggaeen Cross Roads
Horgan's Cross Rds
Newberry Cross Rds
Kilvealaton Hospital
Industrial Estate
Br. Ht. 3.71m
Br. Ht. 4.37m
Br. Ht. 4.41m
Clyda Br (Upper)
Fiddane Br
Knoppoge Br
Cregganes Br
Gortavoher Br
Lombardstown Br
Lackavihoonig Br
Reaghnaord
Ballysimon
Ballysimmon
Ballynamona
Ballyknockane
Ballyhilloge
Ballybanartla
Ballymonisheen
Ballyglass
Ballyboght
Ballyfillibeen



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Notes:

1. Extract from Ordnance Survey 6 Inch Series Mapping - Map No. CK041 & CK042.

Legend:

LAND INTEREST BOUNDARY (c.28.8 Hectares)

APPLICATION AREA (c.28.8 Hectares)

Rev	Amendments	Date	By	Chk	Auth

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Drawing Status & Suitability Code: **FINAL**

Client: BREEDON IRELAND

Project: CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Drawing Title: SITE LOCATION MAP

Scale	SLR Project No.
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Date	Date	Date	Date
12/24	12/24	12/24	12/24

Drawing Number: **FIGURE 1-2** Rev.: **1**

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Notes:

1. Extract from Ordnance Survey 2500 Digital Mapping - Map No. 6052, 6053, 6097 & 6098.

Legend:

- LAND INTEREST BOUNDARY (c.28.8 Hectares)
- APPLICATION AREA (c.28.8 Hectares)
- QUARRY EXTENSION (c.3.7 Hectares)
- EXISTING CONTOURS

Rev	Amendments	Date	By	Chk	Auth

SLR

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Drawing Status & Suitability Code
FINAL

Client
BREEDON IRELAND

Project
CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Drawing Title
EXISTING SITE LAYOUT

Scale		SLR Project No.
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FIGURE 1-3

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Existing Development

2.1 The existing high polished stone value (PSV) rock quarry commenced operations in c. 1978 under P. Ref. No. 1863/75. The site occupies ground with elevations ranging between c. 190 m in the south and c. 160m OD in the north, with current planning permission authorising extraction to 115m OD, with a central sump to 110m OD. Details of the existing site layout are shown on Figure 2.1.

2.2 The existing quarry operations comprise extraction of stone using conventional blasting techniques; processing (crushing, screening and washing) of the fragmented rock to produce high PSV aggregates for use in the production of value-added products, surface dressing of roads, road construction and site development works.

2.3 There is an existing readymix concrete plant located within the existing quarry (P. Ref. No. 19/5902), which commenced operation in c. 2021. Planning permission ref. 19/5902 also provided for the installation of a block yard; however, this has not been constructed to date. A retention planning permission was granted in 2006 for a tarmacadam / asphalt manufacturing plant; however, this plant was removed from the site in c. 2019. The potential for cumulative impacts from the existing readymix concrete plant and permitted block yard have been assessed in the relevant chapters of this EIAR.

2.4 Ancillary facilities at the site include mobile processing plant, portacabin offices with staff facilities, weighbridge and wheelwash, which will continue to be used.

Proposed Development

Development Overview

Operational Phase (Stone Extraction & Processing)

2.5 The proposed development being applied for under this current planning application is shown on Figure 2-2, Figure 2-3, and Figure 2-4, and will consist of:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c. 3.7 hectares;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Overburden storage;
- Operation landscaping including perimeter screening berms around the proposed extension area; and
- Restoration of the quarry to natural habitat after-uses.

All related ancillary site works within an overall application area of c. 28.8 hectares, and all for a period of 20 years and a further 2 years to complete final restoration of the site.

2.6 The overall quarry development plan is shown in Figure 2-3.

2.7 Stone extracted from the quarry will be processed within the quarry void and transported by dump trucks to the existing processing area located on the northern portion of the existing quarry development for further processing.

2.8 The extraction scheme for the quarry and its continued operation provides for maintaining the access to, and fenced boundary around Carraig Cleena, in accordance with Condition 67 attached to P. Ref. QR073 (as amended by ABP Ref. 04.QC.2156)

Restoration (Reinstatement to Nature Conservation Habitats)

2.9 Upon the cessation of extraction operations, it is proposed to return the worked lands to natural habitat after-uses – refer to Figure 2.5.

2.10 Where feasible, restoration of exhausted and redundant areas will be carried out at the earliest opportunity. However, it is envisaged that the majority of restoration works will be carried out after extraction operations at the site have ceased. Provision is made for a 2-year final restoration period.

Aggregate Reserve Assessment

2.11 The total recoverable reserve of rock from within the proposed quarry development / extension is estimated to be c. 5 million tonnes.

The proposed extraction plan for the extension area is shown in Figure 2-2. The overall quarry development is shown in Figure 2-3. Cross-sections through the final quarry landform are shown in Figure 2-4.

Material	Quantity
Topsoil / Overburden	c. 270,000 m³ (est.)
Rock	c. 5 Million Tonnes

Duration of Extraction

2.12 The duration of quarrying activities at the application site will largely be dictated by the rate at which the rock is extracted from the site. There are many factors which will influence this, including, but not limited to the:

- Prevailing economic climate and related construction industry demand;
- Distance of construction projects from the facility (and scale of activity).

2.13 In light of these and other variables, calculation of output rates and duration is not an exact science. It is anticipated that the annual extraction rate will continue to be in the order of 250,000 to 275,000 tonnes per year.

2.14 A planning permission duration of 20 years is sought for the quarry development and a further 2 years to complete final restoration of the site. This duration is in line with the 25-year

duration under Condition 5 attached to P.Ref. QR073 (as amended by ABP Ref. 04.QC.2156).

Site Screening

2.15 Perimeter screening berms along the eastern, southern and western boundaries of the extension extraction area will be constructed using the stripped topsoil and overburden soils. In addition, operational landscaping will be provided in the form of hedgerow / tree planting in the area between the outside face of the screening berms ad the realigned local road – refer to EIAR chapter 13 Landscape and Figure 2-5 Landscaping & Restoration Plan. Details of trees to be removed during the development of the extension area are provided on Figure 2-6.

Removal of Topsoil & Overburden Soils

2.16 Topsoil and overburden stripped to obtain access to the hard rock resource will be either utilised directly for construction of the perimeter screening berms and landscaping works, used in the restoration of worked out parts of the existing quarry as part the restoration scheme; or stored an overburden storage area until it can be used in the final restoration.

2.17 Depending on the stage of the development, topsoil and overburden will be placed according to one of the following options:

- Perimeter screening berms. Topsoil and overburden will be stockpiled separately.
- Within worked out areas of the existing quarry as part of the restoration scheme.

2.18 There is no requirement remove topsoil or overburden off site.

2.19 All berms will have slope angles not greater than 1:1.5 and will be re-vegetated as quickly as possible to avoid soil erosion by air and water. These issues are discussed in greater detail in the relevant EIAR Chapters (Biodiversity / Land, Soils and Geology / Landscape).

Site Drainage

2.20 A hydrological / hydrogeological assessment has been carried out taking into consideration the existing water regime at the site. It addresses mitigation measures to eliminate and/or minimise the potential impacts, if any, on surface water and groundwater – refer to EIAR Chapter 7 -Water.

Stability of the Quarry

2.21 Industry standard slope angles, bench heights, and bench widths will be used for extraction operations at the site.

Method of Extraction

2.22 Industry standard blasting techniques are, and will continue to be, used within the quarry area to fragment the stone prior to processing (crushing / screening / washing / etc.).

Processing Methods

2.23 The processing of the extracted rock, into aggregate products, will consist of crushing and screening using mobile processing plant within the quarry void and within the existing processing area to the north of the quarry void.

Quarry Working Hours

2.24 In accordance with the current permitted quarry working hours (Quarry Ref. QR073 – Condition 8, as amended by ABP Ref. 04.QC.2156) the proposed development will be operated between the hours of 07.00 to 18.00 hrs Monday to Friday; and from 07.00 to 14.00 hrs Saturday, unless in exceptional circumstances otherwise agreed with the planning authority. The quarry will not operate on Sundays or Bank Holidays.

Employment

2.25 The proposed development will provide continued employment of up to 5 people directly on-site, and a number of indirect employees such as crushing contractors, HGV drivers, and maintenance contractors.

SITE INFRASTRUCTURE

Site Access

2.26 The proposed development will use the permitted access to the existing quarry. This access is located on the local road L1214 along the eastern site boundary. Passing bays have been constructed along the local road to ensure satisfactory two-way flow of heavy goods vehicles (HGV's) – refer to EIAR Chapter 14 - Traffic.

2.27 In accordance with Condition 16 attached to P. Ref. QR073 the access is designed to ensure no surface water or silt is discharged onto the public road.

Local Road Realignment

2.28 Two local roads adjoin the existing quarry at its southern and eastern boundaries. There is a requirement to realign the local road to the south of the existing quarry to facilitate the quarry extension into an area of proven high quality stone reserves, refer to Figure 2-2 and EIAR Chapter 14 – Traffic. Once constructed it is envisaged that this section of realigned road will

be taken in charge by Cork County Council. There will be a requirement to apply for an "Extinguishment of a Public Right of Way" under Section 73 of the Roads Act, 1993, for the section of local road that will be closed and removed as part of the quarry extension development.

Site Security

2.29 Vehicular access to the quarry will continue to be from the existing entrance located on the eastern boundary of the site. There is no other vehicular access to the proposed development. The access gate is locked outside operational hours.

2.30 At the present time, the property boundary is secured by ditches, post and wire fencing and/or hedgerow.

Parking

2.31 All HGVs utilising the quarry will be confined within the Applicant's landholding. There is adequate provision for HGV parking to ensure that there is no queueing of HGV's on the public road outside the quarry, in accordance with the requirement of Condition 19 attached to P. Ref. QR073.

2.32 Adequate car parking provision for employees and visitors is provided at the existing weighbridge office.

Wheelwash

2.33 In order to prevent transport of clay and dust onto the public road network, a wheelwash has been installed along the access road to the site in accordance with the requirements of Condition 25 attached to P. Ref. QR073. All HGV traffic exiting the quarry are required to pass through the existing wheelwash, the location of which is indicated on Figure 2-1. This existing wheelwash will continue in use for the proposed development.

2.34 In accordance with Condition 17 attached to P. Ref. QR073 the section of internal road between the wheelwash and the site entrance is hard-surfaced.

Weighbridge

2.35 In order to track and record the amount of material exiting the quarry, all HGV traffic is directed across the existing weighbridge, the location of which are also indicated on Figure 2-1.

Offices and Ancillary Facilities

2.36 Ancillary facilities at the site include the wheelwash, weighbridge & weighbridge office, portacabin with staff facilities and water management system.

Quarry Ancillary Facilities and Activities

2.37 Existing permitted value-added manufacturing facilities at the quarry include concrete manufacturing (readymix and blocks) and asphalt manufacturing (now removed from site), all of which are located within the ancillary area to the north of the application area.

Utilities and Services

2.38 Electrical power is currently provided to the application site via mains supply. Electricity will provide the principal source of energy for office lighting and heating.

2.39 Site based staff at the application site are contactable by mobile phone, landline and email and broadband connections to the site office are provided via a mobile network.

2.40 There is an existing effluent treatment system on site, and this will continue to be used.

2.41 Drinking water is supplied via bottled water. The on-site well supplies water for the toilets, etc.

2.42 Given the lack of combustible waste materials at this site, it is considered highly unlikely that a fire will break out during quarry operations. A range of fire extinguishers (water, foam and CO_2) are kept at the site office to deal with any localised small-scale fires which might occur. Additional fire-fighting capacity can be provided by storing water in a mobile bowser.

Lighting

2.43 Sufficient lighting is provided at the existing quarry site and will be provided within the extension area to ensure safe operations during winter periods.

Fuel and Oil Storage

2.44 The existing fuel and chemical storage facilities will continue in use within the existing quarry. There will be no storage of fuel / chemicals within the proposed extension area.

2.45 There are no bulk fuels stored within the existing quarry, with fuels required to power mobile plant supplied by local fuel suppliers on an as need basis. The only fuels / chemicals within the existing quarry that will have the potential to cause water pollution are lubricating oils, hydraulic oils, etc. All of these chemicals are / will continue to be stored in the following manner:

- suitably certified tanks within areas bunded to a capacity of 110% of the tank, in compliance with P. Ref. QR073 Condition 33 (as amended by ABP Ref. 04.QC.2156);
- where two tanks are bunded, bund capacity will be 120% of the largest tank;

- no pipe work will go through the bund at any point to reduce the risk of leakage;

Landscape and Boundary Treatment

2.46 The boundary of the proposed extension area will be secured by stock-proof post & wire fencing. Perimeter screening berms will be constructed along the eastern, southern and western boundaries. Operational landscaping in the form of hedgerows and trees will be implemented in the area between the outer face of the screening berms and the boundary fencing, refer to Figure 2-5.

Waste Management

Extractive Waste Management

2.47 Almost all products and by-products arising from the aggregate processing have commercial value. Any waste materials from the site are stored, collected, recycled and/or disposed of in accordance with Conditions 45, 46 and 49 attached to P. Ref. QR073 and any requirements of Cork County Council.

General Waste Management

2.48 Potential waste produced and the measures used to control it are described as follows:

- Scrap metal – these materials are chiefly produced from the maintenance of the processing plants and can cause a nuisance if allowed to build up in an uncontrolled manner. A designated scrap metal area is demarcated on site and the build-up of scrap is controlled by the regular removal by licensed scrap metal dealers.
- Used Oil and Oil Filters – any waste oil/oil filters that may arise from servicing of fixed or mobile plant is removed from the site by a licensed waste contractor.
- Used Batteries – similarly all used batteries are removed from site for collection and recycling by a licensed waste contractor in accordance with the Waste Management Regulations.
- Domestic Style Waste (Canteen Waste) – domestic waste generated at the offices and employee's facility is collected by a licensed waste collection contractor.

ENVIRONMENTAL CONTROLS

General

2.49 Extraction, processing and ultimately restoration activities at the application site require a number of environmental controls to eliminate or minimise the potential nuisance to the public arising from the extraction and processing operations. The environmental control measures in place at the quarry are outlined in the relevant EIAR Chapters.

2.50 The existing quarry operations at the site are currently regulated by conditions attaching to P. Ref. QR073 (as amended by ABP Ref. 04.QC.2156).

2.51 Any additional control measures, over and above those already in place and/or outlined below, which may be instructed on foot of this planning application, will also be implemented.

Bird Control

2.52 As the process of sandstone extraction is free of putrescible (food / kitchen) waste, site activities are unlikely to attract scavenging birds such as gulls and crows for the duration of works. Accordingly, it is not intended to implement any specific bird control measures at the site as is the case at present.

Traffic Control

2.53 As the planning application relates to the lateral extension and continued use of the existing quarry operation, the proposed development will continue to utilise the existing site entrance and established haul routes. The proposed development will not result in any increase in the annual extraction rate and will not result in any increase in traffic generated by the existing quarry.

Litter Control

2.54 As the proposed development will be largely free of litter, the daily operational activities are unlikely to give rise to problems with windblown litter. Accordingly, there is no requirement to implement any specific litter control measures at the site.

2.55 In the unlikely event that any litter waste is identified, it will be immediately removed off-site to an authorised waste disposal or recovery site.

Odour Control

2.56 As the sandstone extraction activities at the site are not biodegradable and do not therefore emit odorous gases, site activities do not give rise to odour nuisance. No odour control has been required for the existing quarry or will be required for the proposed development.

Vermin Control

2.57 As the proposed development is free of putrescible (food / kitchen) waste, on-site activities will not attract vermin for the duration of the extraction or subsequent restoration operations. Accordingly, no specific vermin control measures are required.

Fire Control

2.58 In the unlikely event that a fire does occur, the local fire station will be contacted and emergency response procedures will be implemented. Fire extinguishers (water and foam) are provided at all offices to deal with any small outbreaks which may occur.

2.59 A range of fire extinguishers (water, foam and CO_2) are kept at the site office to deal with any localised small-scale fires which might occur. Additional fire-fighting capacity can be provided by storing water in a mobile bowser.

Surface Water & Groundwater Management

2.60 There is an existing water discharge licence (ref. no. WP(W)03/19) in place for the site.

2.61 Surface water run-off and any groundwater inflow into the quarry will continue to the managed within the existing water management system.

2.62 Modifications to the existing surface water management system will be undertaken to increase the capacity of the system to treat waters arising from the development. These improvements are shown in Chapter 7 of the EIAR.

Dust Generation and Control

2.63 In dry, windy weather conditions, site activities may give rise to dust blows across and beyond the existing or planned development site areas.

2.64 The incidence of fugitive dust outside of the operation is reduced by some of the mobile crushing and screening plant being located within the quarry void. Generation of fugitive dust is generally limited to periods of very low rainfall (refer to Chapter 8 – Air Quality). Dust generation occurs from three main sources:

- Point sources – such as operating plant and machinery.
- Line sources – such as roads and conveyors.
- Dispersed Sources– such as quarry floors and stockpiles.

2.65 In order to control dust emissions, the following measures will continue to be implemented in accordance with Conditions 22, 26, 27, 29 and 31 attached to P. Ref. QR073 (as amended by ABP Ref. 04.QC.2156):-

- Water will continue to be sprayed from a tractor drawn bowser on dry exposed surfaces and stockpiles (paved roads, unsealed haul roads and hardstand areas);
- Provision of a fixed sprinkler system along the internal road from the site access to the office;
- HGV's hauling dusty materials to and from the site are covered;
- Conveyor belts carrying dusty materials are enclosed;
- Areas of bare or exposed soils will, insofar as practicable, be kept to a minimum;
- HGV's existing the quarry will pass through the wheelwash;

- The amount of dust or fines carried onto the public road network will be reduced by periodic sweeping of internal paved site roads and surrounding public roads as required;
- Emission of fugitive dust from machinery such as processing plant will be minimised by utilising dust suppression and by locating such plant within the quarry area, where possible.

2.66 These dust mitigation and management measures are in accordance with the DoEHLG (2004) and EPA (2006) guidelines for the sector.

Noise Generation and Control

2.67 The sources of noise located within the planning application area are primarily related to machinery / plant operation.

2.68 The potential for noise generation from the planning application area is reduced by locating some of the mobile crushing and screening plant within the quarry void. This means that the potential for noise generation from activities associated with the operation of the plant such as movement of vehicles and maintenance has been reduced – refer to EIAR Chapter 10 Noise & Vibration.

2.69 In addition to the above the following good house-keeping measures are put in place in order to reduce noise emitted from plant and machinery as much as possible:

- All machinery used will be CE certified for compliance with EU noise control limits;
- The machinery will be regularly maintained. This includes regularly checking any muffler systems and servicing or replacing as required. It also ensures any loose or damaged panels or covers that suppress noise is fixed or replaced immediately;
- If there are further noise-reducing modifications available for any machinery, they will be fitted wherever practical (e.g. rubber-decked screens, rubber chute linings etc.)
- Haul road grades are kept as low as possible (</= 1:10) to reduce engine / brake noise from heavy vehicles.

2.70 These noise mitigation and management measures are provided in accordance with the DoEHLG (2004) and EPA (2006) guidelines for the sector.

2.71 There is an existing noise monitoring programme at the quarry in accordance with Condition 53 attached to P. Ref. QR073 (as amended by ABP Ref. 04.QC.2156), and this will be extended to cover the proposed quarry extension area, refer to EIAR Chapter 10 Noise & Vibration.

Blasting Control

2.72 Blasting operations at the existing quarry are carried out and controlled under the Safety, Health & Welfare at Work (Quarry) Regulations 2008 – 2019.

2.73 The following measures shall be implemented at the application site to minimise disturbances due to any future blasting operations.

- Blasting will be restricted to between 11.00 hours and 15.00 hours Monday to Friday to ensure that it does not clash with milking times for local dairy herds (except in emergencies or for health and safety reasons beyond the control of the operator);
- Blasting will not be carried out on Saturdays, Sundays, or public holidays;
- The frequency of blasting will not be more than two blasts per month;
- Notification of each blast shall continue to be given in writing 3 days in advance of each blast to all residences within a 1km radius of the quarry;
- Blast notifications shall be provided by pre-blast siren warnings;
- All blasting operations shall be carried out by a certified 'shotfirer' in accordance with the relevant health and safety regulations;
- The optimum blast ratio shall be maintained, and the maximum instantaneous charge shall be optimised;
- The blast design and blasting methodology uses the monitoring results to optimise and ensure consistent blast designs;

In addition, each blast design is optimised to minimise air overpressure through proper blast design, spacing and timing of multiple charges.

ENVIRONMENTAL MANAGEMENT SYSTEM

2.74 The existing quarry has an established environmental management system (EMS) in accordance with Condition 59 attached to P. Ref. QR073. This EMS is accredited under ISO 140001 and a copy of the accreditation certificate is provided in Appendix 2-A.

2.75 On receipt of planning permission, the EMS will be reviewed and updated to incorporate the requirements set out in this EIAR and any further relevant conditions attached to the permission.

ENVIRONMENTAL MONITORING

Dust Monitoring

2.76 There is an ongoing dust deposition monitoring programme in place at the quarry in accordance with Condition 23 attached to P. Ref. QR073, and this will be continued for the proposed development, refer to EIAR Chapter 8 – Air Quality.

Noise Monitoring

2.77 There is an existing noise monitoring programme at the quarry in accordance with Condition 53 attached to P. Ref. QR073 (as amended by ABP Ref. 04.QC.2156), and this will be continued for the proposed development, refer to EIAR Chapter 10 Noise & Vibration.

Water Monitoring

2.78 The existing surface water monitoring programme implemented for the discharge licence will be continued.

2.79 There is an existing groundwater monitoring programme in place at the quarry in accordance with Condition 43 attached to P. Ref. QR073, and this will be continued for the proposed development, refer to EIAR Chapter 7 Water.

Blast Monitoring

2.80 There is an existing blast monitoring programme at the quarry in accordance with Condition 58 attached to P. Ref. QR073 (as amended by ABP Ref. 04.QC.2156), and this will be continued for the proposed development, refer to EIAR Chapter 10 Noise & Vibration.

PROPOSED FINAL RESTORATION

Proposed Restoration Scheme

2.81 The restoration scheme for the planning application area is shown on the restoration plan Figure 2-5.

2.82 The application area will be restored to a natural habitat, which is one of the beneficial after uses listed in the EPA Guidelines: 'Environmental Management in the Extractive Industry' (2006). This will be achieved by the following measures:

- The application area will be left for natural recolonisation by locally occurring grass and shrub/scrub species and the void will fill with water. A number of native woodland planting blocks are proposed to accelerate the vegetation cover of the site.
- All existing boundary fences and hedgerows will be retained to ensure that the site is secure.
- All plant and machinery will be removed from the quarry void.

2.83 The restoration works will be carried out in accordance with the EPA Guidelines (2006).

Site Management and Supervision

2.84 The Applicant will clearly define the management responsibility for the site restoration work and will ensure that this person has the necessary information (from the planning application) and authority to manage the whole restoration process. Relevant staff will be briefed on the scheme and will be adequately supervised / controlled. A system of record keeping for the key restoration activities will be put in place.

Long Term Safety and Security

2.85 Existing hedges surrounding the development will be gapped up and thickened where required. These, combined with fencing and the secure and locked entrance gates to the development will prevent unauthorised third party access.

Long Term Surface Water and Groundwater

2.86 On completion of extraction operations. With ongoing surface water run-off and rebound of groundwater levels a water body will be formed on site, within the former quarry void. This process will take many years and water could potentially reach the point where it will overrun the side of the void at its lowest point near the quarry access point. It is therefore proposed to construct an overflow channel to guide the overflow water towards the stream to the north of the site, as part of the restoration works – refer to Figure 2.5.

Decommissioning of Plant and Machinery

2.87 Redundant structures, plant equipment and stockpiles will be removed from site on permanent cessation of extraction activity. Machinery and buildings will either be utilised on other sites or be sold as working machinery or scrap.

2.88 As part of the overall decommissioning process, all fuel, oil storage and effluent treatment tanks within the existing site will be removed from the site by a licensed waste contractor. Therefore, there will be no potential for fuel, oil or sewage to cause long-term water pollution following completion of extraction activities.

Aftercare and Monitoring

2.89 No aftercare or monitoring is required for the restoration proposals for the application area.

FIGURES

Figure 2-1 EXISTING SITE LAYOUT

Figure 2-2 PROPOSED QUARRY EXTENSION LAYOUT

Figure 2-3 OVERALL QUARRY DEVELOPMENT PLAN

Figure 2-4 CROSS-SECTIONS

Figure 2-5 LANDSCAPING & RESTORATION PLAN

Figure 2-6 TREES TO BE REMOVED

Notes:

1. SURVEY PROVIDED TO SLR CONSULTING BY LAGAN MATERIALS LTD.

Legend:

- LAND INTEREST BOUNDARY (c.28.8 Hectares)
- APPLICATION AREA (c.28.8 Hectares)
- EXTENSION LANDS (c.3.7 Hectares)
- CROSS SECTION LOCATIONS
- EXISTING CONTOURS

Rev	Amendments	Date	By	Chk	Auth

SLR

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Drawing Status & Suitability Code
FINAL

Client
BREEDON IRELAND

Project
CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Drawing Title
PROPOSED QUARRY EXTENSION - EXISTING SITE LAYOUT

Scale	SLR Project No.
1:5,000 @ A3	501.V00584.00023

Designed	Drawn	Checked	Authorised
EW	EW	TP	TP
Date	Date	Date	Date
12/24	12/24	12/24	12/24

Drawing Number
FIGURE 2-1

Rev.
1

13/12/2024

\\slr.local\eu\Offices\IEDublin\SLR DATA\SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application\EIAR\Volume-2 EIAR Report Figs Appends\02 Project Description\Dwgs\CADWking\Nov. 2024\FIG. 2-1 Existing Site Layout.dwg

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Notes:

1. Extract from Ordnance Survey 2500 Digital Mapping - Map No. 6052, 6053, 6097 & 6098.

Legend:

- LAND INTEREST BOUNDARY (c.28.8 Hectares)
- APPLICATION AREA (c.28.8 Hectares)
- QUARRY EXTENSION (c.3.7 Hectares)
- CROSS SECTION LOCATIONS
- EXISTING CONTOURS

Rev	Amendments	Date	By	Chk	Auth

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Drawing Status & Suitability Code: **FINAL**

Client: BREEDON IRELAND

Project: CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Drawing Title: PROPOSED QUARRY EXTENSION AREA

Scale	SLR Project No.
1:5,000 @ A3	501.V00584.00023

Designed	Drawn	Checked	Authorised
ML	ML	TP	TP
Date	Date	Date	Date
12/24	12/24	12/24	12/24

Drawing Number: **FIGURE 2-2** Rev. **1**

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\\dir.local\eu\Offices\IE\Dublin\SLR DATA\SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application\EIAR\Volume 2 EIAR Report Figs Appends\02 Project Description\Dwgs\CADWkings\Nov. 2024\FIG_2-2 Proposed Quarry Extension Area.dwg 13/12/2024

Notes:

1. Extract from Ordnance Survey 2500 Digital Mapping - Map No. 6052, 6053, 6097 & 6098.

Legend:

- LAND INTEREST BOUNDARY (c.28.8 Hectares)
- APPLICATION AREA (c.28.8 Hectares)
- QUARRY EXTENSION (c.3.7 Hectares)
- CROSS SECTION LOCATIONS
- EXISTING CONTOURS

Rev	Amendments	Date	By	Chk	Auth

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Drawing Status & Suitability Code: **FINAL**

Client: BREEDON IRELAND

Project: CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Drawing Title: OVERALL QUARRY DEVELOPMENT PLAN

Scale	SLR Project No.
1:5,000 @ A3	501.V00584.00023

Designed	Drawn	Checked	Authorised
ML	ML	TP	TP
Date	Date	Date	Date
12/24	12/24	12/24	12/24

Drawing Number: **FIGURE 2-3** Rev. **1**

13/12/2024

\\slr.local\ie\Offices\IE\Dublin\SLR DATA\SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application\EIAR\Volume-2 EIAR Report Figs Appends\02 Project Description\Dwgs\CAD\Wking\Nov. 2024\FIG 2-3 Overall Quarry Dev' Plan.dwg

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Notes:

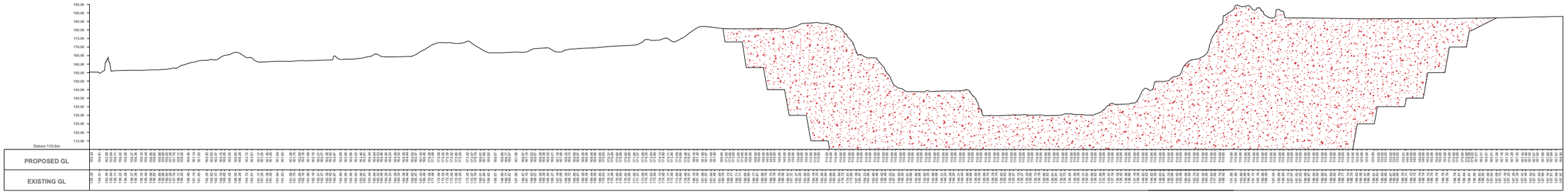
1. REFER TO FIGURE 2-1 AND FIGURE 2-2 FOR LOCATION OF CROSS SECTIONS.

Legend:

EXTRACTION AREA

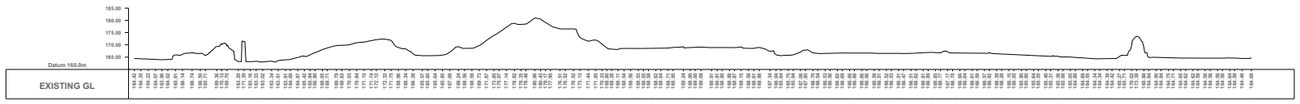
PLANNING APPLICATION BOUNDARY

QUARRY EXTENSION



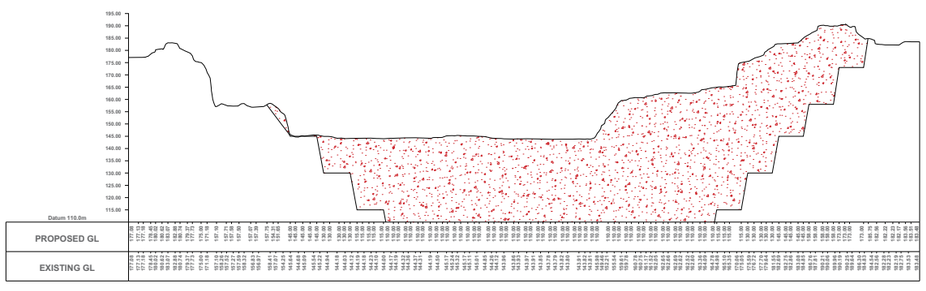
SECTION A-A'

PLANNING APPLICATION BOUNDARY



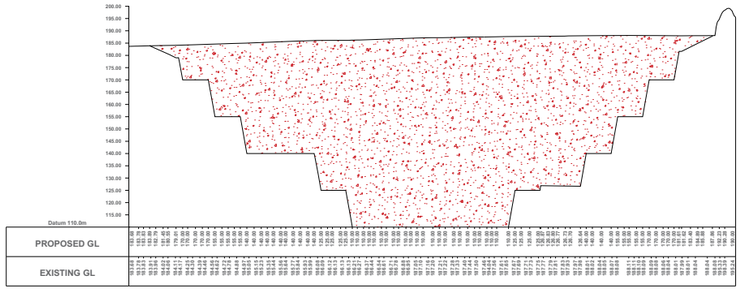
SECTION B-B'

PLANNING APPLICATION BOUNDARY



SECTION C-C'

QUARRY EXTENSION



SECTION D-D'

0 50 100 150 200 250m

Scale 1:2,500

Rev	Amendments	Date	By	Chk	Auth

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Drawing Status & Suitability Code

Client
BREEDON IRELAND

Project
CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Drawing Title
CROSS SECTIONS

Scale	SLR Project No.
1:2,500 @ A3	501.V00584.00023

Designed	Drawn	Checked	Authorised
EW	EW	TP	TP
Date 12/24	Date 12/24	Date 12/24	Date 12/24

Drawing Number **FIGURE 2-4** Rev. **1**

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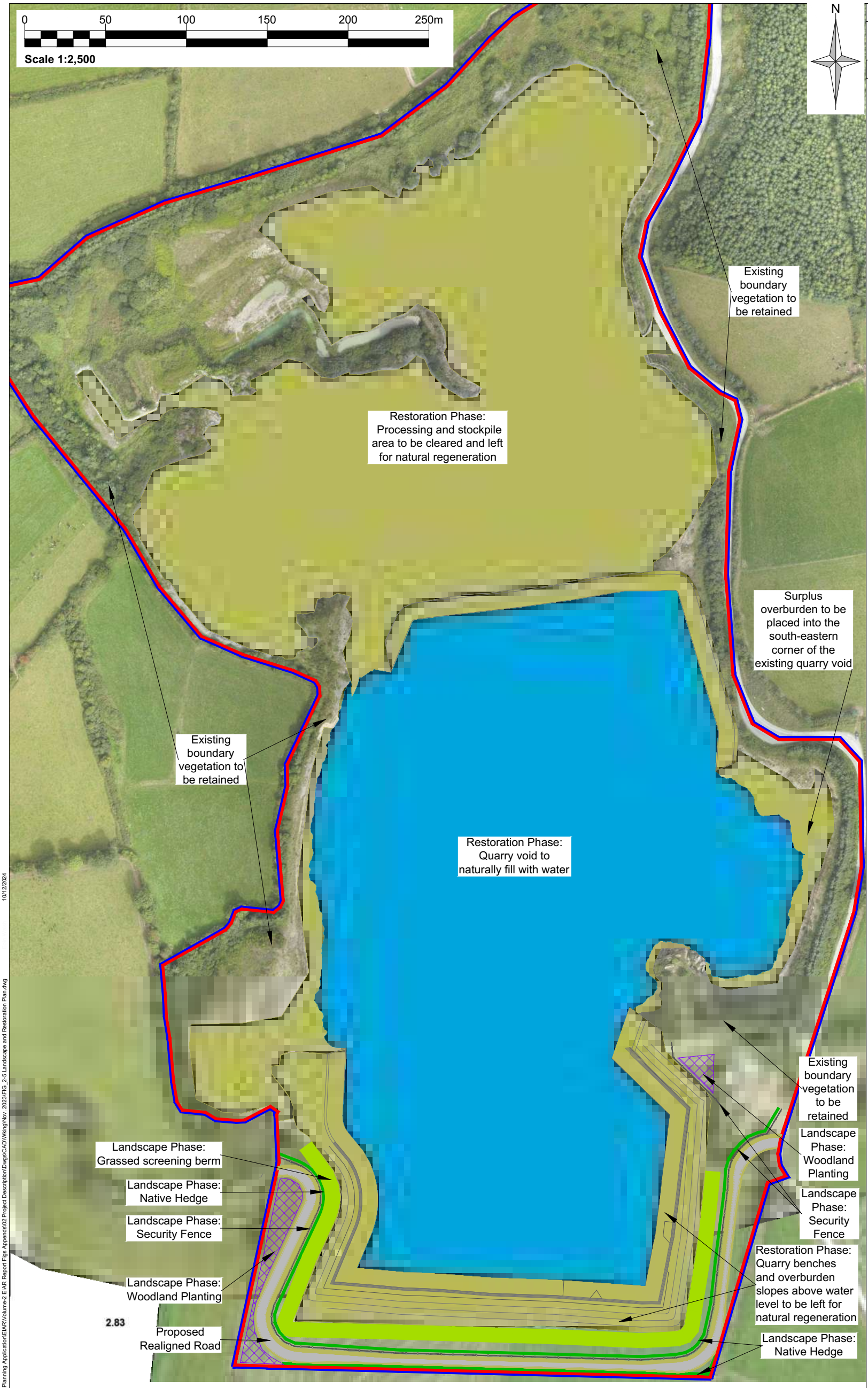
13/12/2024

\\slr.local\eu\Offices\IE\Dublin\SLR DATA\SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application\EIAR\Volume-2 EIAR Report Figs Appends\02 Project Description\Dwgs\CAD\Working\Nov. 2024\FIG_2-4 Cross Sections.dwg



Notes:

1. SURVEY PROVIDED TO SLR CONSULTING BY LAGAN MATERIALS LTD.

Legend:

- LAND INTEREST BOUNDARY (c.28.5 Hectares)
- APPLICATION AREA (c.28.5 Hectares)
- PROPOSED RE-ALIGNED ROAD

LANDSCAPE PROPOSALS
(TO BE CARRIED OUT ON COMMENCEMENT OF THE DEVELOPMENT)

- SCREENING BERMS, TO BE GRASS SEEDED, AS SOON AS CONSTRUCTION IS COMPLETE
- SECURITY FENCE TO SECURE THE EXTENSION AREA
- NATIVE WOODLAND PLANTING
- NATIVE HEDGE PLANTING

RESTORATION PROPOSALS

- QUARRY VOID TO NATURALLY FILL WITH WATER
- PROCESSING / STOCKPILING AREA AND QUARRY BENCHES TO BE LEFT FOR NATURAL REGENERATION

LANDSCAPE & RESTORATION SCHEME

This landscape and restoration scheme is for the existing Bweeng Quarry and proposed lateral extension of same. It aims at minimising the visibility of the extraction works during the operational period, as well as restoring the existing quarry and the extension site to a natural habitat afteruse, on complection of all works. This is in line with the benficial afteruseslisted in the 2006 EPA Guidelines - Environmental Management in the Extractive Industry (Non-Scheduled Minerals).

LANDSCAPE PROPOSALS / PHASE

To be carried out on commencement of the proposed development, consisting of the following elements:

- Retention of all existing treelines, hedgerows and scrub areas along and within the land interest boundary of the applicant, with the exception of those trees / hedgerows located within the proposed extraction extension area.
- Construction of screening berms along the western, southern and eastern boundary of the proposed extension areas, using topsoil and overburden stripped from the extension area. These berms will provide screening and prevent access into the site, from the realigned public road. A fence to the front of the screening berm will provide additional security.
- A combination of native hedge and woodland planting along the western, southern and eastern boundaries of the extension area and to the front of the proposed screening berms (depending on the space available), to provide screening in views from the realigned road, as well as from locations to the south of the site. This planting will also mitigate the loss of existing treelines, hedgerows and scrub areas and create habitat linkage.

RESTORATION PROPOSALS / PHASE

To be carried out on completion of all proposed extraction works, consisting of the following elements:

- The quarry void will be cleared of any machinery and stockpiles and will be left to naturally fill with water. The rebound water level is expected to be around 170m AOD.
- Removal of all plant, structures and stockpiles from the processing and stockpiling area, levelling of the ground and deep-ripping, as required.
- The processing and stockpiling area and all quarry benches above the future water level will then be left to natural recolonisation by locally occuring grass and scrub species, as is already the case in parts of the quarry that have not been disturbed in a number of years.

GENERAL NOTES

Earthworks: All topsoil will be stripped first and will be stored in temporary stockpiles less than 2m in height. The overburden will be stripped next and used for the construction of the screening berms, with surplus overburden placed into the south-eastern corner of the existing quarry, which will not be worked further. The stockpiles topsoil will then be used to cover the screening berms in preparation for grass seeding.

Grass Seeding: All grass sowing will take place, whilst suitable weather conditions prevail. The surface preparation and the sowing specifications will be as per the seed manufacturer's instructions.

Tree stock: Both proposed mixes contain locally occurring native species. All of the trees/shrubs are proposed to be supplied as transplants at 40-120cm height, as this type of stock is known to establish more successfully compared to larger stock.

Planting works: All plant handling, planting and establishment works will be carried out in accordance with current best practice and will take place in the appropriate planting season (e.g. bareroot planting: November to March only) and in favourable weather conditions.

Aftercare: Establishment maintenance will be carried out for 2 years following the planting works (minimum 3 maintenance visits per year; i.e. spring, summer and autumn). This will include weed control, replacement planting where required and the adjustment/removal of spiral guards.

All planting and maintenance works will be carried out by a suitably qualified landscape contractor.

NATIVE WOODLAND MIX

To be planted at 1.5m centres (i.e. 1 plant/2.25m²; approx. 1,350m^2 in total = 600 plants). Transplants to be planted randomly with no more than 4-6 plants of the same species in one group and to be supplied with spiral guards.

No.	Plant Name	Common Name	Height (cm)	Age	%
Transplants/Container Grown Shrubs					
60	*Corylus avellana*	Common hazel	60-90	1+0	10
60	*Crataegus monogyna*	Hawthorn	60-90	1+1	10
60	*Ilex aquifolium*	Holly	60-80	2L	10
60	*Prunus spinosa*	Blackthorn	60-90	1+0	10
60	*Quercus petraea*	Sessile Oak	60-90	1+1	10
60	*Rosa canina*	Dog rose	40-60	1+1	10
60	*Salix cinerea*	Grey willow	60-120	0+1	10
60	*Sambucus nigra*	Elder	60-90	1+1	10
60	*Sorbus aucuparia*	Rowan	60-90	1+1	10
60	*Viburnum opulus*	Guelder Rose	60-90	1+1	10

NATIVE HEDGE MIX

To be planted in two staggered rows, with plants at 50cm centres and rows 30cm apart (i.e. 2 plants/m; approx. 850m in total = 1,700 plants). Transplants to be planted randomly with no more than 5 plants of the same species in one group and to be supplied with spiral guards.

No.	Plant Name	Common Name	Height (cm)	Age	%
Transplants/Container Grown Shrubs					
340	*Crataegus monogyna*	Hawthorn	60-90	1+1	20
170	*Ilex aquifolium*	Holly	60-80	2L	10
340	*Prunus spinosa*	Blackthorn	60-90	1+0	20
340	*Rosa canina*	Dog rose	40-60	1+1	20
170	*Sambucus nigra*	Elder	60-90	1+1	10
170	*Sorbus aucuparia*	Rowan	60-90	1+1	10
170	*Viburnum opulus*	Guelder Rose	60-90	1+1	10

Rev	Amendments	Date	By	Chk	Auth

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www.slrconsulting.com

Client
BREEDON IRELAND

Project
CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Figure Title
LANDSCAPE AND RESTORATION PLAN

Scale	SLR Project No.
1:2,500 @ A3	501.V00584.00023

Designed	Drawn	Checked	Authorised
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Date 12/24	Date 12/24	Date 12/24	Date 12/24

Figure Number
FIGURE 2-5

Rev.

10/12/2024

\\slr.local\ie\Offices\IE\Dublin\SLR DATA\SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application\EIAR\Volume-2 EIAR Report Figs Appends\02 Project Description\Dwgs\CAD\Wking\Nov. 2023\FIG_2-5-Landscape and Restoration Plan.dwg

CYAL50316488

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Tree removal
Ca. 340m of rows of spruce (*Picea sp.*), planted for screening within the last 5-20 years.
Planted densely at ca. 50cm centres. Therefore, a total of ca. 680 spruce would be removed.

Tree retention
All existing treelines / hedgerows along the site boundaries, which are not affected by the road realignment or proposed extraction area will be retained.

Tree retention
- 1 ash (*Fraxinus excelsior*)
Note: a tree protection fence enclosing an area of ca. 11x11m will be constructed, as soon as the new road is in place and prior to any overburden being removed in the vicinity of this trees

Tree removal
Ca. 3,250m² of scrub, consisting of the following species:
- blackthorn (*Prunus spinosa*)
- elder (*Sambucus nigra*)
- gorse (*Ulex europaeus*)
- hawthorn (*Crataegus monogyna*)
- willow (*Salix sp*)
Note: number of individual plants impossible to provide, due to their small size and / or density

Tree removal
5 ash (*Fraxinus excelsior*)

Tree removal
Ca. 50m of mostly non-native hedgerow, consisting of the following species:
- alder (*Alnus sp.*)
- cypress (*Cypressus sp.*)
- rowan (*Sorbus auciparia*)
- spruce (*Picea sp.*)
Note: number of individual plants impossible to provide, due to their density

Outline of the proposed extraction area

Area occupied by the proposed realigned road

Tree removal
2 sections of mostly native hedgrow, ca. 90m in total consisting of the following species:
- ash (*Fraxinus excelsior*)
- guelder-rose (*Viburnum opulus*)
- hawthorn (*Crataegus monogyna*)
- sycamore (*Acer pseudoplatanus*)
- spruce (*Picea sp.*)
Note: number of individual plants impossible to provide, due to their small size and / or density

Tree retention
All existing treelines / hedgerows along the site boundaries, which are not affected by the road realignment or proposed extraction area will be retained.

N

0 25 50 75 100 125m
Scale 1:1,250

Notes:
1. SURVEY PROVIDED TO SLR CONSULTING BY LAGAN MATERIALS LTD.

Legend:

- LAND INTEREST BOUNDARY
- APPLICATION AREA
- QUARRY EXTENSION
- PROPOSED REALIGNED ROAD

TREE PROTECTION

- INDIVIDUAL TREES TO BE RETAINED (TREE PROTECTION AREA INDICATED)

TREE REMOVAL

- INDIVIDUAL/MATURE TREES TO BE REMOVED, AS DETAILED ON THE PLAN
- HEDGEROWS / TREESLINES, TO BE REMOVED, AS DETAILED ON THE PLAN
- ROWS OF SPRUCE TO BE REMOVED, AS DETAILED ON THE PLAN

NOTE:
Should planning permission be granted, the affected trees are deemed to be exempt from requiring a felling licence in line with the Forestry Act 2014.

Please also note that the more native sections of the hedgerows and scrub areas contain many hawthorn and blackthorn plants, which are exempt from requiring a felling licence outside a forest.

Rev	Amendments	Date	By	Chk	Auth

SLR
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Drawing Status & Suitability Code: **FINAL**

Client: BREEDON IRELAND

Project: CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Drawing Title: TREES TO BE REMOVED PLAN

Scale	SLR Project No.
1:1,250 @ A3	501.V00584.00023

Designed	Drawn	Checked	Authorised
AM	AM	TP	TP
Date 12/24	Date 12/24	Date 12/24	Date 12/24

Drawing Number: **FIGURE 2-6** Rev. **1**

\\slr.local\ie\Offices\IE\Dublin\SLR DATA\SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application\EIAR\Volume-2 EIAR Report Figs Appends\02 Project Description\Dwgs\CADWorking\Nov. 2024\FIG_2-6 Tree to be removed Plan.dwg 19/12/2024

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APPENDIX 2-A EMS ISO14001 CERTIFICATION

Certificate GB05/64995.00

The management system of

Lagan Materials Limited t/a Breedon

Rosemount Business Park, Ballycoolin Road, Dublin 11, Co. Dublin, D11 K2TP Ireland

has been assessed and certified as meeting the requirements of

ISO 14001:2015

For the following activities
Importation and distribution of bitumen.
Manufacture and distribution of polymer modified bitumen.
Production and supply of aggregates and sand.
Production and supply of concrete blocks.
Production and supply of readymix concrete.
Production and supply of bituminous products.

This certificate is valid from 19 October 2023 until 07 May 2026 and remains valid subject to satisfactory surveillance audits.
Issue 23. Certified since 05 May 2005

Certified activities performed by additional sites are listed on subsequent pages.

Authorised by
Jonathan Hall
Global Head - Certification Services

SGS United Kingdom Ltd
Rossmore Business Park, Ellesmere Port, Cheshire, CH65 3EN, UK
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Lagan Materials Limited t/a Breedon

ISO 14001:2015

Issue 23
Sites
Lagan Materials Limited t/a Breedon Rosemount Business Park, Ballycoolin Road, Dublin 11, Co. Dublin, D11 K2TP Ireland
Lagan Materials Limited t/a Breedon 55 Friary Road, Cladybeg, Mohan, Co Armagh, BT60 2HE United Kingdom
Lagan Materials Limited t/a Breedon Alexandra Road, Dublin Port , Dublin 1, D01 DK64 Ireland
Lagan Materials Limited t/a Breedon Aughamore Far, Carraroe, Co. Sligo, F91 AV80 Ireland
Lagan Materials Limited t/a Breedon Aghamore Upper, Aughnacliffe, Co Longford, N39 Y519 Ireland
Lagan Materials Limited t/a Breedon Carrigcleena More, Bweeng, Mallow, Co. Cork, P51 FT51 Ireland
Lagan Materials Limited t/a Breedon Coppeen, Enniskeane, Co. Cork, P47 E093 Ireland
Lagan Materials Limited t/a Breedon Deerpark, Castlepollard, Co. Westmeath, N91 V678 Ireland
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Lagan Materials Limited t/a Breedon Harrington's Quarry, Ballysadare, Co. Sligo, F91 HP60 Ireland
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Lagan Materials Limited t/a Breedon Mortimer's Quarry, Belclare, Tuam, Co. Galway, H54 RD83 Ireland
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DO NOTHING ALTERNATIVE 1

ALTERNATIVE SOURCES OF AGGREGATES 1

ALTERNATIVE LOCATIONS 2

ALTERNATIVE DESIGNS / LAYOUTS 2

ALTERNATIVE PROCESSES 3

Introduction

3.1 In the consideration of alternatives below, the issues of alternative sources of aggregates; and alternative locations, designs / layouts and processes have been addressed.

3.2 The proposed development comprises the continued use and extension of the existing permitted quarry, and realignment of a section of local road to the south of the proposed extension area, refer to EIAR Chapter 2 for further details. The existing quarry area is located in an area favourable to extraction activities, due to, *inter alia* the:

- Established long history of extraction within the existing quarry at this location;
- Proven reserves of high polished stone value (PSV) stone of strategic importance for the long-term supply of road surfacing materials to Cork and the southern region;
- Established road access and traffic routes;
- Best practice industry standard extraction and processing methods being used;
- Low development costs due to infrastructure already being in place at the existing quarry.

Do Nothing Alternative

3.3 If the proposed development does not take place, the existing quarry would remain in operation and on permanent cessation of extraction be restored to natural habitat after-uses as per the previously permitted proposals.

Alternative Sources of Aggregates

3.4 In the medium term there are no real alternatives to the current land-based sources of construction aggregates.

3.5 The volume of C&D waste suitable for recycling into secondary aggregates is very low in comparison to the overall demand for aggregates. The demographic spread of the population results in only the large urban centres potentially being capable of generating sufficient volumes of construction and demolition (C&D) waste to justify a commercial operation producing secondary aggregates going forward.

3.6 In the longer term (>25 years), there may be some scope for extraction of minerals from marine sources.

3.7 In the absence of significant volumes of aggregates from recycled / secondary and marine sources, it is clear that land-based deposits (such as the proven reserves at Bweeng Quarry) will continue to be the main source of construction aggregates in Ireland, including Cork and the wider southern region.

Alternative Locations

3.8 The current planning application is for continued use and extension of the existing permitted quarry, and realignment of a section of local road to the south of the proposed extension area, refer to EIAR Chapter 2 for further details.

3.9 The only alternative location option available to the Applicant relates to development of a new replacement 'greenfield' quarry with high PSV stone reserves in Cork to serve the established clients and markets in this region.

3.10 At the current time, there is no suitable alternative replacement quarry location with high PSV stone reserves available to the applicant in County Cork. It is generally accepted that the overall timeframe for development of a 'greenfield' quarry site (from initial site selection, land acquisition, preparation of a planning application and accompanying EIAR, through planning process and site development to extraction of aggregates) takes between 5 and 10 years.

3.11 Notwithstanding the above, the proposed development would be beneficial in planning terms by eliminating the need for:

- Extracting additional materials from other quarries within the county, should the applicant be unable to develop a new 'greenfield' site in the event that the existing quarry ceases operation. This would result in faster depletion of aggregate resources at these other quarry locations and potentially result in future intensification of those operations;
- Development of a 'greenfield' site at some other location within the county where there is little or no previous extractive industry land use;
- Haulage of high PSV stone materials by road from other quarries within, and outside the county, with potentially significantly longer haulage distances and increased traffic levels on the wider road network.

3.12 The proposed development of the existing quarry at Bweeng will assist in facilitating extraction from an existing established and proven high PSV stone reserve, with no significant increase in environmental emissions.

3.13 This development is not like an industrial factory, for example, that can be located at many locations. It is a resource tied development. High PSV stone reserves can only be worked where they exist and where the environmental effects of working such resources can be managed to an acceptable level.

3.14 On the basis of the above, it is considered that the proposed development, subject to continued implementation of best environmental management practice and compliance with appropriate planning controls (i.e. planning conditions and recommended emission limit values for the sector) is preferable in an overall planning context, compared to the development of a new replacement 'greenfield' site at some alternative location in Cork.

Alternative Designs / Layouts

3.15 Geological assessment and drilling has confirmed the continuation of high PSV stone reserves in the proposed extension area.

3.16 Alternative designs within the proposed extension area were considered. The design was optimised to provide for realignment of the section of local road and for continued access to Carrig Cleena.

3.17 Hydrogeological assessment has confirmed that the proposed depth of extraction in the extension area to the permitted level of 110 mOD in the existing quarry will not result in any groundwater drawdown outside the existing quarry and proposed extension area.

Alternative Processes

3.18 Breedon Ireland are a company with expertise and experience in the field of quarrying, aggregates production and the manufacture of value-added products.

3.19 As the proposed development comprises the continued use and extension of an existing quarry with established stone processing facilities, alternative processes are not considered relevant in this instance.

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INTRODUCTION

4.1 This Chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, addresses the potential effects of a proposed development at Bweeng Quarry on population and human health. The existing quarry is located at Carrigcleena More, Bweeng, Co. Cork.

4.2 The proposed development being applied for under this current planning application is shown on EIAR Figure 2-2 and will consist of:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c. 3.7 hectares;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Overburden storage;
- Operation landscaping including perimeter screening berms around the proposed extension area;
- Restoration of the quarry to natural habitat after-uses;

All related ancillary site works within an overall application area of c. 28.8 hectares, and all for a period of 20 years and a further 2 years to complete final restoration of the site.

4.3 Further information on the proposed development, site activities, environmental management systems and controls at the application sites are provided in the Chapter 2 of this EIAR.

Scope of Work

4.4 The EPA guidelines in relation to the preparation of EIAR[1] note the following in respect of population and human health:

- assessment of land-use planning and demographic issues or detailed socio-economic analysis is not generally required;
- economic development or settlement patterns are only relevant if they give rise to new development and associated effects;
- human health should be considered in the context of the relevant environmental topics addressed by the EIAR;
- the effects on human health via relevant pathways (such as air and water) should be considered in the context of accepted standards for exposure, dose or risk;

[1] Environmental Protection Agency (2022). *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.*. Environmental Protection Agency, Johnstown Castle Estate, Co. Wexford.

- other health and safety issues are addressed under other EU directives.

4.5 On the basis of the guidelines, the scope of this chapter of the EIAR is limited to a consideration of population, employment, amenity and human health in the context of the topics addressed by this EIAR.

Consultations

4.6 No specific consultation was undertaken in relation to this chapter of the EIAR.

Contributors / Authors

4.7 This chapter of the EIAR was prepared by Edward Goulding – Planner, and Tim Paul – Chartered Engineer & Mineral Surveyor, both of whom have worked previously on numerous extractive industry planning applications and EIAR's.

Limitations / Difficulties Encountered

4.8 No limitations or difficulties were encountered in the preparation of this chapter of the EIAR.

REGULATORY BACKGROUND

Legislation

4.9 There is no specific legislation relevant to this chapter of the EIAR. Legislation, if any, that is relevant to each pathway (noise, air, water, etc.) is addressed elsewhere in this EIAR.

Guidelines

4.10 This chapter of the EIAR has been prepared on the basis of the Guidelines on the Information to be contained in Environmental Impact Assessment Reports by the EPA (2022).

Technical Standards

4.11 There are no technical standards relevant to this chapter of the EIAR. Technical standards, if any, that are relevant to each pathway (noise, air, water, etc.) are addressed elsewhere in this EIAR.

RECEIVING ENVIRONMENT

Study Area

4.12 The study area relates to the vicinity of the application site and to those dwellings in the vicinity of the application site.

Baseline Study Methodology

4.13 The baseline study comprises a desk-top review of online and published resources, information provided by the applicant and information contained in the other chapters of this EIAR. A review of existing residential housing and sensitive receptors in the vicinity of the application site was undertaken. Ordnance Survey maps and aerial photography were also examined.

Sources of Information

4.14 Baseline information was obtained from the following sources:

- Myplan.ie (http://myplan.ie/index.html);
- Historic Environment Viewer (http://webgis.archaeology.ie/historicenvironment/);
- Cork County Development Plan 2022-2028;
- The environmental topic chapters of this EIAR;
- OSi Maps;
- Aerial Photographs;
- Census 2022.

Site Location

4.15 The application site is located within the townland of Carrigcleena More, Bweeng Co. Cork, approximately 2.5 km northeast of Bweeng village, refer to EIAR Figure 1-1. The application site and the overall site are located within undulating rural agricultural landscape.

Site Description

4.16 The existing high polished stone value (PSV) rock quarry commenced operations in c. 1978. The existing operations comprise extraction of stone using conventional blasting techniques; processing (crushing, screening and washing) of the fragmented rock to produce high PSV aggregates for use in the production of value added products, surface dressing of roads, road construction and site development works. There is an existing readymix concrete plant located within the existing quarry, which commenced operation in c. 2021.

4.17 Two local roads bound the quarry at its southern and eastern boundaries. Access to the quarry is from local road L1214 approximately mid-way at the eastern site boundary. The Reamanagh Stream bounds the quarry to the north and flows in an easterly direction into the Lyre River a tributary of the River Blackwater.

4.18 The lands surrounding and within the application site predominantly comprise farm fields. The application site is not subject to any statutory or non-statutory nature conservation designations. Dwellings in the vicinity of application site are generally located along the local road network comprise farmsteads or isolated on-off residences, with occasional small clusters. The nearest dwellings to the application site boundary are shown in Figure 8-2.

Population

4.19 The review of population is based on the electoral divisions of Dromore, in which the application site is located. The change in population from 2016 to 2022, as per Census 2022[2] for the electoral divisions, the county, the province and the state are outlined in Table 4.1.

Table 4.1 - Population 2016 - 2022

	2016	2022	% Change
Dromore	2,706	3,061	13.1%
County Cork	542,868	584,156	7.6%
Ireland	4,757,976	5,149,139	8.0%

4.20 The census results indicate that the population has increased in the Dromore Electoral Division. During the same period the population has also grown at the county and national level.

Employment

4.21 According to the 2022 census results Dromore has a total population of 3,061. Of the 2,282 people aged 15 years or older, some 1,314 were at work, 6 were looking for their first job and 87 were unemployed. Others were students, working at home, retired, unable to work or other.

4.22 The populations of Dromore against Cork County Council is categorised by occupation as per Table 4.2.

Table 4.2 - Population of Dromore ED and Cork County Council by Occupation

	Dromore		Co. Cork	
Occupation	**No.**	**%**	**No.**	**%**
Managers, Directors and Senior Officials	100	7.1%	12,887	7.6%
Professional Occupations	219	15.6%	33,695	19.8%
Associate Professional and Technical Occupations	154	11.0%	19,075	11.2%
Administrative and Secretarial Occupations	141	10.1%	14,558	8.6%

[2] http://census.cso.ie/sapmap/

	Dromore		Co. Cork	
Skilled Trades Occupations	238	17.0%	28,627	16.8%
Caring, Leisure and Other Service Occupations	110	7.9%	12,951	7.6%
Sales and Customer Service Occupations	92	6.6%	9,675	5.7%
Process, Plant and Machine Operatives	166	11.8%	14,674	8.6%
Elementary Occupations	86	6.1%	12,595	7.4%
Not stated	95	6.8%	11,207	6.6%
Total	1,401	100.0%	169,944	100.0%

4.23 A breakdown of the occupation in which those at work are employed is provided above as per Table 4.2. This shows that:

a) a lower proportion of the population in Dromore ED is likely to be engaged *Professional Occupations* than in Cork County.

b) Dromore ED has a larger proportion of the population in *Process, Plant and Machine Operatives* than the county average.

c) There are slightly more people in Dromore ED engaged in *Administrative and Secretarial Occupations* than in Cork County.

d) Dromore has a lower percentage of *Elementary Occupations* than in Cork County.

Table 4.3 - Persons at work in Dromore ED and Cork County Council by Industry

	Dromore		Co. Cork	
Industry	**No.**	**%**	**No.**	**%**
Agriculture, forestry and fishing	84	6.4%	10,476	6.5%
Building and construction	92	7.0%	10,367	6.4%
Manufacturing industries	226	17.2%	28,798	17.9%
Commerce and trade	275	20.9%	34,664	21.5%
Transport and communications	94	7.2%	10,875	6.7%
Public administration	81	6.2%	7,854	4.9%
Professional services	324	24.7%	37,711	23.4%
Other	138	10.5%	20,429	12.7%
Total	1,314	100%	161,174	100%

4.24 A breakdown of the industry in which those at work are employed is provided above as per **Error! Reference source not found.**. This shows that:

a) A number of the population is employed in the *Agriculture, Forestry and Fishing* industry Dromore (6.4%) vs County Cork (6.5%);

b) Dromore ED has fewer people employed in the *Commerce and Trade* than the county average;

c) Dromore ED has a larger proportion working in *Public Administration* in comparison to County Cork;

d) There are higher figures of employment in the *other* industry in County Cork in comparison to and Dromore ED.

4.25 Bweeng Quarry is served by mains electricity, which feeds directly into the overall site. Potable water is supplied by bottled water. Water for welfare facilities is provided from an onsite well.

4.26 Effluent from the existing toilet facilities is treated using on-site treatment system.

4.27 There are no built services or utilities located within the proposed extension area and it is not proposed to provide any as part of the proposed development.

Sensitive Receptors

4.28 Dwellings in the vicinity of application site are generally located along the local road network. The nearest dwellings to the landholding site boundary are identified on EIAR Figure 8-1.

4.29 There are 8 receptors (dwellings) identified within the 500m of the application area located at distances of c. 200 to 500 metres from the boundary of the application.

IMPACT ASSESSMENT

Evaluation Methodology

4.30 The evaluation of effects on employment, human health and amenity comprises a qualitative assessment based on the analysis of potential effects on the environment undertaken in other chapters of this EIAR. The assessment also takes into account a review of relevant literature and professional judgement in relation to impact on population and human health.

Employment

Construction Stage Impacts

4.31 The planning application is for the proposed extension to the existing quarry. No construction stage impacts on employment have been identified.

Operational Stage Impacts

4.32 The proposed development will provide continued employment for up to 5 people directly on-site, and a number of indirect employees such as crushing contractors, HGV drivers, and maintenance contractors.

4.33 The proposed development will contribute indirectly to sustaining and developing the local and regional economy by providing a long term secure supply of construction aggregates.

4.34 This is a medium-term and positive impact on employment and economic development.

Post – Operational Stage Impacts

4.35 Following the permanent cessation of operations, the application site will be restored. This would result in the loss of employment at the site in the long term. Some short-term employment would be provided in relation to the aftercare of the restored site.

Human Health

Construction & Operational Stage Impacts

4.36 The construction & operational stages of the development relates to the extraction & processing of stone using industry standard techniques. These stages have the potential to generate impacts that would have effects on human health through the pathways of air, noise, and water.

4.37 It is considered that, following the continued implementation of the existing and proposed mitigation measures as documented in chapter 7 (water), chapter 8 (air quality) and chapter 10 (noise & vibration) that the construction and operational stage impacts are predicted to be negligible to acceptable.

4.38 On this basis, it is considered that there would be no likely significant temporary or permanent effects on human health during the construction and operational stages of the proposed development.

Post – Operational Stage Impacts

4.39 There will be limited activity on site during restoration works, and the main sources of noise and dust associated with extraction and processing operations will have been removed. Accordingly, this stage will have limited potential to generate impacts that would have effects on human health through the pathways of air, noise, and water.

4.40 Notwithstanding this, with implementation of the mitigation measures as documented in chapter 7 (water), chapter 8 (air quality) and chapter 10 (noise & vibration) the post-operational stage impacts are predicted to be negligible to insignificant.

4.41 On this basis, it is considered that there would be no likely significant effects on human health during the post- operational stage of the proposed development.

Amenity

Construction & Operational Stage Impacts

4.42 The construction & operational stages of the development relates to the extraction & processing of stone using industry standard techniques. These stages have the potential to

generate impacts that would have effects on amenity through the pathways of air, noise, and water.

4.43 It is considered that, following the continued implementation of the existing and proposed mitigation measures as documented in chapter 7 (water), chapter 8 (air quality) and chapter 10 (noise & vibration) that the construction and operational stage impacts are predicted to be negligible to acceptable.

4.44 On this basis, it is considered that there would be no likely significant temporary or permanent effects on amenity during the construction and operational stages of the proposed development.

Post – Operational Stage Impacts

4.45 There will be limited activity on site during restoration works, and the main sources of noise and dust associated with extraction and processing operations will have been removed. Accordingly, this stage will have limited potential to generate impacts that would have effects on amenity through the pathways of air, noise, and water.

4.46 Notwithstanding this, with implementation of the mitigation measures as documented in chapter 7 (water), chapter 8 (air quality) and chapter 10 (noise & vibration) the post-operational stage impacts are predicted to be negligible to insignificant.

4.47 On this basis, it is considered that there would be no likely significant effects on amenity during the post- operational stage of the proposed development.

Unplanned Events

4.48 According to the EPA guidelines, unplanned events, such as accidents, can include *"spill from traffic accidents, floods or land-slides affecting the site, fire, collapse or equipment failure on the site"*. The 2014 EIA directive refers to *"major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes)"*.

4.49 In this instance, the vulnerability of the proposed development to accidents, unplanned events or natural disasters is relatively limited owing to the relatively simple nature of the development works, the established nature of the techniques, regulations and procedures to be followed, the material to be handled on site and the relatively rural location of the proposed works.

4.50 Unplanned events in relation to the proposed development could potentially relate to:

- Instability during the extraction process;
- Spills from traffic accidents;

4.51 The HSA Safe Quarry Guidelines to the Safety Health and Welfare at Work (Quarries) Regulations 2008 As Amended are implemented at the quarry and will limit the potential for unplanned events in the form of instability during extraction. The final restoration will provide for a stable landform restored to natural habitat.

4.52 Chapter 7 (Water) notes that accidental spillages or leaks of fuels or chemicals during site activities could happen without proper control and supervision. Appropriate mitigation measures and monitoring are and will continue to be implemented to ensure that there are no potential impacts on the water environment as a result of unplanned events at the site.

4.53 The traffic and transport assessment, carried out as part of the EIAR (Chapter 14), indicates that existing road network can accommodate the proposed development. It is considered

that the risk of an accident resulting in a spillage from traffic associated with the development would be no greater in relation to this development than it is for any other form of development that relies on the transportation of goods and materials by HGVs. The potential for significant impacts on employment, human health in the wider population or amenity as a result of a road spillage is likely to be very low and any such effects would be temporary.

Cumulative / Synergistic Impacts

4.54 A search of the Cork County Council online planning search facility indicates that there is no other planned development in the vicinity of the application site which were granted planning permission in the last five years and have the potential to have any significant adverse cumulative impacts on population and human health.

Transboundary Impacts

4.55 By virtue of its location a significant distance from any international boundaries, It is not anticipated that the impacts of the proposed development would have any transboundary effects on population and human health.

Interaction with Other Impacts

4.56 The effects of the proposed development on population and human health and the interaction with other environmental topics is covered in the relevant EIAR chapters i.e. Chapter 7 – Water; Chapter 8 (Air Quality) and Chapter 10 (Noise & Vibration).

'Do-nothing Scenario'

4.57 If planning permission is not approved for the proposed development, the existing quarry would continue operations and the existing site would be restored to natural habitat following the completion of extraction.

4.58 A 'do-nothing scenario' would not result in any significant adverse impact in relation to human health & population, and the effect of a 'do-nothing scenario' would be neutral in relation to these factors.

MITIGATION MEASURES

Construction & Operational Stages

4.59 There are a range of existing management and mitigation measures implemented at the existing quarry. These measures will continue to be implemented to minimise the impact of the proposed development on surrounding sensitive receptors in relation to water, air, noise and vibration, landscape and traffic. These measures relate primarily to avoidance, prevention and reduction and are discussed in the relevant chapters of the EIAR.

4.60 A summary of the existing management and mitigation measures is provided in Table 4.4 below:

Table 4.4 – Construction & Operational Stage Mitigation Measures

EIAR Section	Operational Mitigation Measures
Chapter 7: Water	**Water Management** The surface water management and protection requirements set out in the existing discharge licence (ref. no. WP(W)03/19) will continue to be implemented at the quarry. The discharge water quality from the quarry is monitored by Breedon Ireland on a regular basis in compliance with the discharge licence. The discharge quality will continue to be monitored on a quarterly basis. There is an existing site environmental management plan – ISO 14001: 2015, which includes Water Management Procedures. The key points of the Water Management Procedures DP008 are summarised below: • All water usage at the site shall be monitored and recorded. Any significant changes in water usage shall be investigated and the findings documented. • The discharge point shall be visually inspected daily unless otherwise specified in any regulatory requirement. • Where any visual pollution is detected in the discharge, a sample shall be taken immediately and tested. Water with high suspended solids shall be prevented from entering watercourses and surface water drains by proper onsite management. • Effective controls to prevent contamination of groundwater resources and an effective monitoring programme to monitor groundwater quality and supply shall be put in place, including: - Minimise water demand; - No uncontrolled discharge of drainage from the site occurs at any time; and - Storage of wastes, fuels and hazardous materials shall be in designated bunded storage areas. In instances when an actual or suspected uncontrolled release of pollutants occurs to a watercourse or groundwater, emergency response procedures DP004 shall be implemented. If a non-compliance with an Objective or Target is noted, an immediate review will be undertaken to identify the cause. **Groundwater Protection** • Crushing / screening / washing plant is refueled in-situ using refueling vehicles from the fuel supplier on an as-needs basis. Quarry vehicles are refueled on a hard stand refueling area, outside of the quarry void area. • Spill kits are maintained on site in case of accidental leak/spillage and staff are trained in the use of same. • Vehicle maintenance is carried out in the garage in the west of the site; various oil products (hydraulic oil, engine oil, axle oil) are stored on spill pallets in this garage. • Breedon Ireland environmental team undertake quarterly environmental audits at the site to ensure that compliance with all planning consents, licences and site environmental management system, which is accredited to ISO 14 001 standard, is both maintained and enhanced.

EIAR Section	Operational Mitigation Measures
Chapter 8 Air	**Dust Management & Suppression:** • Minimise drop heights when handling materials. Maximise use of excavated soil in construction of vegetated screening berms or in quarry restoration works. Dampen materials using mist cannon, sprinklers, or water bowser. • Minimise drop heights when handling material. Protect from wind where possible. • Minimise length of on-site haul routes. • Use of mist cannon / sprinklers / water bowser to dampen haul routes during dry weather periods. • Restrict vehicle speeds to less than 20kph. Install signage and undertake staff training. • Use of road sweeper to reduce the amount of material available for re-suspension. • Direct all HGVs through wheelwash facility. • Seed / vegetate surfaces of completed perimeter mounds and stockpiles of restoration soils. • Locate stockpiles to take advantage of any available shelter from wind.
Chapter 10: Noise and Vibration	**Noise Management & Suppression** Screening • Screening berms will be constructed along the boundary of the extension area prior to commencement of extraction activities and will act as acoustic barriers to the closest; • Screening berms will be inspected on a regular basis and maintained as necessary. Plant • All mobile crushing will take place on the quarry floor, behind newly exposed quarry faces. • All mobile plant used at the development will have noise emission levels that comply with the limiting levels defined in EC Directive 86/662/EEC and any subsequent amendments. • All plant items will be properly and regularly maintained and operated according to the manufacturers' recommendations, in such a manner as to avoid causing excessive noise (i.e., all moving parts are kept well lubricated, all cutting edges are kept sharpened, the integrity of silencers and acoustic hoods are maintained) • All plant will be fitted with effective exhaust silencers which are maintained in good working order to meet manufacturers' noise rating levels. Any defective silencers will be replaced immediately. Traffic • Any deliveries to the quarry will be programmed to arrive during daytime hours only; • Care will be taken when unloading vehicles to reduce or minimise potential noise disturbance to residents; • Access / internal haul roads will be kept clean and maintained in a good state of repair, i.e., any potholes are filled, and large bumps removed, to avoid unwanted rattle and "body-slap" from heavy goods vehicles; • Vehicles waiting within the quarry will be prohibited from leaving their engines running and there will be no unnecessary revving of engines.

EIAR Section	Operational Mitigation Measures
	Vibration Management & Suppression: • Blasting will be restricted to between 11.00 hours and 15.00 hours Monday to Friday to ensure that it does not clash with milking times for local dairy herds (except in emergencies or for health and safety reasons beyond the control of the operator) • Blasting shall not be carried out on Saturdays, Sundays, or public holidays. • The frequency of blasting shall not be more than two blasts per month. • Notification of each blast shall continue to be given in writing 3 days in advance of each blast to all residences within a 1km radius of the quarry. • Blast notifications shall be provided by pre-blast siren warnings. • All blasting operations shall be carried out by a certified 'shotfirer' in accordance with the relevant health and safety regulations. • The optimum blast ratio shall be maintained, and the maximum instantaneous charge shall be optimised. • The blast design and blasting methodology uses the monitoring results to optimise and ensure consistent blast designs.
Chapter 13: Landscape	Landscaping & Restoration scheme, refer to EIAR Figure 2-5.
Chapter 14: Traffic	• Quarry working hours (Quarry Ref. QR073 – Condition 8, as amended by ABP Ref. 04.QC.2156) will be continued. The proposed development will be operated between the hours of 07.00 to 18.00 hrs Monday to Friday; and from 07.00 to 14.00 hrs Saturday, unless in exceptional circumstances otherwise agreed with the planning authority. The quarry will not operate on Sundays or Bank • All traffic exiting the facility is / will be directed over the existing wheelwash facility and extended length of internal surfaced road prior to egress off-site to ensure that mud and debris from the quarry is not carried onto the public road network. • Unpaved road sections within the facility are regularly inspected and maintained so as to minimise potential accumulation of mud on the wheels of HGVs. • Public roads outside the site shall be regularly inspected for cleanliness, as a minimum, on a daily basis, and cleaned as necessary. If required, a road sweeper is / will be made available to ensure that public roads are kept free of debris.

RESIDUAL IMPACT ASSESSMENT

Construction & Operational Stages

4.61 With implementation of the management & mitigation measures detailed above there will be no residual impacts on population and human health arising during the construction and operational stages of the development.

Post – Operational Stage

4.62 The post -operational stage impacts will be negligible to insignificant and no specific mitigation measures are required. There will be no residual impacts on population and human health arising during the post-operational stage.

MONITORING

4.63 There is an existing environmental monitoring programme in place at the quarry (refer to EIAR chapters 7 (Water), 8 (Air Quality) and 10 (Noise & Vibration)) and this will be continued for the proposed development. There is no other monitoring required in relation to population & human health.

REFERENCES

Environmental Protection Agency (2022) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports'.

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INTRODUCTION

5.1 This Biodiversity chapter forms part of the Environmental Impact Assessment Report (EIAR) prepared for Breedon Materials Limited t/a Breedon Ireland, in support of a planning application to Cork County Council for the continuance of use and extension of an existing quarry at Carrigcleena More, Bweeng, Co. Cork.

Site Description

5.2 The existing quarry site and proposed quarry extension ("the Site") extends over an area of c. 28.8 hectares to the south of the existing pit. The quarry is centred at approximate Irish Transverse Mercator (ITM) coordinates 552473 X 590513 Y within the townland of Bweeng, Co. Cork.

5.3 The existing high polished stone value (PSV) rock quarry commenced operations in c. 1978 under P. Ref. No. 1863/75 and current operations comprise extraction of stone using conventional blasting techniques; processing (crushing, screening and washing) of the fragmented rock to produce high PSV aggregates.

5.4 There is an existing readymix concrete plant located within the existing quarry (P. Ref. No. 19/5902), which commenced operation in c. 2021. Ancillary facilities at the site include mobile processing plant, portacabin offices with staff facilities, weighbridge and wheelwash, which will continue to be used.

5.5 The proposed extension area and the surrounding landscape is characterised by agricultural land with fields under permanent pasture some of which are bounded by hedgerows and thin treelines.

Project Description

5.6 The proposed development being applied for under this current planning application is shown on Figure 2-2 of Chapter 2 of this EIAR and will consist of:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c. 3.7 hectares;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Overburden storage;
- Operation landscaping including perimeter screening berms around the proposed extension area; and
- Restoration of the quarry to natural habitat after-uses.

All related ancillary site works within an overall application area of c. 28.8 hectares, and all for a period of 20 years and a further 2 years to complete final restoration of the site.

5.7 Topsoil and overburden stripped to obtain access to the hard rock resource will be either utilised directly for construction of the perimeter screening berms and landscaping works, used in the restoration of worked out parts of the existing quarry

as part the restoration scheme; or stored an overburden storage area until it can be used in the final restoration.

5.8 Stone extracted from the quarry will be processed within the quarry void and transported by dump trucks to the existing processing area located on the northern portion of the existing quarry development for further processing.

5.9 There is an existing water discharge licence (ref. no. WP(W)03/19) in place for the site. Surface water run-off and any groundwater inflow into the quarry will continue to the managed within the existing water management system.

5.10 The extraction scheme for the proposed development provides for maintaining the access to, and fenced boundary around Carraig Cleena, in accordance with Condition 67 attached to P. Ref. QR073 (as amended by ABP Ref. 04.QC.2156)

Restoration (Reinstatement to Nature Conservation Habitat Areas)

5.11 Upon the cessation of extraction operations, it is proposed to return the worked lands to natural habitat after-uses – refer to Figure 2-5 in Chapter 2 of this EIAR.

5.12 Where feasible, restoration of exhausted and redundant areas will be carried out at the earliest opportunity. However, it is envisaged that the majority of restoration works will be carried out after extraction operations at the site have permanently ceased. Provision is made for a 2-year final restoration period.

Purpose of the Report

5.13 The purpose of this biodiversity chapter is to describe the baseline ecological conditions at the Site and to identify potential significant effects associated with the proposed development. Where necessary appropriate mitigation measures will be set out to reduce residual effects to a suitable level.

5.14 This chapter forms part of the EIAR that will be submitted with the planning application to assist the competent authority, in this case Cork County Council, to carry out an Environmental Impact Assessment (EIA) of the proposed development.

Evidence of Technical Competence and Experience

5.15 SLR Project Ecologist Brogan Costello prepared this chapter. SLR Associate Ecologist Michael Bailey MCIEEM carried out the supporting field surveys and technical review of this chapter.

5.16 Brogan holds a BSc in Science (Botany) from the National University of Galway and a MSc in Global Change, Ecosystem Science and Policy from the University of Dublin and Justus Liebig Universität. She has previously completed traineeship with Galway County Council and the European Commission. She is a qualifying member of CIEEM.

5.17 Michael Bailey holds a BSc (Hons) in Biology and Ecology from the University of Ulster, and an MSc in Quantitative Conservation Biology from the University of the Witwatersrand, Johannesburg, South Africa. Michael is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM). He has prepared Appropriate Assessments and Ecological Impact Assessments for a wide range of projects in Ireland and the UK.

5.18 Ross Macklin (Triturus Environmental Ltd.) undertook detailed aquatic ecological studies focussed on the assessment of the ecological health of the adjacent Reamanagh Stream, and the streams local to the area. Ross' report is appended to this chapter of the EIAR. Ross Macklin PhD (Candidate) BSc (Hons) Applied Ecology

HDip GIS Dip IPM MCIEEM IFM is an environmental scientist specialising in freshwater and fisheries ecology. He studied a bachelor's degree in applied Ecology at UCC and later completed a higher diploma in Geographical Information Systems at UCC and a diploma in Integrated Pest Management at UCD. He is currently completing his PhD at UCC in fisheries ecology. Ross has an in-depth knowledge of all freshwater ecosystems and riparian corridors. He has undertaken river habitat, lake habitat, canal habitat and fisheries assessments in professional work for 19 years. His specialist freshwater experience lies in biological and physiochemical water quality analysis, fisheries ecology, riparian habitat assessments, habitat mapping, protected species, mammal surveys, geographical information systems, ecological design and invasive species. Ross has expert experience in identifying and assessing macrophyte plant, aquatic bryophytes, fish and macroinvertebrates from a variety of aquatic habitats. He routinely undertakes fisheries assessments, protected species surveys, invasive species surveys, river hydromorphology surveys, habitat mapping; surface water management plans, CEMP, EcIA and EIAR reporting. He holds full national licences for freshwater pearl mussel (Margaritifera margaritifera), white-clawed crayfish (Austropotamobius pallipes) and amphibians inclusive of an open photography licence for numerous protected species. He has held over 300 section 14 licences for electro-fishing and netting surveys spanning the breadth of Ireland. Ross is widely considered as an expert in aquatic ecology.

Relevant Legislation

Legislation

5.19 The main pieces of legislation in terms of ecology in regard to developments such as this are as follows;

- The EIA Directive (2014/52/EU);
- The Habitats Directive (92/43/EEC);
- The Birds Directive (2009/147/EC);
- European Communities (Birds and Natural Habitats) Regulations, 2011 - 2015.
- The Wildlife Acts 1976 as amended;
- Wildlife (Amendment) Act, 2000, 2010, 2012;
- The Flora (Protection) Order 2015.

5.20 The details of these are summarised in **Appendix 5-A** of this report.

Local Policy

5.21 The relevant local planning policies have been extracted from the Cork County Development Plan (CDP) 2022-2028[1] and have been placed in **Appendix 5-A** of this report. These policies are specific to "Chapter 12 – Heritage" of the county development plan and are concerned with the policies and objectives to protect and/or enhance the ecology and biodiversity of County Cork. In broad terms these objectives and policies aim to ensure correct measures are put in place to identify and protect natural heritage and important environmental features within Cork

[1] Cork County Development Plan 2022-2028: https://www.corkcoco.ie/en/cork-county-development-plan-2022-2028

County. The full list of relevant policies and objectives are in **Appendix 5-A** of this report.

METHODOLOGY

5.22 The methods used to carry out the survey of the Site, to evaluate the ecological value and to prepare the biodiversity chapter is outlined in this section. The assessment methodology for this proposal was developed using the standard professional impact assessment guidance published in 2018 by the Chartered Institute of Ecology and Environmental Management (CIEEM).

Scope of the Assessment

5.23 The scope of this Biodiversity Chapter is to identify potential impacts likely to occur from the proposed progressive extraction and restoration operations, and to determine if the effects on biodiversity are significant. The scope of the report includes the provision of mitigation, compensation and enhancement measures as required.

Baseline Data Collection

Desk Study

5.24 A desk study was carried out to collate the available existing ecological information on the Site. The Site and the surrounding area were viewed using existing available satellite imagery[2]. High resolution aerial imagery of the Site has been collected by SLR as part of a drone survey. This imagery was examined during the desk study and has been incorporated into the mapping figures.

5.25 The National Parks and Wildlife Service (NPWS)[3] and the National Biodiversity Data Centre (NBDC)[4] online resources were accessed for information on sites designated for nature conservation and on protected habitats and species. Only records for the past 10 years are considered within this report as older records are unlikely to still be relevant given their age and the changes in land management that has occurred in the intervening period. Environmental Protection Agency (EPA) Maps[5] was accessed for other environmental information, such as surface water features, relevant to preparation of this report.

5.26 Cork County Council website was accessed for information on relevant planning policy while the planning portal[6] was accessed for information on other planning applications within the Site and immediate surrounding area.

5.27 Birds of Conservation Concern in Ireland (BoCCI) 2020-2026, published by BirdWatch Ireland and the RSPB NI, is a list of priority bird species for conservation action on the island of Ireland. The BoCCI lists birds which breed and/or winter in Ireland and classifies them into three separate lists; Red, Amber and Green; based on the conservation status of the bird and hence their conservation priority. Birds on the Red List are those of highest conservation concern, Amber List are of medium

[2] https://www.google.ie/maps & http://www.bing.com/maps/ (last accessed October 2023)

[3] www.npws.ie (last accessed October 2023)

[4] http://maps.biodiversityireland.ie/#/Map (last accessed October 2023)

[5] http://gis.epa.ie/ (last accessed October 2023)

[6] Planning and Development | Cork County Council (corkcoco.ie)

conservation concern and Green List are not considered threatened. The BirdWatch Ireland website[7] was accessed for information on birds of conservation concern.

5.28 The conservation status of mammals within Ireland and Europe is evaluated using one or more of the following documents; Wildlife Acts (1976 - 2012), the Red List of Terrestrial Mammals (Marnell *et al.*, 2009) and the EU Habitats Directive 92/43/EEC.

5.29 The drawings and the full project description for the sand and gravel pit are contained within other sections of this EIAR also informed the desk study. Other chapters of the EIAR reviewed included Chapter 7 - Water, Chapter 8 - Air Quality and Chapter 13 - Landscape.

Field Surveys

5.30 The fieldwork carried out to inform the preparation of this report is discussed in the following sections.

Ecological Surveys

5.31 The Site was initially visited on 10th June 2021 and an ecological survey was carried out by SLR Associate Ecologist Michael Bailey. The ecological survey was carried out in mostly dry weather conditions with scattered light showers with F1 light air on the Beaufort scale. The temperature was ca. 13°C and conditions were overcast with cloud cover of 6 oktas[8].

5.32 Fieldfare Ecology (NI) carried out a site survey as part of the preparation of a biodiversity action plan (BAP) for the quarry using the IUCN BIRS system in August 2022. Some of the biodiversity information from that study has been incorporated into this chapter and the BAP is included in **Appendix 5-D**.

5.33 Three site visits were conducted on 14th March, 19th April and 23rd May 2023 by independent bird surveyors Aidan Crean and Debbie Nelson (2023) to determine the status of peregrine falcon in the quarry. These surveys also recorded all other bird species which were observed in the quarry area during the vantage point surveys for peregrine. Again, some of the bird data and information from that study has been incorporated into this chapter and the report is included in **Appendix 5-E**.

5.34 The Site was re-visited by SLR Associate Ecologist Michael Bailey on 19th October 2023 to note any changes habitats or utilisation of the site by fauna since the initial survey in June 2021. The survey was conducted in dry weather conditions with intermittent cloud cover, some sunny spells, a temperature of 15°C and a gentle breeze.

5.35 Two more visits were conducted during the 2024 breeding season. On 1st May 2024 SLR Graduate Ecologist Lorcan Kelly carried out a breeding bird survey in the extension area. The survey was conducted in overall dry weather conditions, with some periods of drizzle, cloud cover of 6/8 oktas, temperature of 4/ 5 °C and a light breeze. On 14th July 2024 SLR Senior Ecologist Faolán Linnane carried out a peregrine survey within the existing pit and a breeding bird survey within the existing pit and the extension area. The surveys were conducted in overall dry weather conditions, with some periods of drizzle, cloud cover of 4/8 oktas, temperature of 10 °C and a light breeze.

5.36 Aquatic surveys of the river sites downstream of Bweeng Quarry were conducted on the 15th July 2024 by Triturus Environmental Ltd. on behalf of the Client. The purpose

[7] https://www.birdwatchireland.ie/ (Last accessed October 2023)

[8] Cloud amount is reported in oktas or eighths. Okta is a unit used in expressing the extent of cloud cover, equal to one eighth of the sky. https://www.metoffice.gov.uk/guide/weather/observations-guide/how-we-measure-cloud

of these surveys was to inform the overall aquatic ecological evaluations of connected watercourses in context of the Project and to detect species of high conservation value. Eight sites (inclusive of upstream controls) were surveyed across three waterbodies: the Reamanagh Stream (EPA code: 18R34), the South Kilpadder River (EPA code: 18S62) and the Lyre River (EPA code: 18L02). Surveys consisted of electro-fishing (for faunal species), fisheries habitat appraisal, and an assessment of the aquatic vegetation community.

5.37 The objective of the ecological surveys was to describe the ecology of the Site and to determine its ecological value. The Site was comprised mainly of the proposed extension area (red boundary in Figure 5.1), and the areas to the south of the existing quarry which are most likely to be impacted by the extension works.

5.38 Habitats were classified using '*A Guide to Habitats in Ireland*' (Fossitt, 2000) during this visit. The dominant plant species present in each habitat type were recorded. Species nomenclature follows Parnell & Curtis (2012) for scientific and English names of vascular plants.

5.39 Incidental sightings or evidence of birds, mammals or amphibians were noted during the ecological survey. Trees or structures suitable for bat roosts within the Site and potential suitable bat foraging and commuting habitat were also noted.

Desk Study

5.40 Desk study data is unlikely to be exhaustive, especially in respect of species, and is intended mainly to set a context for the study. It is therefore possible that important habitats or protected species not identified during the data search do in fact occur within the vicinity of the site. Interpretation of maps and aerial photography has been carried out using recent imagery, but it has not been possible to verify the accuracy of any statements relating to land use and habitat context outside of the field study area.

Field Surveys

5.41 The optimal period to undertake a habitat survey is April - September. The initial SLR survey was completed in June 2021, which is inside the optimal survey window. As such, the survey timing is not considered to present a constraint to the assessment.

5.42 The October 2023 SLR survey was conducted outside the optimal survey window for many flowering plants, however, this late season survey allowed for better assessing for the presence of faunal species such as badgers, less hidden by dense vegetation, and wintering bird species such as whooper swan or geese which may utilise the surrounding fields for grazing.

5.43 The Fieldfare Ecology survey was carried out in August which is an optimum time of year for recording flowering plants, identifying invasive species and late-season breeding birds.

5.44 The Crean & Nelson (2023) bird surveys were conducted between March and May which was an ideal time for surveying for breeding birds and also for recording both winter visitors such as redwing, and also early summer visitors such as swallow and sand martin.

5.45 SLR bird surveys (2024) were conducted on 01 May and 14 June which was an ideal time for surveying for breeding birds. Notes on behaviour of all bird species were taken during the May survey, but only for amber and red-listed bird species during the June survey. As a result, breeding status of green-listed bird species could only be assessed based on the first visit.

5.46 To determine presence or likely absence of protected species usually requires multiple visits at suitable times of the year. As a result, this survey focuses on assessing the potential of the site to support species of note, which are considered to be of principal importance for the conservation of biodiversity with reference to those given protection under Irish or European wildlife legislation. This provides an assessment of the ecological interest present on the days the site was visited and highlights areas where further survey work may be recommended.

5.47 All areas of the Site were accessible. No other limitations were experienced.

ASSESSMENT APPROACH

5.48 The ecological evaluation and assessment within this chapter has been undertaken with reference to relevant parts of the 2018 Guidelines for Ecological Impact Assessment in the UK and Ireland developed by the Chartered Institute of Ecology and Environmental Management (CIEEM, September 2018). Although this is recognised as current good practice for ecological assessment, the guidance itself recognises that it is not a prescription about exactly how to undertake an ecological impact assessment (EcIA); rather, they "provide guidance to practitioners for refining their own methodologies". For the full guidance, refer to https://www.cieem.net/data/files/ECIA%20Guidelines.pdf. The approach to impact assessment also has regard to advice set out in the EPA draft guidelines on the information to be contained in Environmental Impact Assessment Reports (EIAR) published in August 2017.

Important Ecological Features

5.49 Ecological features can be important for a variety of reasons. Importance may relate, for example, to the quality or extent of the site or habitats therein; habitat and/ or species rarity; the extent to which such habitats and/ or species are threatened throughout their range, or to their rate of decline.

Determining Importance

5.50 The importance of an ecological feature should be considered within a defined geographical context. The following frame of reference has been used in this case, relying on known/ published accounts of distribution and rarity where available, and professional experience:

- International (European)
- National (Ireland)
- County (Dublin)
- Local (higher value)
- Local (lower value)

5.51 The above frame of reference is applied to the ecological features identified during the desk study and surveys to inform this report.

5.52 In assigning a level of value to the population of a species, it is necessary to consider its distribution and status, including a consideration of trends based on available historical records. Examples of relevant lists and criteria include species of European conservation importance (as listed on Annexes II, IV and V of the Habitats Directive or Annex 1 of the Birds Directive), species protected under the Wildlife Acts 1976 - 2012 and BoCCI.

Impact Assessment

5.53 The impact assessment process involves the following steps:

- identifying and characterising potential impacts;
- incorporating measures to avoid and mitigate (reduce) these impacts;
- assessing the significance of any residual effects after mitigation;
- identifying appropriate compensation measures to offset significant residual effects (if required); and
- identifying opportunities for ecological enhancement.

5.54 When describing impacts, reference has been made to the following characteristics, as appropriate:

- Positive or negative;
- Extent;
- Magnitude;
- Duration;
- Timing;
- Frequency; and
- Reversibility.

5.55 The impact assessment process considers both direct and indirect impacts: direct ecological impacts are changes that are directly attributable to a defined action, e.g. the physical loss of habitat occupied by a species during the construction process. Indirect ecological impacts are attributable to an action, but which affect ecological resources through effects on an intermediary ecosystem, process or feature, e.g. the creation of roads which cause hydrological changes, which, in the absence of mitigation, could lead to the drying out of wet grassland.

5.56 Consideration of conservation status is important for evaluating the effects of impacts on individual habitats and species and assessing their significance:

- Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area; and
- Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

Significant Effects

5.57 The 2018 CIEEM guidance sets out information in paragraphs 5.24 through to 5.28 of the guidance documents which describes the concept of ecological significance. Significant effects are qualified with reference to an appropriate geographic scale, and the scale of significance of an effect may or may not be the same as the geographic context in which the feature is considered important.

5.58 A significant effect, for the purposes of EcIA, is defined as an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local.

5.59 The nature of the identified effects on each assessed feature is characterised. This is considered, along with available research, professional judgement about the sensitivity of the feature affected, and professional judgement about how the impact is likely to affect the site, habitat, or population's structure and continued function. Where it is concluded that an effect would be likely to reduce the importance of an assessed feature, it is described as significant. The degree of significance of the effect takes into account the geographic context of the feature's importance and the degree to which its interest is judged to be affected.

Cumulative Effects

5.60 Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects can occur where a proposed development results in individually insignificant impacts that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects.

5.61 Other plans and projects that should be considered when establishing cumulative effects are:

- proposals for which consent has been applied but which are awaiting determination;
- projects which have been granted consent, but which have not yet been started or which have been started but are not yet completed (i.e. under construction);
- proposals which have been refused permission, but which are subject to appeal, and the appeal is undetermined;
- constructed developments whose full environmental effects are not yet felt and therefore cannot be accounted for in the baseline; or
- developments specifically referenced in a National Policy Statement, a National Plan or a Local Plan.

Avoidance, Mitigation, Compensation and Enhancement

5.62 When seeking mitigation or compensation solutions, efforts should be consistent with the geographical scale at which an effect is significant. For example, mitigation and compensation for effects on a species population significant at a county scale should ensure no net loss of the population at a county scale. The relative geographical scale at which the effect is significant will have a bearing on the required outcome which must be achieved.

5.63 Where potentially significant effects have been identified, the mitigation hierarchy has been applied, as recommended in the CIEEM Guidelines. The mitigation hierarchy sets out a sequential approach beginning with the avoidance of impacts where possible, the application of mitigation measures to minimise unavoidable impacts and then compensation for any remaining impacts. Once avoidance and mitigation measures have been applied residual effects are then identified along with any necessary compensation measures, and incorporation of opportunities for enhancement.

5.64 It is important to clearly differentiate between avoidance mitigation, compensation and enhancement and these terms are defined here as follows:

- Avoidance is used where an impact has been avoided, e.g. through changes in scheme design;
- Mitigation is used to refer to measures to reduce or remedy a specific negative impact in situ;

- Compensation describes measures taken to offset residual effects, i.e. where mitigation in situ is not possible; and
- Enhancement is the provision of new benefits for biodiversity that are additional to those provided as part of mitigation or compensation measures, although they can be complementary.

BASELINE ECOLOGICAL CONDITIONS

5.65 This section sets out the current baseline conditions for the ecological features considered within the Site and provides a clear description of the changes that would occur as a result of the proposed development using the findings of the desk study and field survey. The current baseline includes the ecological features created by quarrying under the existing consent.

Nature Conservation Sites

5.66 Sites which have been designated for nature conservation are discussed in this section. These designations may include; Natura 2000 sites, Natural Heritage Areas, National Parks, Nature Reserves, Wildfowl Sanctuaries and Ramsar Sites.

5.67 The proposed development area is not within or adjacent to any site designated for nature conservation or subject to any nature conservation designations (Figure 5-1).

Natura 2000 Sites

5.68 There are no Natura 2000 Sites within or directly adjacent to the Site. The nearest Natura 2000 sites are Blackwater River (Cork/Waterford) (SAC) [002170] ca. 2.2 km north of the Site at the closest point when measured in a straight line, and Mullaghanish to Mushermore Mountains SPA [004162] ca. 19.3 south-west of the Site.

5.69 The proposed development will require a continuation of the discharge of excess water to surface waters. Discharge of water with a high silt content or accidental spills and leaks could potentially impact on the surface water quality at the Reamanagh Stream, which in turn flows into the South Kilpadder stream which discharges into Blackwater River (Cork/Waterford) SAC. Discharge from the site could lead to a reduction in water quality and impact the QIs of this SAC. There is an existing discharge licence in place with existing mitigation and management measures implemented to treat water prior to discharge and which meets the requirements set out in the conditions attached to the discharge licence.

5.70 An Appropriate Assessment Screening and Natura Impact Statement (NIS) report was prepared for this Project, and it concluded that with the existing and proposed mitigation to avoid pollution of surface water and groundwater, in compliance with the existing discharge licence, the proposed development, individually or in combination with other plans or projects, will not result in any likely significant effects on any Natura 2000 sites. Therefore, Natura 2000 sites are excluded from any further consideration in this Chapter.

Natural Heritage Areas

5.71 There are no proposed Natural Heritage Areas (pNHA) or Natural Heritage Areas (NHA) within 5 km of the proposed development. Boggeragh Mountains NHA is 8.4km from Site and Banteer Ponds pNHA is 15.8km from Site, refer to Figure 5-1.

Boggeragh Mountains NHA

5.72 Boggeragh Mountains NHA 002447 is ca. 8.4km to the south-west of the Site measured in a straight line from the closest point.

5.73 "Boggeragh Mountains NHA consists primarily of upland blanket bog habitat and is located 10 km south-west of Mallow in Co. Cork. "It contains excellent blanket bog habitat on peat depths of at least 2 m. Other habitats present include heath on the slopes of the hills, headwaters and a number of small flushes and streams. Golden Plover are also present on the site" (NPWS Site Synopsis[9])

5.74 The Reamanagh Stream to the north of the Site which flows in a northern direction into the Blackwater River (Cork/Waterford) SAC, it does not intersect with the Boggeragh Mountains NHA and therefore there is no water surface pathway to this NHA. Therefore, Boggeragh Mountains NHA is scoped out of further consideration in this report.

Banteer Ponds pNHA

5.75 Banteer Ponds pNHA 001036 is 15.8km northwest of the Site when measured in a straight line from the closest point.

5.76 Banteer Ponds pNHA flows into and intersects with Blackwater River (Cork/Waterford) SAC.

5.77 The development will not have any effect on this pNHA. Therefore, Banteer Ponds pNHA is scoped out of further consideration in this report.

Habitats

5.78 Habitats present within the Site, as recorded during the walkover survey, are described in this section. Habitat classification follows that of *'A Guide to Habitats in Ireland'*[10]. A habitat map for the site is provided in Figure 5-2 at the end of this report.

5.79 No Annex I habitat (under the Habitats Directive) was identified within the Site.

5.80 A macrophyte community representative of the Annex I habitat (under the Habitats Directive) '*floating river vegetation'* [3260] was recorded ca. 3.2 kms downstream of the Site on the Lyre River during aquatic surveys conducted by Triturus Environmental Ltd. on 15th July 2024.

5.81 The following sections detail each habitat present within the Site in further detail, and they are shown in Figure 5-2.

On-site

5.82 Within the existing quarry there are four main habitat types:

ED4 – Active quarries and mines

5.83 A majority of the existing quarry is comprised of an active quarry which will not be affected by the proposed extension into the fields to the south.

5.84 This habitat is assessed to be of **negligible value** for biodiversity and has not been assessed further.

[9] SITE SYNOPSIS (npws.ie)

[10] Fossitt, (2000), https://www.npws.ie/sites/default/files/publications/pdf/A%20Guide%20to%20Habitats%20in%20Ireland%20-%20Fossitt.pdf (last accessed August 2023).

ED3 – Recolonising Bare Ground

5.85 There is an area of recolonising bare ground to the north-west of the application area, but which is part of the existing quarry; this is an old berm which has a covering of scrub and pioneer plant species. This area will be removed during the expansion of the quarry.

5.86 Colonising weeds dominate the slopes of this area with ground cover of white clover *Trifolium repens*, creeping buttercup *Ranunculus repens,* greater plantain *Plantago major*, coltsfoot *Tussilago farfara*, dock *Arumix* spp., and creeping thistle *Cirsium arvense.*

5.87 Grasses present on the lower slopes of the berm included coarse grasses, Yorkshire fog *Holcus lanatus* and creeping bentgrass *Argostis stolonifera.* Bramble *Rubus fructicosus agg,* some gorse Ulex europaeus and young elder trees are also present.

5.88 Recolonising bare ground is assessed as important at a **local (lower) level** and has not been assessed further.

FL8 – Other artificial lakes and ponds

5.89 There are five sump ponds within the existing quarry area, two on the floor of the southern end and three in the northern area (Figure 5-2). The ponds in the south of the quarry will be removed as part of the quarry expansion.

5.90 These ponds tend to be temporary and ephemeral in nature as they can be moved depending on the location of the quarry works at the time. The two ponds in the south are small and shallow and did not contain any aquatic vegetation species. These were assessed as being unsuitable for amphibians. The ponds in the northern section were recently establish but were currently heavily polluted with silt and were also considered unsuitable as amphibian habitat.

5.91 Therefore, the ponds were considered to have **negligible value** for biodiversity and were not assessed further.

WS1 - Scrub

5.92 There is an area of dense scrub on the southern boundary of the existing quarry which has established itself on the old berm along the southern boundary of the existing quarry. This area will also be removed as part of the quarry expansion.

5.93 The dense scrub was comprised predominantly of gorse *Ulex europaeus* and goat willow *Salix caprea* with other young trees including ash *Fraxinus excelsior*, hawthorn *Crataegus monogyna*, and sycamore *Acer pseudoplatanus*. Other ground flora included bramble *Rubus fructicosus* agg., snowberry *Symphoricarpos albus*, laurel *Prunus laurocerasus*, dogrose *Rosa canina*, coltsfoot *Tussilago farfara*, common nettle *Urtica dioica*, willowherb *Epilobium* sp., hogweed *Heracleum sphondylium*, dandelion *Taraxacum officinalis* agg., ragwort *Jacobaea vulgaris*, herb robert *Geranium robertianum*, red clover *Trifolium pratense*, creeping thistle *Cirsium arvense*, spear thistle *Cirsium vulgare*, cocks-foot *Dactylis glomerata*, and vetch *Vicia sativa*.

5.94 Dense scrub has been assessed as important on a **local (higher value)** level.

5.95 Within the proposed expansion area there are three main habitat types:

GA1 - Improved Agricultural Grassland

5.96 Within the proposed extension area (refer to **Figure 5-2**), there were two large fields classified as improved agricultural grassland. These fields are currently used as grazing pasture.

5.97 Ground vegetation of three grazing fields was dominated by the typical agricultural perennial ryegrass *Lolium perenne,* white clover *Trifolium repens* and some creeping buttercup. The western field had a covering of pioneer vegetation such as extensive dock and tall willowherb *Epilobium* spp. from the previous season's growth. The eastern field was dominated by denser, un-grazed perennial ryegrass with taller greater plantain and dock.

5.98 This is a common and widespread habitat throughout Ireland and is assessed as important at a **local (lower) level** and has not been assessed further.

WL1 - Hedgerow

5.99 Within the proposed extension area there are two sections of hedgerows which make up part of the western boundary and the eastern boundary of the proposed expansion area (Figure 5-2).

5.100 The western section is comprised of a low, old wall covered with ivy and hawthorn and an undergrowth of ground ivy and foxglove *Digitalis sp*. with some bramble and nettle.

5.101 The eastern section of hedgerow is similar to the western section but is comprised of taller hawthorn and also has dominant gorse. It is also part of an original old stone wall boundary.

5.102 Within the Site the hedgerows provide some ecological connectivity to the larger hedgerow network s in the surrounding area. Hedgerows in general are considered to be valuable ecological habitat, and even the very limited hedgerow within this Site are evaluated as having an ecological value important at the **local (higher value) level.**

WL2 – Treelines

5.103 There were three distinct, but short treelines between the agricultural fields (Figure 5-1) and along the northern boundary of the Site.

5.104 The treelines on the northern boundary have a narrow local access road running between them and they are dominated by non-native conifers to the north of the road and thin, immature ash *Fraxinus excelsior* with infrequent sycamore *Acer pseudoplatanus* to the south of the road. These species were interspersed with bramble, nettles, holly, and ivy *Hedera helix* growing in the old stone walls features which form the original field boundaries.

5.105 The short treelines along the western and eastern boundaries of the Site are dominated by non-native conifers.

5.106 Overall, treelines are evaluated as important at a **local (higher value) level**.

Rare or Protected Flora

Desk Study

5.107 The NBDC database was searched for records of rare and/or protected faunal species from the 1 km grid square W5290, or the 2 km grid squares W59F and W59A, within which the Site is located.

5.108 No records of rare and/or protected species have been recorded within these grid squares over the past 10 years.

Field Survey

5.109 No notable or protected flora was identified on the Site during the field survey, with much of the Site comprising common and widespread habitats, as described above.

5.110 As such, notable and/or protected flora is assessed as likely absent on the Site and have been scoped out from further assessment.

Faunal Species

5.111 The NBDC database was searched for records of rare and/or protected faunal species from the 1 km grid square W5290, or the 2 km grid squares W59F and W59A, within which the Site is located.

5.112 No records of rare and/or protected species have been recorded within these grid squares over the past 10 years.

Amphibians

Field Survey

5.113 There were no lakes or ponds noted within the expansion the site but there are five sump ponds within the existing quarry area, two on the floor of the southern end and three in the northern area (Figure 5-2). Only the two ponds in the south of the quarry will be removed as part of the quarry expansion.

5.114 The only ponds to be affected by the expansion works, the two ponds in the south of the quarry, were assessed as being unsuitable for amphibians and therefore amphibians have been scoped out from further assessment.

Birds

Desk Study

5.115 No records of rare and/or protected bird species have been recorded on the NBDC database within these grid squares over the past 10 years.

Field Survey

5.116 Birds recorded during the two initial SLR site surveys in June 2021 and October 2023 included common bird species such as wood pigeon *Columba palumbus,* hooded crow *Corvus cornix*, magpie *Pica pica*, robin *Erithacus rubecula*, blackbird Turdus *merula*, song thrush *Turdus philomelos*, jackdaw *Corvus monedula*, chaffinch *Fringilla coelebs*, wren *Troglodytes troglodytes* and starling *Sturnus vulgaris*.

5.117 Notable migratory or over-wintering bird species observed within or around the Site during the June 2021 survey included sand martin *Riparia riparia* and swallow *Hirundo rustica*.

5.118 Recorded species identified during the SLR 2024 breeding bird surveys are detailed in Table 1, along with the number of records and assessed breeding status.

Table 1: Bird Species Identified During SLR 2024 Breeding Bird Surveys

Species	Scientific name	Conservation status[11]	No. Records		Breeding status
			01.05.24	14.06.24	
Blackbird	*Turdus merula*	Green	7	2	Possible
Blackcap	*Sylvia atricapilla*	Green	1	1	Possible
Blue Tit	*Cyanistes caeruleus*	Green	1	0	Non-Breeding

[11] As listed under BoCCI and listed on Annex I of the Habitats Directive

Species	Scientific name	Conservation status[11]	No. Records		Breeding status
			01.05.24	14.06.24	
Chaffinch	*Fringilla coelebs*	Green	5	0	Possible
Chiffchaff	*Phylloscopus collybita*	Green	4	0	Possible
Coal Tit	*Periparus ater*	Green	0	2	Unconfirmed
Dunnock	*Prunella modularis*	Green	4	1	Possible
Goldcrest	*Regulus regulus*	Amber	1	1	Possible
Goldfinch	*Carduelis carduelis*	Green	3	1	Confirmed
Great Tit	*Parus major*	Green	2	4	Possible
Hooded Crow	*Corvus cornix*	Green	1	0	Non-Breeding
Jackdaw	*Coloeus monedula*	Green	11	21	Probable
Linnet	*Carduelis cannabina*	Amber	1	0	Possible
Meadow Pipit	*Anthus pratensis*	Red	0	N/A	Unconfirmed
Moorhen	*Gallinula chloropus*	Green	0	N/A	Unconfirmed
Peregrine	*Falco peregrinus*	Green; Annex I	0	3	Confirmed
Raven	*Corvus corax*	Green	0	N/A	Unconfirmed
Robin	*Erithacus rubecula*	Green	4	2	Confirmed
Rook	*Corvus frugilegus*	Green	0	15	Unconfirmed
Sand Martin	*Riparia riparia*	Amber	0	N/A	Confirmed
Siskin	*Carduelis spinus*	Green	2	0	Probable
Song Thrush	*Turdus philomelos*	Green	2	0	Possible
Swallow	*Hirundo rustica*	Amber	4	0	Confirmed
Willow Warbler	*Phylloscopus trochilus*	Amber	3	3	Probable
Woodpigeon	*Columba palumbus*	Green	6	12	Probable
Wren	*Troglodytes troglodytes*	Green	8	3	Possible

BoCCI Species Summary

Red-listed Birds

5.119 One red-listed BoCCI bird species was recorded during the initial SLR surveys, kestrel *Falco tinnunculus* was observed during both surveys, and it is assessed that kestrel may breed on the cliff faces within the existing quarry but will not likely breed on the Site.

5.120 One red-listed BoCCI bird species was recorded during the SLR 2024 breeding bird surveys, meadow pipit *Anthus pratensis* was observed within the existing quarry but not in the proposed extension area.

5.121 In addition, five red-listed BoCCI bird species were recorded during the Crean & Nelson surveys (2023); snipe *Gallinago gallinago*, swift *Apus apus*, meadow pipit, grey wagtail *Motacilla cinerea* and redwing *Turdus iliacus*.

Amber-listed Birds

5.122 As mentioned above, two amber-listed species were recorded during the SLR June 2021 survey – sand martin and swallow. The sand martin were observed nesting in the sand piles in the northern section of the site but there was no suitable nesting habitat found in the proposed extension Site.

5.123 One amber-listed species was recorded during the SLR October 2023 survey. As starling were observed in October they were assessed as being non-breeding, flyover species. However, they may find foraging value on the Site. Additionally, starling, whilst assessed as non-breeding from the surveys, can find nesting value within the hedgerows and treelines.

5.124 Five amber-listed BoCCI bird species were recorded during the Crean & Nelson surveys (2023); mallard *Anas platyrhynchos*, swallow, sand martin, willow warbler *Phylloscopus trochilus* and goldcrest *Regulus regulus*.

5.125 Five amber-listed BoCCI bird species were recorded during the SLR 2024 breeding bird surveys – sand martin, swallow, willow warbler, goldcrest and linnet (Table 1). Sand martins were confirmed as breeding in sand piles within the existing quarry. Swallows were confirmed as breeding in a small disused building within the existing quarry.

5.126 All red- and amber-listed birds are considered important at a **County level** and have been considered for further assessment.

Green-listed Birds

5.127 These comprised of common bird species which are assessed as being able to find nesting value within the scrub and hedgerow/treeline habitats within the Site and the surrounding habitats. As such, these common birds are considered important to a **local (lower) level** and have been considered for further assessment.

Birds of Prey

5.128 Two examples of a bird of prey were identified on the Site during the field surveys, peregrine *Falco peregrinus* was observed during both the SLR and the Cean & Nelson surveys on the cliff face forming the southern boundary of the existing quarry (seen during both the site surveys) and kestrel was observed foraging over scrub and grassland habitats to the south of the Site.

5.129 The cliff face noted above is known as a regular peregrine breeding location and peregrine were observed sitting on a nest during the June 2021 survey, during the Cean & Nelson survey (March to May 2023) and during the 2024 breeding bird surveys. In the latter survey, at least one chick was observed in the nest in June. The location of the know peregrine nesting location is marked by a yellow spot in Figure 5-2 and is at approximate ITM coordinates 552523 590246.

5.130 Peregrines are listed on Annex I of the Birds Directive and is protected under the Wildlife Act 1976 and Amendment Acts, which aims to protect birds and their habitats. There is an obligation to take measures to ensure peregrine's conservation and protection. As such, this species is evaluated as important at **national level** and has been assessed further in this report.

5.131 Kestrel as a BoCCI red-listed species are evaluated as important at a **County level**.

Bats

5.132 There are no records in the NBDC within 10 years of any bat species from any of the grid squares in which the Site is located.

Roosting Bats

5.133 Roosting suitability criteria developed by the BCT is provided in **Appendix 5-B**. The trees within the hedgerows and treelines bordering the Site and the on the south of the existing quarry comprised mostly young, immature trees which lacked Potential Roost Features (PRFs) for roosting bats.

5.134 It was concluded that bats are not likely to be roosting either within the existing quarry on within the proposed expansion Site.

Commuting and Foraging Bats

5.135 The active quarry areas are assessed to be of negligible value for commuting and foraging bats due to the lack of vegetation limiting the likelihood of significant invertebrates. This area also lacks vegetated corridors for commuting bats.

5.136 The vegetated habitats including treelines and hedgerows located mostly along the Site boundaries provide suitable foraging habitat for bats. These linear habitats also provide valuable ecological corridors, providing commuting habitat.

5.137 Overall, the Site is considered to be of moderate potential for commuting and foraging bats.

5.138 The bat assemblage of the Site is evaluated as important at the **county level** and is assessed further in this report.

Badger

5.139 No badger setts or signs of badger activity were identified within the Site or the surrounding areas during the field surveys.

5.140 The hedgerows within the Site were made of old stone walls and did not present suitable habitat for potential sett locations and breeding habitat. The existing quarry areas are also considered of negligible value for badgers, lacking in significant foraging or sett-creating habitats.

5.141 As no signs of badger were noted in the vegetated areas of the existing quarry of with the proposed expansion Site, badger is scoped out of further assessment in this report.

Hedgehog

5.142 The field survey found no evidence of hedgehog on the Site. However, the scrub, grassland, treelines and hedgerows on Site does provide suitable habitat for this species, and their presence cannot be discounted.

5.143 Hedgehog are evaluated as important at a **local (higher value) level**.

Other Mammals

5.144 Other mammals, such as red fox or rabbit, were both observed during the Site surveys. Both fox and rabbit were seen in the fields just to the south of the proposed expansion Site.

5.145 Although no dens or rabbit warrens were noted in the habitats on Site, it is possible that they may be built at any time. Any occupants would risk being harmed or killed through the loss of these habitats. Due to the lack of formal protection for these species, this would represent a minor-negative impact. Potential impacts to other mammals are assessed to be significant at a **local (lower) level**.

Fish

5.146 Five species of fish were recorded during aquatic surveys carried out by Triturus Ltd.: Atlantic salmon *Salmo salar*, brown trout *Salmo trutta*, lamprey *Lampetra sp.*, European eel *Anguilla anguilla* and stone loach *Barbatula barbatula*.

Atlantic Salmon

5.147 Atlantic salmon was recorded in low abundance in one of the eight sites surveyed – the Lyre River, ca. 3.2 kms downstream from the Site.

5.148 Atlantic salmon are a qualifying interest of the River Blackwater SAC (002170) which has a hydrological link with the Site. The Blackwater is a designated salmonid water under the European Communities (Quality of Salmonid Waters) Regulations, 1988 (S.I. No. 293/1988) and supports a nationally important population of Atlantic salmon (*Salmo salar*) as well as a highly valuable recreational salmon fishery. Potential impacts to Atlantic salmon are assessed to be significant at **national level.**

Brown Trout

5.149 Brown trout were recorded across all sites, with the highest density recorded in the Reamanagh Stream adjoining the quarry, which was noted as an important brown trout nursery.

5.150 Brown trout have no formal designation in southern Ireland but are a priority species in Northern Ireland.

5.151 Potential impacts to brown trout are assessed to be significant at a **local (higher) level**.

Lamprey

5.152 Lamprey were recorded across three sites, with low densities of lamprey ammocoetes recorded along the South Kilpadder River (ca.1.1 kms downstream of the Site) and low densities of brook lamprey *Lampetra planeri* recorded on the Lyre River.

5.153 Brook lamprey are a qualifying interest of the River Blackwater SAC (002170) which has a hydrological link with the Site. Potential impacts to lamprey are assessed to be significant at **national level.**

European Eel

5.154 Low densities of European eel were recorded in low densities across two sites, both of which were located along the Reamanagh Stream adjoining the quarry.

5.155 European eel are red-listed in Ireland[12] and are classed as 'critically endangered' on a global scale[13]. Potential impacts to European eel are assessed to be significant at **national level.**

Stone Loach

5.156 A single stone loach was recorded on the Lyre River. Potential impacts to stone loach are assessed to be significant at **local (lower) level.**

Invasive Species

5.157 The field surveys did not identify any invasive species in the proposed extension area as listed on the under the Third Schedule of the EC Birds and Natural Habitats Regulations 2011.

12 King, J.L., Marnell, F., Kingston, N., Rosell, R., Boylan, P., Caffrey, J.M., FitzPatrick, Ú., Gargan, P.G., Kelly, F.L., O'Grady, M.F., Poole, R., Roche, W.K. & Cassidy, D. (2011) Ireland Red List No. 5: Amphibians, Reptiles & Freshwater Fish. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

13 Pike, C., Crook, V. & Gollock, M. (2020). Anguilla anguilla. The IUCN Red List of Threatened Species 2020: e.T60344A152845178. https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T60344A152845178.en.

5.158 There is a known stand of Japanese knotweed located on the edge of the ponds in the northern area of the quarry (**Photograph 5-6**); this stand is also recorded in the Fieldfare Ecology report where it is noted that the stand is currently undergoing eradication treatment by a professional eradication company. As of the SLR 2024 June survey, this stand of Japanese knotweed remained in the same location and was persisting despite the previously mentioned eradication treatments. This is now a restricted area and there is no active quarry works or vehicle movement in the area the chances of the spread of Japanese knotweed is highly unlikely.

Summary of Important Ecological Features

5.159 Table 5-2 summarises all important (Local (Higher) Level and above) ecological features for which detailed assessment is required. The geographical scale of importance for the ecological features within the Site are summarised along with their legal status and a rationale, where appropriate, for not carrying forward any features for detailed assessment.

Table 5-1: Summary of Important Ecological Features Subject to Detailed Assessment

Ecological Feature		Scale of importance	Comments on Legal Status and/or Importance
Habitats	WL1 Hedgerows	Local (Higher) Level	Does not comprise Annex I habitat. Provides valuable semi-natural habitat for local fauna. Protected under objective RP 5-22, GI 14-9, BE 15-2, BE 15-5, BE 15-6, BE 15-8 and HE 16-21 of the Cork County Development Plan (2022-2028)
	WL2 Treelines	Local (Higher) Level	Does not comprise Annex I habitat. Provides valuable semi-natural habitat for local fauna. Protected under objectives G1 14-1 of the Cork County Development Plan (2022-2028)
	Scrub	Local (Higher) Level	Does not comprise Annex I habitat. Provides valuable semi-natural habitat for local fauna.
Species	Peregrine	National level	Listed as Annex I species on the Birds Directive. The cliff ledges provide suitable breeding habitats. Evidence of past nesting behaviour within the Site.
	Kestrel	County level	Listed as Annex I species on the Birds Directive and Red-listed on BoCCI. Kestrel are also identified in the Co. Cork Biodiversity Action Plan 2022 – 2028.
	Other Red- & Amber-listed Birds	County level	Red- and Amber-listed on BoCCI
	Bat assemblage	County level	The complete bat assemblage is currently unknown at present. Bats are identified in the Co. Cork Biodiversity Action Plan 2022 – 2028.

Ecological Feature		Scale of importance	Comments on Legal Status and/or Importance
	Hedgehog	Local (Higher) Level	Protected under the Wildlife acts 1976 and subsequent amendments. Unconfirmed but considered likely present on the Site. Likely to find foraging value on the Site's grassland, woodland, and scrub.
	Salmon	National	Atlantic salmon (Salmo salar) are listed under Annex II and Annex V of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive').
	Lamprey	National	Lamprey (Lampetra spp.) are listed under Annex II and Annex V of the Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) ('EU Habitats Directive')
	European Eel	National	European eel are 'critically endangered' according to most recent ICUN red list (Pike et al., 2020) and listed as 'critically engendered' in Ireland (King et al., 2011).
	Brown Trout	Local (Higher) Level	Brown trout have no formal designation in southern Ireland but are a priority species in Northern Ireland.

ASSESSMENT OF EFFECTS AND MITIGATION MEASURES

5.160 This section sets out the potential impacts and their effects on important ecological features. The information available from the desk study and fieldwork has been used to identify impacts and the significant effects including positive, negative, direct, indirect and cumulative effects. The following design principles and "designed-in" mitigation have informed the assessment of impacts.

- Within the design of the proposal good practice environmental and pollution control measures are employed with regard to current best practice guidance such as, but not limited to, the following:
  - EPA Environmental Management Guidelines (2006): Environmental Management in the Extractive Industry (Non-Scheduled Minerals); and
  - DoEHLG (Department of the Environment, Heritage and Local Government) April 2004: Quarries and Ancillary Activities Guidelines for Planning Authorities.
- Landscaping and restoration measures are proposed within the design of the development. These are listed in full in Chapter 2 of the EIAR (refer also to EIAR Figure 2.5) and include features to minimise loss of biodiversity on-site. Such measures include the following;
  - Hedgerows will be retained where possible. Any hedgerows to be removed as part of the project will be replanted using appropriate species as part of the landscaping plan (refer to EIAR Figure 2-5). There will be no net loss of hedgerows, post restoration, as a result of the proposed development.
  - Landscaping during and post operation will include aftercare management to encourage dense, well-structured hedgerows along the site boundaries.

5.161 Taking the above into account, the potential impacts of the proposed development are outlined in the following sections.

Do Nothing Impact

5.162 In the absence of the proposed development, it is assumed that the farming and existing quarry activities currently being carried out within the Site at Bweeng will continue as before and the Do-Nothing Impact will result in no significant change in the ecological interest of the Site.

Potential Impacts and Effects

Hedgerows

Potential Impacts

5.163 The hedgerow habitats forming the boundary of the proposed expansion area will be retained and are not expected to be impacted by the proposed development.

Proposed Mitigation Measures

5.164 There is no specific mitigation aimed at the hedgerow habitats. However, there will be perimeter screening berms constructed along the eastern, southern and western boundaries of the extension extraction area using the stripped topsoil and overburden soils. This will be followed by operational landscaping which involve hedgerow / tree planting in the area between the outside face of the screening berms and the realigned local road – refer to EIAR chapter 13 Landscape and Figure 2-5 Landscaping & Restoration Plan.

Significance of Residual Effects

5.165 There are no predicted impacts to hedgerows in the area. The retention of the existing hedgerows along with the planting of additional hedgerows and trees and natural re-vegetating of the site during the restoration phase will have a long-term positive effect on hedgerow levels at the Site.

Treelines

Potential Impacts

5.166 There will be the loss of a small area of trees lining the southern end of the existing quarry when accessing the proposed expansion area. Many of these trees are non-native conifers.

5.167 The treelines forming the boundary of the proposed expansion area will be retained and are not expected to be impacted by the proposed development.

Proposed Mitigation Measures

5.168 There is no specific mitigation aimed at the treeline habitats. However, there will be perimeter screening berms constructed along the eastern, southern and western boundaries of the extension extraction area using the stripped topsoil and overburden soils. This will be followed by operational landscaping which involve hedgerow / tree planting in the area between the outside face of the screening berms and the realigned local road – refer to EIAR chapter 13 Landscape and Figure 2-5 Landscaping & Restoration Plan.

Significance of Residual Effects

5.169 The predicted impacts to treelines and trees in the area is expected to be slight and the loss of trees on the southern boundary of the existing quarry area will be temporary. The planting of additional trees during the operational landscaping and the natural re-vegetating of the site during the restoration phase will have a long-term positive effect on native tree numbers on the Site.

Scrub vegetation

Potential Impacts

5.170 There will be the loss of a small area of scrub habitat along the southern boundary of the existing quarry area which will be removed during the proposed expansion works.

Proposed Mitigation Measures

5.171 There is no specific mitigation aimed at the scrub habitat. However, there will be perimeter screening berms constructed along the eastern, southern and western boundaries of the extension extraction area using the stripped topsoil and overburden soils and some of this area will naturally develop scrub habitat as it re-vegetates over time.

Significance of Residual Effects

5.172 The predicted impacts to scrub habitat in the area is expected to be slight and the loss of scrub on the southern boundary of the existing quarry area will be temporary. The re-vegetation with scrub habitat during the operational landscaping and the natural re-vegetating of the site during the restoration phase will mean there is no negative effect on scrub habitat on the Site.

Birds

Peregrine

Potential Impacts

5.173 Peregrine are known to nest on the cliff faces at the southern end of the existing quarry and in an area which will be removed as part of the proposed expansion works (refer to **Photograph 5-1** provided in **Appendix 5-C**); the Crean & Nelson Report is provided in **Appendix 5-E.**

5.174 The extension to the quarry may directly remove a peregrine nesting site. This may harm birds that may already be nesting or disturb the birds enough to disrupt or halt nesting activities on the Site. This would comprise a significant negative impact to this species.

Proposed Mitigation Measures

5.175 It is proposed that further peregrine surveys are undertaken on the Site prior to any rock extraction being carried out in the vicinity of the historical nest site and in other proposed work areas where peregrines may be nesting. These surveys will provide confirmation of nesting peregrine presence / absence. The surveys will comprise of up to three survey visits[14] following guidance adopted from the BTO[15]:

- The first visit will take be undertaken between early March and mid-April.
- If no birds are recorded on the first visit, a second survey visit should be undertaken 2-6 week following the first to establish if late breeding birds have begun nesting.
- A third and final survey will take place between June – mid-July either to check unoccupied sites for potentially missed nesting birds or to check whether observed nesting has been successful.

[14] If peregrine presence is recorded, following survey visits are not necessary.
[15] BTO (2014). The 2014 Peregrine Survey Guidelines for Contributors. Available from https://www.bto.org/sites/default/files/shared_documents/peregrine_survey/2014-peregrine-survey-guidelines-contributors.pdf. Last accessed October 2023.

5.176 If evidence of peregrine nesting within the working area of the quarry is noted the advice of a qualified ecologist will be sought and a suitable buffer area (25-50m) where no works will take place will be communicated (i.e. no interference of the nest site during the bird nesting season of 1st March to 31st August). Monitoring surveys will be implemented to establish when the peregrines are considered to no longer be nesting, i.e. chicks have fully fledged or nest no longer in use.

5.177 The Crean & Nelson study (2023) confirmed that peregrine successfully breed in the quarry during the 2023 season and that the nest was located on the southern wall. They also observed the peregrine perching and plucking/feeding on ledges in the south-east corner of the quarry demonstrating that they use other cliff faces within the quarry.

5.178 It is anticipated that peregrines will be able to use other areas of the quarry that have been worked-out and which provide suitable ledges for nesting during the operational phase, e.g. the ledges used for perching and feeding/plucking, as observed by Crean & Nelson (2023) to the east of the Carraig Cleena rock promontory which will be retained as part of the proposed works (refer to **Photograph 5-2** provided in **Appendix 5-C**).

5.179 As works extend to other areas of the quarry, exposed faces currently being worked will become available for cliff-nesting birds such as peregrine.

Significance of Residual Effects

5.180 As there are other suitable peregrine nesting habitats within the existing quarry, and which will not be affected by the proposed expansion works, impacts on peregrine breeding in the quarry are assessed as slight and temporary as a new nesting site is established, and long-term impacts on the peregrine population in the area are not anticipated.

Other Birds of Prey

Potential Impacts

5.181 The potential loss of vegetation along the southern boundary of the existing quarry and the loss of open agricultural fields may cause a slight reduction in foraging habitat for birds of prey. This will lead to a temporary minor-negative impact on these species.

5.182 The loss of some of the southern cliff faces may also cause a reduction of potential nesting and roosting habitat for kestrel and other birds of prey.

5.183 Potential impacts to kestrel, as a red-listed bird, are considered significant on a county level. Potential impacts to other birds of prey are considered significant at a local (lower) level.

Proposed Mitigation Measures

5.184 It is proposed that as part of the peregrine surveys undertaken on the Site, the surveys should also provide confirmation of nesting kestrel presence / absence and allow a full assessment to be made.

5.185 Any confirmed nesting will result in the implementation of a suitable buffer to protect the nesting birds until they no longer use the nest site. It is anticipated that other areas of retained quarry cliff faces will provide alternative nesting sites for kestrel.

5.186 The trees and other potential bird of prey nesting habitats will be removed outside the nesting bird season (which runs from 1st March to 31st August inclusive), limiting the potential to impact nesting birds of prey.

5.187 Alternatively, if the removal of the trees and other vegetated habitats is required

during the nesting season, a preliminary nesting bird check will be undertaken by a suitably qualified ecologist no longer than 48 hours prior to their removal. Any confirmed nests will be left *in situ* and protected by a suitable buffer zone, which will be communicated by the qualified ecologist, until the chicks have fledged, or if the nest is disused.

Significance of Residual Effects

5.188 The loss of some of the quarry cliffs through the proposed expansion works will lead to a permanent loss of potential nesting habitat for kestrel and possibly other bird of prey.

5.189 However, as there are other suitable peregrine nesting habitats within the existing quarry, and which will not be affected by the proposed expansion works, impacts on peregrine breeding in the quarry are assessed as slight and temporary as a new nesting site is established, and long term impacts on the peregrine population in the area are not anticipated.

Sand Martin

Potential Impacts

5.190 Sand martin were observed during the SLR June 2021 survey and in the main quarry area during the Crean & Nelson surveys, the Fieldfare surveys and the 2024 breeding bird surveys. There was no suitable nesting habitat found within the proposed extension area. However, sand martin were recorded nesting in sand piles near the northern boundary of the quarry in the Crean & Nelson, the Fieldfare and SLR 2024 breeding bird surveys.

Proposed Mitigation Measures

5.191 As there is no suitable nesting habitat within the proposed extension area no mitigation is required for this area. However, in order to maintain the breeding population in the northern section of the quarry a number of dis-used sand piles will be retained as sand martin breeding sites (**Photograph 5-3**).

Significance of Residual Effects

5.192 The retention of sand piles in the northern section of the quarry will ensure that sand martin can continue to breed in the area, and this will result in a positive impact sand martin.

Swallow, Swift and Starling

Potential Impacts

5.193 Swallow were seen flying and foraging over the proposed extension area during the SLR June 2021 and 2024 breeding bird surveys, but no nesting habitat was identified in the area. They were also observed flying in the main quarry area during the Crean & Nelson survey. They were observed using disused buildings within the existing quarry during the 2024 surveys, and confirmed nests were located in June 2024.

5.194 Swift were observed flying over the main quarry area during the Crean & Nelson survey 2023.

5.195 Starling were observed in the proposed extension area and in the active quarry during both the LSR October 2023 survey and the Crean & Nelson survey 2023.

Proposed Mitigation Measures

5.196 The loss of the grassland and hedgerow habitat in the proposed extension area will result in a loss of foraging habitat for both swallow and starling, however, there are

many other open fields and hedgerows in the surrounding area so this will only represent a very slight loss in foraging habitat.

5.197 Swallow, swift and starling are known to breed in buildings with suitable ledges and which are fairly undisturbed by human activity. The small, old disused building in the northern section of the quarry which is already in use by nesting swallows should be retained. If appropriate openings are provided in the other buildings being retained within the existing quarry, these could also be used by swifts and starlings as nesting habitat (**Photograph 5-3**).

Significance of Residual Effects

5.198 The loss of a small area of foraging habitat will not have a significant impact on either swallow, swift or starling populations in the area. However, the retention of the old farm building will provide valuable nesting habitat for these species, and this will be a positive impact on swallow, swift and starling populations.

Other Red- and Amber-listed Bird Species

Potential Impacts

5.199 Mallard and snipe were recorded over the main quarry area during the Crean & Nelson survey, but it was not noted if they were using any of the ponds or wetland areas within the quarry.

5.200 There was no suitable pond/wetland habitat in the proposed extension Site and so there will be no loss of foraging or breeding habitat for these two species as a result of the quarry expansion.

5.201 All of the other red- and amber-listed bird species are passerine birds and they have been considered in the section below.

Proposed Mitigation Measures

5.202 The ponds and wetland areas have been recently created/managed in the dis-used northern section of the quarry as part of the biodiversity improvement plans for the over-all quarry site.

Significance of Residual Effects

5.203 While there is no confirmed observation of either species in these newly created/managed habitats they can only have a positive impact on these and other aquatic or wetland dependant bird species.

Passerine Birds

Potential Impacts

5.204 The proposed development will result in a minor negative loss of habitat, with necessary vegetation removal being limited to the scrub and trees between the existing quarry and the proposed expansion area. This habitat loss will result in a permanent reduction in suitable passerine bird nesting habitat.

5.205 Potential impacts to passerine birds are considered slight and temporary as the loss of habitat is very limited in size and there is plenty of other nesting habitats in the surrounding area.

Proposed Mitigation Measures

5.206 Existing external hedgerows, treelines and existing vegetation along the application site boundaries will be protected and retained. This will maintain ecological corridors along the boundaries of the Site to the surrounding habitats and will provide suitable bird nesting habitat.

5.207 The necessary vegetation removal to facilitate the proposed works will be removed outside the nesting bird season (which runs between 1st March to 31st August) to avoid harming nesting birds that may be present during the nesting season. If any vegetation removal is required inside the nesting season, a preliminary nesting bird check will be undertaken by a suitably qualified ecologist no longer than 48 hours prior to the removal. Any confirmed nests will be protected through a suitable buffer zone, communicated by the ecologist. All confirmed nests will be left in situ until all chicks have fledged and the nest is disused.

5.208 Proposed hedgerow and tree planting on the perimeter screening berms constructed along the eastern, southern and western boundaries of the extension extraction will provide additional nesting habitat once established.

5.209 During the restoration phase, areas of the Site will be allowed to naturally re-vegetate. This will lead to an overall increase in nesting and foraging habitat for passerine birds in the long-term.

Significance of Residual Effects

5.210 With the proposed mitigation measures, there will be no long-term reduction of nesting habitat for passerine birds. All potential impacts to passerine birds can be considered minor negative and not significant.

5.211 Long-term there will be an increase in nesting and foraging habitat during the restoration phase. The Site will become more suitable for nesting birds following the operation phase. This will lead to a permanent, positive impact for passerine birds.

Bats

Potential Impacts

5.212 There were no trees which will need to be removed which were identified as having PRFs for bats. Therefore, no roosting bats will be affected by the project.

5.213 Two trees were assessed to have low bat roosting potential, and one tree was assessed to have moderate bat roosting potential (refer to **Appendix 5-B**). It is currently unknown whether these trees support confirmed bat roosts. This would result in a significant permanent negative impact for roosting bats.

5.214 The loss of the scrub and trees between the existing quarry and the proposed expansion area will result in the loss of potential bat foraging and commuting habitat. This would result in a minor-negative impact on commuting and foraging bats.

5.215 The potential impacts to bats are considered to be slight and temporary on a county level.

Proposed Mitigation Measures

5.216 Apart from the removal of the vegetation between the existing quarry and the expansion area, the existing external hedgerows, treelines, and existing planting along the application site boundaries will be protected and retained as far as possible. This will retain ecological corridors along the boundaries of the Site.

5.217 The proposed restoration plan will revert all lands within the Site for natural re-vegetation and ecological habitat use. This will represent a replacement (like for like) of potential breeding and foraging habitat for bats.

Significance of Residual Effects

5.218 There will be no significant residual effect on commuting and foraging bats as a result of the proposed development. The planting of additional trees and hedgerows will act

to maintain ecological corridors and connection to the surrounding environment and increase the overall biodiversity of the Site.

5.219 The proposed restoration plan will revert all lands within the Site for natural re-vegetation and ecological habitat use. This will represent a replacement (like for like) of potential commuting and foraging habitat for bats and represents a long-term positive residual effect.

Hedgehog

Potential Impacts

5.220 The proposed development will result loss of some scrub and trees between the existing quarry and the proposed expansion area will result in the loss of potential foraging and sett creating habitat for this species. This is anticipated to represent a minor-negative and short-term impact to this species.

5.221 Potential impacts to hedgehog are assessed to be significant at a local level.

Proposed Mitigation Measures

5.222 All suitable habitats for this species, other than scrub and tree loss, will be retained. It is recommended that the required loss of scrub and trees will be undertaken under the supervision of a qualified ecologist. This ecologist will check for hedgehog in this area immediately prior to the vegetation removal.

5.223 The proposed restoration plan will revert all lands within the Site for natural re-vegetation and ecological habitat use. This will represent a replacement (like for like) of potential breeding and foraging habitat for hedgehog and represents a long-term positive residual effect.

Significance of Residual Effects

5.224 The proposed extension is not anticipated to have significant residual effects for hedgehog. Overall, following the completion of the operational phase, the Site will be enhanced for hedgehog, leading to a long-term positive impact for this species.

Fish Species

Potential Impacts

5.225 The three riverine sites in the study area downstream of the proposed quarry development, the Reamanagh Stream, South Kildapper River and the Lyre River (all tributaries of the Clyda River), were found to support a number of fish species of high conservation value. This included Atlantic salmon, lamprey (Lampetra sp.) and European eel. Lamprey and salmon are qualifying interest fish species of the hydrologically connected River Blackwater SAC (002170) downstream. While not of significantly high conservation value, wild brown trout populations are of high local biodiversity value and were recorded at all sites in the study area.

5.226 The proposed development has the potential to effect populations of fish in the rivers connected to the Site through a reduction in water quality from discharged polluted waters.

Proposed Mitigation Measures

5.227 The surface water management and protection requirements set out in the existing discharge licence (ref. no. WP(W)03/19) will continue to be implemented at the quarry. The discharge water quality from the quarry is monitored by Breedon Ireland on a regular basis in compliance with the discharge licence. The discharge quality will continue to be monitored on a quarterly basis.

5.228 Significant silt source control measures have been implemented at the site in 2024, and these include improvements to the surface water settlement pond system as described in the EIAR water Chapter 7, Section 7.233. It is proposed to undertake additional improvements to the settlement pond system at the site as described in Section 7.245 to Section 7.252. These measures include refurbishing and redesigning the settlement ponds, and provision of a new settlement pond (1,000m^2).

5.229 There is an existing site environmental management plan – ISO 14001: 2015, which includes Water Management Procedures.

Significance of Residual Effects

5.230 Examination of the identified potential impacts on the receiving environment show that with the mitigation measures in place, there are no significant residual impacts with respect to groundwater and surface water during the construction / operational / post operational stages of the quarry development. Following mitigation through implementation of the mitigation and management measures set out above, the significance of all potential impacts identified will be reduced to "slight" or lower.

Cumulative Effects

5.231 Cumulative effects can result from individually insignificant but collectively significant actions taking place over a period of time or concentrated in a location. Cumulative effects can occur where a project results in individually insignificant impacts that, when considered in-combination with impacts of other proposed or permitted plans and projects, can result in significant effects (CIEEM, 2018).

5.232 The Cork County Development Plan 2022-2028[16] was reviewed for strategies and objectives that may act in-combination with the project. There are no strategies or objectives in the Cork County Development Plan 2022-2028 that are likely to result in significant effects when considered in-combination with the proposed development.

5.233 Cork County Council planning portal[17] was accessed to examine planning applications within 5 years in the vicinity of the Site for potential to act in-combination with the project. Table 5-2 details some of the granted planning applications within 1km. The planning applications found in the vicinity of the Site consist of small-scale domestic and agricultural construction or conversion projects. The recent developments in the vicinity of the Site are sufficiently small-scale and distant from the Site. Therefore, there is no potential for cumulative or in-combination effects with these planning applications.

Table 5-2: Some of the Granted planning applications between 2018 - 2024

Applicant/ Development Name	Development Type	Reg. Ref. & County	Distance to Development
Charles and Monica McCarthy	Retention of the existing side and rear extensions, front closed porch and alterations of the existing dwelling house and the existing detached domestic	195638	Approx. 800 metres S

[16] CorkCoCo (2022). Cork adopted county development plan. Available from: https://www.corkcoco.ie/en/resident/planning-and-development/cork-county-development-plan-2022-2028 (Last accessed October 2023).
[17] NPAD (n.d.). Available from: https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=9cf2a09799d74d8e9316a3d3a4d3a8de. (Last accessed December 2024).

Applicant/ Development Name	Development Type	Reg. Ref. & County	Distance to Development
	garage and existing site entrance as constructed with all associated site and ancillary works.		
Cian McCarthy	Construction of dwelling house, installation of septic tank and percolation area and all associated site works.	217442	Approx. 800 metres S
Denise McSweeney	Dwelling house, entrance, wastewater treatment unit and soil polishing filter and all associated site works.	224252	Approx. 600 metres E

CONCLUSION

5.234 SLR Consulting conducted an ecological assessment of the Site and prepared this biodiversity chapter to inform the wider Environmental Impact Assessment process and production of an Environmental Impact Assessment Report to accompany the planning application by Breedon Materials Ltd. t/a Breedon Ireland for the continued permitted use and extension of the quarry as detailed in Chapter 2 of the EIAR.

5.235 The application site is not subject to any statutory or non-statutory designation and no such sites will be directly or indirectly impacted upon by the proposed development.

5.236 The proposed expansion and development will result in the direct loss of grassland currently being used as grazing pasture, and a small area of scrub and trees between the existing quarry and the proposed expansion area. Many of the existing hedgerows and treelines will be retained.

5.237 A detailed aquatic ecological assessment was undertaken by Triturus Environmental Ltd., in July 2024 on three riverine sites near the proposed development.

5.238 The Reamanagh Stream, South Kildapper River and the Lyre River (all tributaries of the Clyda River), were found to support a number of fish species of high conservation value. This included Atlantic salmon, lamprey (Lampetra sp.) and European eel. Lamprey and salmon are qualifying interest fish species of the hydrologically connected River Blackwater SAC (002170) downstream.

5.239 While not of significantly high conservation value, wild brown trout populations are of high local biodiversity value and were recorded at all sites in the study area during the aquatic ecological assessment in July 2024.

5.240 There will be perimeter screening berms constructed along the eastern, southern and western boundaries of the extension extraction area using the stripped topsoil and overburden soils and some of this area will be planted with native plant species and will also naturally develop into hedgerow and scrub habitat as it re-vegetates over time.

5.241 In the long term there will be no significant loss of habitats due to the proposed project.

5.242 There are no mammal species which will be significantly affected by the proposed project in the medium or long term.

5.243 Peregrine falcon is known to nest and breed successfully within the existing quarry and the current nest site is on the cliff face at the southern end of the quarry. This cliff face will be removed as part of the project.

5.244 There are a sufficient number of other suitable cliff faces within the existing quarry which will not be impacted by this or any other proposed development, which will be available for the peregrine to nest on.

5.245 The cliff faces could also provide nesting habitat for a range of other bird species. Prior to the start of any works, all affected cliff faces will be surveyed for nesting birds by a suitably qualified ecologist. If evidence of nesting birds within the proposed working area is noted (i.e. within 25-50m) a suitable buffer area (25-50m) where no works will take place will be communicated (i.e. no interference of the nest during the bird nesting season of 1st March to 31st August). Monitoring surveys will be implemented to establish when the birds are considered to no longer be nesting.

5.246 Potential impacts and recommended mitigation measures have been detailed for the flora and fauna identified on the Site and in the main quarry area including the

habitats, amphibians, birds, bats, hedgehog, other mammals, and invasive species. The proposed mitigation will ensure that significant effects on the ecology of the area will be limited, with some mitigation leading to positive effects on some species and biodiversity features, and these will ensure the project complies with the Cork County Council policy for biodiversity.

Figures

Figure 5-1: Designated Sites

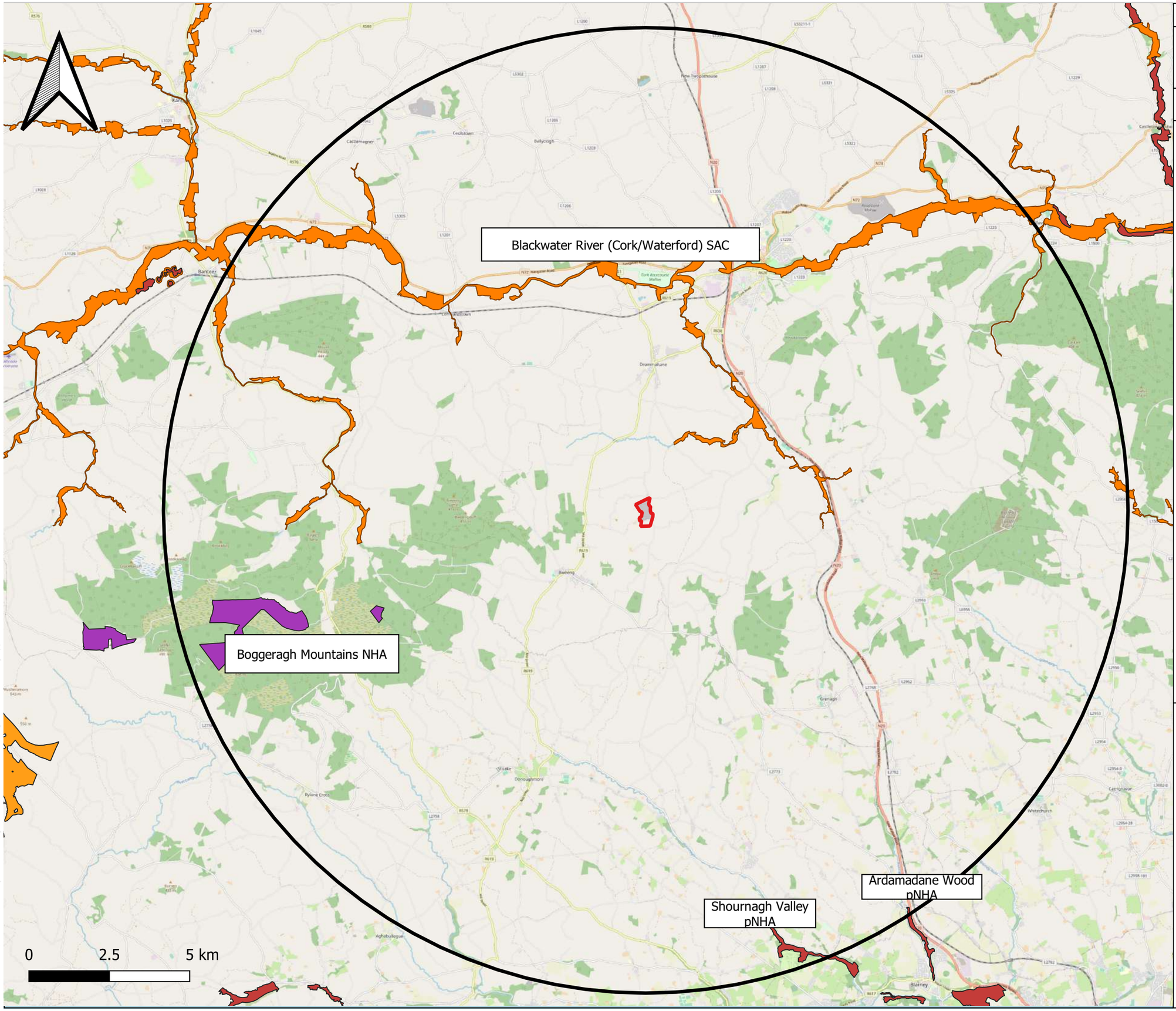
Figure 5-2: Habitat Map

Figure 5-3: Breeding Bird Survey Transect Route

Figure 5-4: Breeding Bird Survey Results 01.05.24

Figure 5-5: Breeding Bird Survey Results 14.06.24

Figure 5-6: Locations of Nesting Birds



NOTES

1. Base Mapping: OpenStreetMap © (www.openstreetmap.org/copyright)
2. CYAL50316488
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LEGEND

- Land Interest
- Natural Heritage Area
- Planning Application Area
- Proposed Natural Heritage Area
- Special Areas of Conservation (SAC)
- 15km Radius Buffer

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BREEDON IRELAND

BIODIVERSITY CHAPTER

CONTINUED USE & **EXTENSION**
of **EXISTING QUARRY**
Bweeng, Co. Cork

DESIGNATED SITES MAP

FIGURE 5-1

Scale
1:50000 @ A3

Date
DECEMBER 2024

\\euafs\DUBFS1\SLR DATA\SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application

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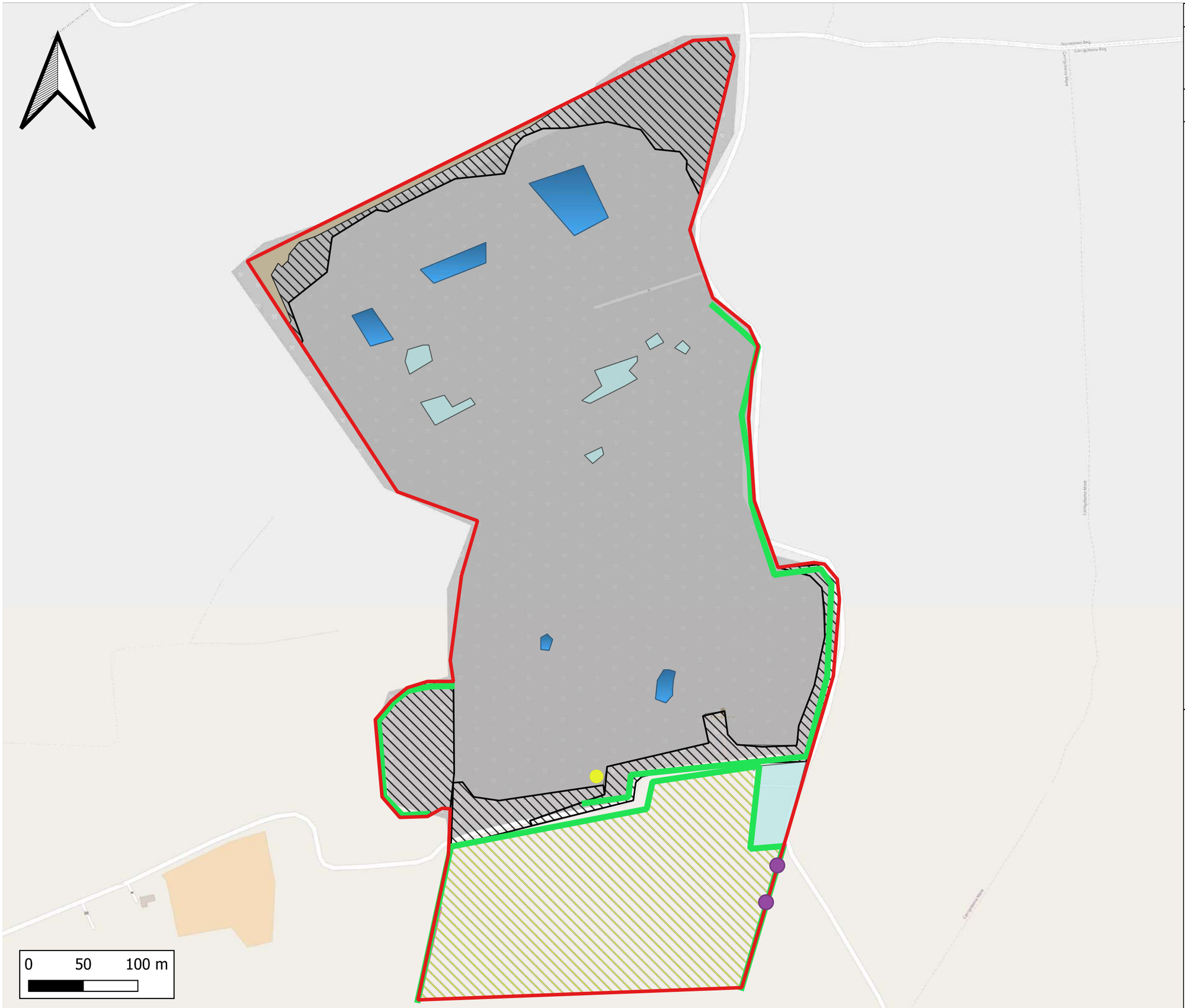

NOTES

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LEGEND

- BL3 - Buildings and Artificial Surfaces
- ED3 - Recolognising Bare Ground
- ED4 - Active Quarries and Mines
- FL8 - Other Artifical Lakes and Ponds
- GA1 - Improved Agricultural Grassland
- Individual Large Tree
- Land Interest
- Peregrine Nesting Area
- Planning Application Area
- WL1 - Hedgerow
- WS1 - Scrub
- WL2 - Treeline
- WN2 - Semi-natural woodland

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BREEDON IRELAND

CONTINUED USE & EXTENSION of EXISTING QUARRY

Bweeng, Co. Cork

HABITAT MAP

FIGURE 5-2

Scale: 1:7339 @ A3

Date: DECEMBER 2024

\\euafs\DUBFS1\SLR DATA\SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application

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LEGEND

Expansion Area

Transect Direction

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Quarry Extension

Breeding Bird Survey Transect Route

FIGURE 5-3

Scale: 1:4013 @ A3

Date: **December 2024**

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LEGEND

- Expansion Area
- AA BTO Species Code
- AA Amber Listed Bird of Conservation Concern

BTO Activity

- Flightline
- Calling
- ♀ Male
- ♂ Female
- for Foraging
- juv Juvenile
- Singing

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Lagan Materials Ltd. t/a Breedon Ireland

Quarry Extension

Breeding Bird Survey Results 01.05.24

FIGURE 5-4

Scale 1:4013 @ A3

Date December 2024

SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application\EIAR

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LEGEND

Expansion Area

AA BTO Species Code

AA Amber Listed Bird of Conservation Concern

BTO Activity

Flightline

Calling

for Foraging

juv Juvenile

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Lagan Materials Ltd. t/a Breedon Ireland

Quarry Extension

Breeding Bird Survey Results
14.06.24

FIGURE 5-5

Scale
1:4013 @ A3

Date
December 2024

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LEGEND

	Site Location Area
	Nest/Activity Location
PE	Peregrine nest
SL1	Swallows using building
SL2	Confirmed swallow nest
SM1-3	Sand martin holes

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Quarry Extension

Breeding Bird Nest Locations
14.06.24

FIGURE 5-6

Scale	Date
1:6998 @ A3	December 2024

SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application\EIAR\Volume-2 EIAR Report Figs Appends\05 Biodiversity\Ecology

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Appendix 5-A: - Relevant Legislation and *Planning Policy*

A1: EIA Directive 2014/52/EU

The EIA Directive, Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment as amended by Council Directive 97/11/EC of 3 March 1997, Directive 2003/35/EC of 26 May 2003 and Directive 2009/31/EC of 23 April 2009, now codified in Directive 2011/92/EU of 13 December 2011 and amended in Directive 2014/52/EU of 16 April 2014, is designed to ensure that projects likely to have significant effects on the environment are subject to a comprehensive assessment of environmental effects prior to project consent being given.

The EIA Directive was first transposed into Irish law by the European Communities (Environmental Impact Assessment) Regulations, 1989 (S.I. No. 349 of 1989) which amended the Local Government (Planning and Project) Act, 1963 (and other legislation) to provide for environmental impact assessment. The European Union (Planning and Project) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018) transpose the requirements of Directive 2014/52/EU, Amending previous Directive 2011/52/EU, on the assessment of the effects of certain public and private projects on the environment (the EIA Directive) into Irish planning law.

A2: Habitats and Birds Directive

The Habitats Directive ensures the conservation of a wide range of rare, threatened or endemic animal and plant species. Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora was adopted in 1992 and aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It forms the cornerstone of Europe's nature conservation policy with the Birds Directive and establishes the EU wide Natura 2000 ecological network of protected areas, safeguarded against potentially damaging projects. The Natura 2000 network of protected areas is known as Special Areas of Conservation (SAC) and Special Protection Areas (SPA). In general terms, they are considered to be of exceptional importance in terms of rare, endangered or vulnerable habitats and species within the European Community. The requirements of the Habitats Directive have been transposed into Irish law through the European Communities (Birds and Natural Habitats) Regulations 2011 [S.I. No. 477/2011]. This legislation affords protection to both Special Protection Areas and Special Areas of Conservation. Special Areas of Conservation (SAC) are designated under the Conservation of Natural Habitats and of Wild Fauna and Flora Directive 92/43/EEC (Habitats Directive) which is transposed into Irish law by the EC (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). Special Protection Areas (SPA) are classified under the Birds Directive (2009/147/EC on the Conservation of Wild Birds). Article 6(3) of the Habitats Directive requires an 'appropriate assessment' to be undertaken for any plan or project that is likely to have a significant effect on the conservation objectives of a Natura 2000 site. An 'appropriate assessment' is an evaluation of the potential impacts of a plan or project on the integrity of a Natura 2000 site, and the incorporation, where necessary, of measures to mitigate or avoid negative effects.

A3: National Legislation

Flora and fauna in Ireland are protected at a national level by the Wildlife Acts 1976 to 2018 and the Floral (Protection) Order 2015. Natural Heritage Areas (NHA) are areas that are considered to be important for the habitats present or for the species of plants and animals supported by those habitats. Under the Wildlife Amendment Act 2000, NHAs are legally protected from damage from the date they were formally proposed for designation. Section 19(1) of the Act states that 'Where there is a subsisting natural heritage area order in respect of any land, no person shall carry out, or cause or permit to be carried out, on that land any works specified in the order or any works which are liable to destroy or to significantly alter, damage or interfere with the features by reason of which the designation order was made'. In addition, a list of proposed NHAs (pNHAs) was published in 1995 but to date these have not had their status confirmed. Prior to statutory designation, pNHAs are subject to limited protection under

various agri-environment and forestry schemes and under local authority planning strategies such as County Project Plans.

A4: Relevant Planning Policy

The planning policy and legislation that is relevant to the proposed project is set out in the following section.

A4.1 Cork County Development Plan 2022-2028

This plan contains a number of policies relevant to ecology and nature conservation that are summarised in Table A-2.

Table A-2: Biodiversity policies within the Cork County Development Plan 2022 - 2028

Policy Reference	Policy
RP 5-22	Require the appropriate landscaping and screen planting of proposed developments by retention of existing on-site trees hedgerows, historic boundaries, and natural features using predominantly indigenous/local trees and plant species and groupings.
GI 14-1	Seek to strengthen ecological linkages which watercourses have with other water dependent habitats as well as with hedges/treelines, woodland and scrub in the wider landscape.
GI 14-9	Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments.
BE 15-2	Support and implement best practice in the management of roadside boundaries including tree lines and hedgerows managed by Council.
BE 15-5	Support and implement best practice in the management of roadside boundaries including tree lines and hedgerows managed by Council.
BE 15-6	Encouraging the retention and integration of existing trees, hedgerows and other features of high natural value within new developments
BE 15-8	Where appropriate, to protect mature trees/groups of mature trees and mature hedgerows that are not formally protected under Tree Preservation Orders
HE 16-21	It is a Policy Objective to maintain and protect the natural character and ecological value of the river and stream corridors in the County and where possible to enhance existing channels and to encourage diversity of habitat and nature-based solutions that incorporate biodiversity features. It is also policy (subject to the sensitivity of the riverside habitat), to provide public access to riparian corridors, to promote improved passive recreational activities.
GIB25	HE 16-21 - Require the appropriate landscaping and screen planting of proposed developments by using predominantly indigenous/local species and groupings and protecting existing hedgerows and historic boundaries in

Policy Reference	Policy
	rural areas. Protection of historical/commemorative trees will also be provided for.

Appendix 5-B: – BCT Guidance

BCT Guidelines for assessing the potential suitability of proposed development sites for bats:

Suitability	Description of Roosting Habitats	Description of Communing and Foraging Habitats
Negligible	A building, structure, tree or other feature with negligible habitat features likely to be used by bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A building or structure with one or more potential roost features that could be used by individual bats opportunistically, but do not provide enough space, shelter, protection or appropriate conditions (for example temperature, humidity, height above ground, light levels, levels of disturbance) and/or suitable surrounding habitat to be used on a regular basis, or by larger numbers of bats. Buildings in this category are unlikely to support a maternity colony or be used by hibernating bats. A tree of sufficient size and age to contain potential roost features but with none seen from the ground, or features seen with only very limited roosting potential (i.e. some small cracks or crevices, low ivy cover).	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or un-vegetated stream, but isolated and not very well connected to the surrounding landscape by other habitat and/or features. Suitable but isolated habitat that could be used by small numbers of foraging bats.
Moderate	A building, structure, tree or other feature with one or more potential roost sites that could be used by bats due to their size, shelter, protection or appropriate conditions (for example temperature, humidity, height above ground, light levels, levels of disturbance) and surrounding habitat but unlikely to support a roost of high conservation value status. Buildings, structures and trees falling into this category would not be expected to support a maternity colony, or significant hibernation or transitory roost.	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A building, structure, tree or other feature with one or more potential roost sites that are obviously suitable for use by large numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection or appropriate conditions (for example temperature, humidity, height above ground, light levels, levels of disturbance) and surrounding habitat. Buildings, structures and trees falling into this category may be expected to support a maternity colony, or significant hibernation or a significant transitory roost.	Continuous high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such a broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roost.

Appendix 5-C: Site Photographs

Photograph 5-1: Current location of the peregrine nesting within Bweeng quarry

Photograph 5-2: Alternative cliff faces available for peregrine nesting and breeding

Photograph 5-3: Sand piles and old farm building in northern section of the quarry which are being retained as sand martin, swift, swallow and starling breeding habitat

Photograph 5-4: Old building where swallows were observed nesting during the 2024 June survey.

Photograph 5-5: Existing sand piles to be retained as sand martin breeding habitat within the existing quarry.

Photograph 5-6: Stand of Japanese knotweed undergoing treatment in the northern section of the quarry

Appendix 5-D: Fieldfare Ecology (NI) BAP

Biodiversity Action Plan

Bweeng

Date Created:06 October 2022	Last Updated:18 December 2022

Contents

Site Information

Biodiversity Indicator and Reporting System (BIRS)

Carbon Estimates,

External Local Biodiversity Policy, Action Plans,

Biodiversity Priority Habitats and Species

Nature Recovery Network- Site Context

Public Access

Site Map

Habitat Map

Local Biodiversity Action Plan Proposals

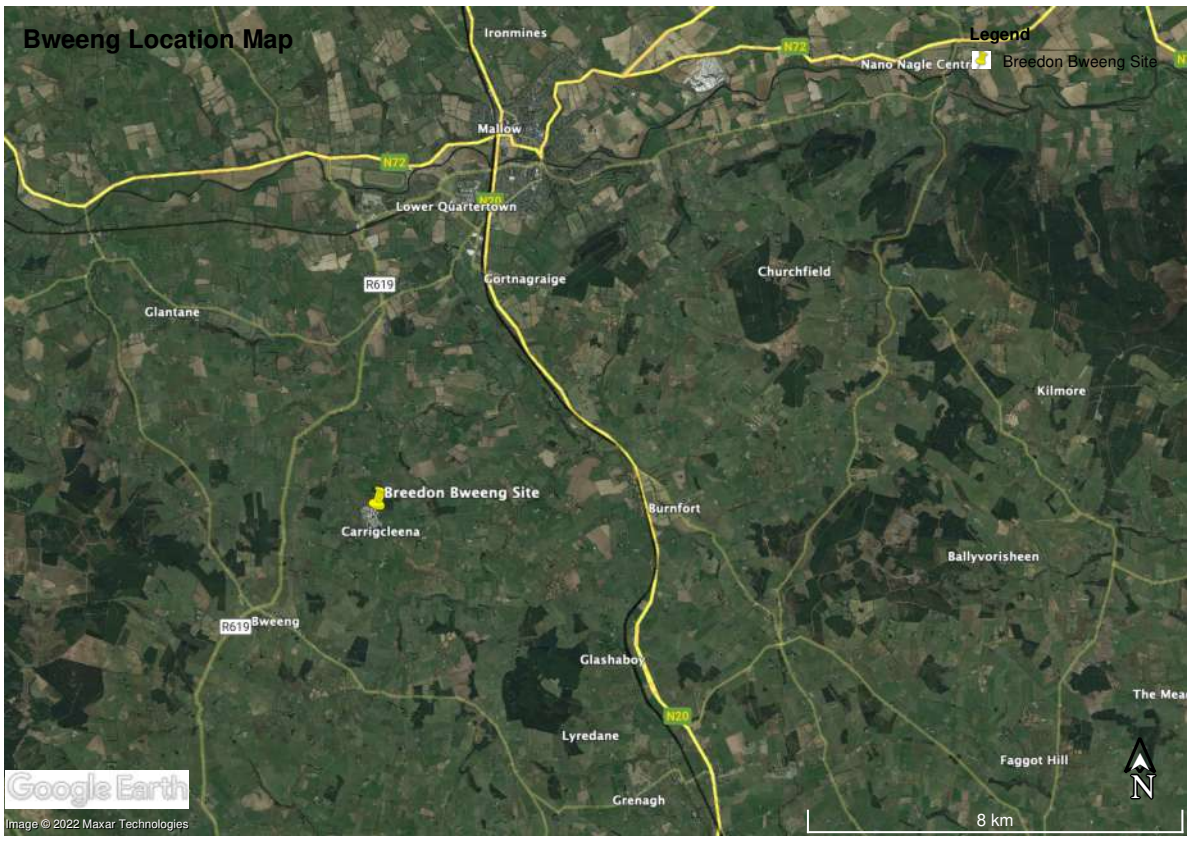
Breedon's Biodiversity Initiatives

Action Plan

Indicative Costs for Biodiversity Work

Images of Wildlife, Ideas and Options

Site Information



Situated approximately 10 kilometres south-east of Mallow in County Cork, Bweeng Breedon site offers the potential for biodiversity gain.

The site comprises a main extraction area towards the south and a processing area in the north of the site. Tree planting is a key feature at this site, particularly towards the northern boundary.

Bweeng is a 23.8 ha area producing sandstone chips and has been in operation from the 1980s.

Site Name, address, grid location:	Bweeng, Carrigcleena, Bweeng, Mallow, Co Cork, P51 FT51 W 52496 90431
Site Contact:	Roy Willis roy.willis@breedongroup.com +353 860812562
Background and site description:	Bweeng Quarry is a 23.8ha sand stone chip quarry which has operated from the 1980s, located around 10km south of Mallow and 3km north-east of Bweeng in County Cork. Bweeng Quarry consists of a processing area towards the north and an active quarry site in the south of the site.
Habitat(s) identified:	Woodland, Wetland, Conifer Plantation, Scrub, Artificial Lake/Pond
Species to be encouraged:	Pollinators (Bees, Butterflies), Dragonflies, Wildflowers, Bats, Birds (Sand martin, Swift), Willow Plantation.
Species of concern:	Japanese Knotweed (*Reynoutria japonica*) present on-site towards north-westAugust 2022 (See **Action Plan**for management proposal for removal)
Any National Designations (ASSI, SAC,SPAs, (p)NHAs etc) within 500m:	N/A within 500m, however distance to**Blackwater River (Cork/Waterford) SAC** is 1.8km. **Habitats listed under Annex I of the EU Habitats Directive:** - Water courses of plain to montane levels with *Ranunculion-fluitantis* and *Callitricho-Batrachion* vegetation - Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles. **Species listed on Annex II of the EU Habitats Directive:** -Freshwater Pearl Mussel (*Margaritiferamargaritifera*) -White-clawed Crayfish (*Austropotamobiuspallipes*) -Atlantic Salmon (*Salmo salar*) -Otter (*Lutralutra*) -Killarney Fern (*Trichomanesspeciosum*)

Resource requirements:	Refer to **Action Plan** re. materials, specialists.
Potential Biodiversity Gains:	**-Increase** native wildflower habitat across site for pollinators. **-Increase** habitat potential for species such as sand martin, solitary bees, bats and birds. **-Raise Awareness** with both staff and local community of wildlife within Bweeng Breedon Site and surrounding area. **-Eradicate** any invasive species present on-site. **-Conduct** surveys that will increase the knowledge of biodiversity on Breedon Sites. **-Consider** erection of 'Breedon Bio-Hub'
Partners and Local Initiatives:	**Butterfly Conservation Ireland** **Birdwatch Ireland** **All Ireland Pollinator Plan -** Buglife **Local Primary Schools –**Mallow, Glantane, Dromahane **Irish Raptor Study Group (IRSG)** **Greenway Landscaping (GWL)** **Cork County Biodiversity Action Plan**

Biodiversity Indicator and Reporting System (BIRS)

This section identifies the identities, extent and characteristics of the natural assets present on site, completing the first three steps of the Biodiversity Indicator and Reporting System. This will set up Breedon for the next step of BIRS, which is a more detailed condition assessment of the features on site.

The overall goal of this system is the annual calculation of a biodiversity condition index for each Breedon Quarries properties, combining annual assessments of the extent and condition of the habitats within the site.

This BAP document also aims to include Step 1, Step 2 and Step 3 of the IUCN's Biodiversity Indicator and Reporting System (BIRS).

Step 1 – Identification and delineation of priority habitats

Habitat polygons were created in QGIS to capture all habitat features discernible from ESRI orthophotography and Google and Bing satellite imagery in the 23.8-ha area of Bweeng Quarry. This was backed up with targeted ground truthing.

Each habitat block is given a Fossitt and BIRS category individually, but a conversion can be made between the two based on IUCN habitat classification.

Conversion of Fossitt to BIRS habitat classifications (all sites)

Fossitt habitats	BIRS habitats
BL, ED	Operational
Various, where known	Rehabilitation
WD4	Forests
WD2, WL, WN, WS	Shrubland, Woodland
GA, GS, WD5	Grasslands
	Ruderal Habitats
FL6/GA1, HH3	Wetlands
FL6	Lakes, Ponds
FL8	Artificial Lakes, Ponds
FW	Rivers, Streams

Step 2 – Estimated area of each habitat type

The areas covered by each BIRS habitat type are as follows:

Area of each BIRS habitat type at Bweeng Quarry

BIRS Habitat	Area (ha)	% of total
Forests	0.2	0.85%
Grasslands	0.35	1.49%
Operational	18.79	79.75%
Artificial Lakes and ponds	0.14	0.59%
Shrubland, Woodland	4.08	17.32%
Total	**23.56**	**100%**

The areas of the original Fossitt habitats are provided below:

Areas covered by each Fossitt habitat at Bweeng

Fossitt Habitat	Area (ha)
BL3 – Buildings and other artificial surfaces	0.79
ED1 – Exposed sand, gravel or till	0.21
ED2 – Spoil and bare ground	0.02
ED3 – Recolonising bare ground	0.21
ED4 – Active quarries and mines	17.56
FL8 – Other artificial lakes and ponds	0.14
GA1 – Improved agricultural grassland	0.23
GA2 – Amenity grassland (improved)	0.12
WN – Semi-natural woodland	0.82
WL1 – Hedgerow	0.09
WL2 – Treeline	1.35
WS1 - Scrub	1.82
WD4– Conifer plantation	0.2
Total	**23.56**

Step 3 – Context factor of each habitat/habitat block

Our determination of the habitat context factor is as follows:

BIRS Habitat	Uniqueness of habitat in landscape	Importance of habitat to regional and global biodiversity	National/ ecoregional level of threat to habitat	Ecosystem service provision value to the landscape	Habitat Context Factor
	descriptor and BIRS value				*mean of the four values to the nearest tenth*
Grasslands – species-poor	Common 1	Low 1	Not threatened 1	Medium 2	1.3
Shrubland, Woodland	Common 1	Medium 2	Near threatened 2	Medium 2	1.8

Operational

- Operational areas are given a default context factor of 1.0

Artificial Lakes, Ponds

- Artificial lakes and ponds are given a default context factor of 1.0.

Grasslands

- Occurs around south eastern section of site.

Shrubland, Woodland

- Occurring along perimeter of much of the site, a mixture of treeline, scrub and woodland.

Carbon Estimate Climate resilience

Carbon Estimates,

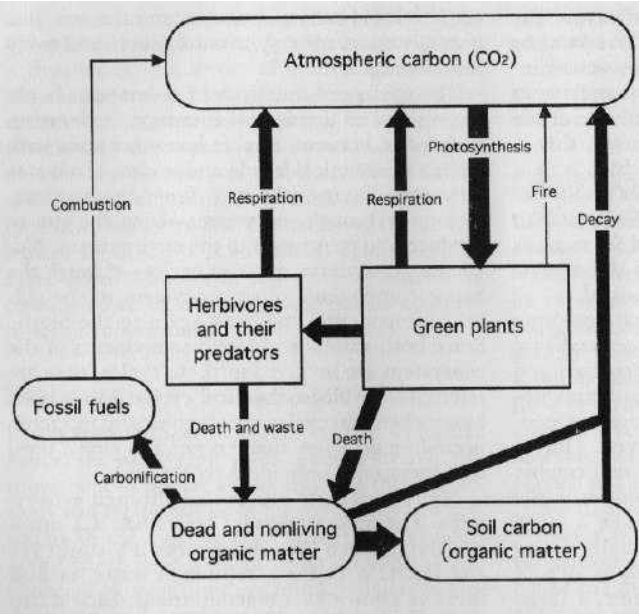
Carbon on site and carbon being sequestered.

Carbon footprints, offsetting and sequestration have all become household terms and have an increased importance in government policy and legislation. Management of carbon assets have become a major influence in business policy which will increase in importance in years to come.

A Climate Emergency has been declared by the NI Executive and the UK Government has set challenging targets to achieve a Net Zero carbon balance for businesses by 2050 as part of the recent Climate Change Act. Businesses will be expected to achieve a carbon balance, or to offset carbon emissions in some way. Sectoral plans will contain fully funded carbon audits of sites, assessing where the contribution each site can make to carbon management as an asset across the Plan sites.

The NI Assembly passed the Climate Change Act (Northern Ireland) 2022 which sets challenging targets to achieve a net zero emissions target for all NI Businesses by 2050. In Ireland the Climate Action and Low Carbon Development (Amendment) Act 2021 has similar aims. These Acts require achieving landmark targets for greenhouse gas emissions and carbon sequestration opportunities across all sectors of public and private sectors in both Northern Ireland and Ireland.

Carbon is essential for the process of photosynthesis - the basis of life on earth. Carbon is a recycled macronutrient and the length of cycles and retention of carbon is vitally important.



The Carbon Cycle

Carbon is present in both soils and vegetation. In soil it is found in the soil organic matter (SOM) which forms due to the decomposition of plants and animal residues that enter the soil system. SOM has 3 main components: actively decomposing material, stable organic matter and living soil organisms. It is Important for healthy and productive soils-like the “glue” binding the soil particles together and retaining moisture, nutrients and biodiversity. Soil Organic Carbon is the main constituent of SOM. Carbon storage in soil is a balance between the input of organic materials and the rate they are lost at, via decay, respiration and combustion.

Peat holds a lot of stable organic matter. Soils are our biggest store of carbon. Carbon capture is the amount of carbon taken out of the atmosphere by the soil/plant system. Carbon storage = Carbon sequestration – Carbon emissions.

The overall aim in this report is to give an estimate of the amount of the carbon stored in soils and above ground biomass in each of the Breedon holdings. Based on the habitats present and condition of the peatland, an approximation of the amount of active sequestration is made.

Methodology

Soil carbon. Soil type and depth will be calculated for the Breedon sites using appropriate databases and soil maps to calculate the areas of individual soil types per site. This was verified by visiting/ground truthing each site.

Soils were described according to the WRB (World Reference Base).The WRB is the international standard for soil classification system endorsed by the International Union of Soil Sciences (IUSS). The classification used in the NI Soil Survey (Cruickshank, 1987) and the National Soil Survey of Ireland (Gardiner & Radford, 1980) predates the WRB classification but using the classification terminology was updated to the nearest WRB equivalents.

Soil carbon content values for these soil types and depths in Northern Ireland and Ireland are available and published in peer-reviewed, widely accepted sources.

Carbon stored in above ground biomass(vegetation). The Fossitt habitat classes for Ireland have been widely used throughout this report. There are no direct values for carbon in vegetation cited in this classification, but the vegetation descriptors correspond to the broad habitat classes described by Gregg et al (2021) in their comprehensive review of relevant data on carbon stocks and fluxes in vegetation across the UK. We have used these estimates and the EU CORINE estimates as cited by Cruickshank, Tomlinson, Devine and Milne (1998) for Northern Ireland.

The IPCC are the standard, internationally accepted source of values for measured carbon stocks and emissions in soils and vegetation. These are grouped by region and are the bases of official returns on carbon stocks and emissions made by most governments. However, they attempt to cover very broad habitat regions and it is generally accepted that estimates based on more local research and reviews should be used where possible. These will generally eventually feed into the IPCC reports and standards so represent a more

accurate picture of a region's carbon stocks and fluxes profile (while falling within the ranges cited within the IPCC reports). In this report we have used the locally generated and published data from the NI Soil Survey (Cruickshank 1997) and Cruickshank, et al (1998) and for the Republic of Ireland data published by Xu et al (2011) have been used. These were found to be within the ranges cited by the IPCC values. The most recent review of research on soils and vegetation Carbon stocks and fluxes is a Research Report produced by Natural England for the UK and hence covers the ranges of soils and habitats across the British Isles (Gregg et al 2021). Also very helpful is the Natural England Research Report NERR043 (Alonso et al, 2012) on the impacts of management decisions and condition on carbon stores and sources.

Carbon sequestration estimates. These are notoriously variable with wide ranges reported for all vegetation types across the British Isles. As a general rule most of the grassland habitats will be sequestering in the order of 0.1-0.7 tC/ha/Year. For peatland to be sequestering carbon (rather than emitting) it has to be in favourable condition ie have a dense vegetation cover and a water table around 10cm below the ground surface. Few peatlands are in that state and those in unfavourable conditions will be net carbon emitters. The highest potential sequestration rates come from woodland/tree-based habitats (Gregg et al, 2021). Nominal values (in t Carbon sequestered) have been assigned to habitats based on the literature but these are very vulnerable to change.

At Bweeng the wet woodland habitat is both a carbon store and is continually sequestering carbon from the atmosphere.

Results

The following tables summarise the soil and biomass stocks and sequestration of carbon for Bweeng quarry; full details of the individual calculations are available in a workbook.

Table 1: Estimated soil and biomass carbon stocks on Bweeng quarry.

tC stored	tC	tCO_2e
Soil	**801.8**	**2,939.9**
Vegetation	**183.0**	**671.0**
Total stored carbon	**984.8**	**3,610.9**

Table 2: Estimated current carbon sequestration (tC y^{-1}) for main habitat groupings.

Habitat type	tC y^{-1}	tCO_2e y^{-1}
Woodland	**6.7**	**24.6**
Scrub	**1.5**	**5.5**
Grassland	**0.2**	**0.7**
Hedgerow	**0.1**	**0.4**
Regenerating spoil	**0.05**	**0.2**
Total carbon sequestered	**8.6**	**31.4**

Conclusions

Overall, Bweeng quarry is estimated to have a total carbon stock of **985 tC** (**3,611 tCO_2e**). As would be expected, much lower amounts of carbon are stored in the above ground biomass – **183 tC** (**671 tCO_2e**) representing only **19%** of the total carbon stocks across the holdings. Hence, the protection of the soil carbon reserve should be a key environmental objective.

The carbon sequestration potential of the vegetation is currently approximately **9 tC y^{-1}** (**31 tCO_2e y^{-1}**). It must be noted that potential variabilities in factors affecting emissions -and sequestration - make it extremely difficult to state an overall Carbon Flux balance for the site. This estimation is based on most current flux figures from Alonso et al. (2012) and may be refined with developing understanding in the field of Carbon transfers.

Currently, **78%** of all sequestration is coming from the woodland habitats and scrub. The woodland habitats represent the best opportunity to increase carbon sequestration across the site. Opportunities to convert species-poor grassland, into woodland will give the best return in increasing carbon stock and sequestration. There will also be substantial biodiversity benefits.

External Local Biodiversity Policy, Action Plans, Biodiversity Priority Habitats and Species

https://assets.gov.ie/233057/f1a92f68-e668-498d-a56c-df777a19b549.pdf

Ireland's 4th National Biodiversity Action Plan (NBAP) has been in development since October 2021. The Plan will set the national biodiversity agenda for the period 2023-2027 and aims to deliver the transformative changes required to the ways in which we value and protect nature.

Relevant outcomes include:

- Biodiversity and ecosystem services in the wider countryside are conserved
- The NBDC will produce and implement a Biodiversity Citizen Science Strategy to promote citizen engagement with both terrestrial and marine biodiversity and to develop greater awareness of the value of local biodiversity
- DHLGH and DAFM will fund, support, and promote the work of the Business for Biodiversity platform during its initial set up phase of three years
- The Business for Biodiversity platform will engage with business to enhance private sector action on biodiversity
- The Business for Biodiversity platform will provide a mechanism to match private sector resources with appropriate biodiversity projects
- The Business for Biodiversity platform will support businesses in conducting materiality assessments and determining their impacts and dependencies on nature and biodiversity

Ireland has Red lists for its important species of wildlife this includes birds ref https://www.bto.org/our-science/projects/birdtrack/bird-recording/birds-conservation-concern/red-list-ireland and Mammals, invertebrates, fish, flora etc ref National Biodiversity Data Centre for Ireland ref https://biodiversityireland.ie/publications-category/red-lists/?search=

An example is the **Red List of Terrestrial Mammals** They are listed in order of most critical

Table 1 – Terrestrial mammal species included in this red list assessment, listed according to their status.

Regionally extinct			
Canis lupus	Grey wolf		
Vulnerable			
Rattus rattus	Black rat/Ship rat		
Least concern			
Erinaceus europaeus	Hedgehog	*Sciurus vulgaris*	Red squirrel
Sorex minutus	Pygmy shrew	*Lutra lutra*	Otter
Myotis daubentonii	Daubenton's bat	*Martes martes*	Pine marten
Myotis mystacinus	Whiskered bat	*Meles meles*	Badger
Myotis nattereri	Natterer's bat	*Mustela erminea hibernica*	Irish stoat
Nyctalus leisleri	Leisler's bat	*Vulpes vulpes*	Red fox
Pipistrellus nathusii	Nathusius' pipistrelle	*Phoca vitulina*	Harbour seal
Pipistrellus pipistrellus	Common pipistrelle	*Halichoerus grypus*	Grey seal
Pipistrellus pygmaeus	Soprano pipistrelle	*Lepus timidus hibernicus*	Irish hare
Plecotus auritus	Brown long-eared bat	*Oryctolagus cuniculus*	Rabbit
Rhinolophus hipposideros	Lesser horseshoe bat	*Cervus elaphus*	Red deer
Apodemus sylvaticus	Wood mouse	*Dama dama*	Fallow deer
Mus musculus domesticus	House mouse		

An example of the Birds Red list is shown below

The Red List (Ireland) – high conservation concern

Red-list species are those that are Globally Threatened according to the IUCN criteria; those whose population or range has declined rapidly in recent years; and those that have declined historically and not shown a substantial recent recovery.

Black-necked Grebe #	Red-necked Phalarope #
Common Scoter * #	Roseate Tern * #
Hen Harrier *	Barn Owl *
Red Grouse *	Nightjar * #
Grey Partridge * #	Ring Ouzel #
Quail #	Chough *
Corncrake * #	Twite * #
Lapwing *	Yellowhammer *
Curlew *	Corn Bunting * #

* = declining breeder
# = historical decline

The Amber List has 75 species of which the following are most relevant to quarry habitats:. Sand Martin, Peregrine, Swallow, Stonechat, Grasshopper and Willow Warbler and Coot

The Cork County Biodiversity Action Plan (Relevant extracts)

https://www.corkcoco.ie/sites/default/files/2022-06/volume-1-main-policy-material.pdf

CHAPTER 15 BIODIVERSITY AND ENVIRONMENT

Aim of Chapter- Ensure that the natural environment, biodiversity and ecosystems are protected, delivering benefits essential for all sectors of society and that Cork County contributes to efforts to reverse the loss of biodiversity and the degradation of ecosystems and the environment.

Introduction The biodiversity of Cork includes our native plant and animal species, and the places (habitats and ecosystems) where they live. At EU level the most important habitats and species are protected through Natura 2000 which is the network of protected areas established under the Habitats and Birds Directives. In addition, Member States are called on to develop and implement wider countryside measures in their land-use planning and development policies that support the coherence of the Natura 2000 network pursuant to Article 10 of the Habitats Directive and Article 3 of the Birds Directive. 15.2.2 At European level, the 2030 EU Biodiversity Strategy sets out a long term plan to protect nature and reverse the degradation of ecosystems.

At national level, biodiversity policy is set out in the National Biodiversity Action Plan 2017-2021 (NBAP) which identifies habitat degradation, climate change and spread of invasive alien species as significant factors negatively impacting on biodiversity in Ireland today. The Cork County Biodiversity Action Plan was adopted in December 2008. This Plan sets out County level policy and action in areas relating to increasing knowledge, raising awareness and protecting biodiversity.

The Habitats Directive provides for the protection of biodiversity across Europe through the designation of Special Areas of Conservation. These sites are proposed or designated for protection because they support habitats and/ or populations of plant and animal species that have been identified to be rare or threatened at a European level. The habitats for which sites can be proposed for designation include coastal habitats such as sand dunes, upland habitats such as blanket bog and heath, freshwater habitats including lakes and rivers, and a number of different woodland types. The species for which such sites are proposed for designation include both plants and animal species e.g. Killarney Fern, Otter, Salmon and Freshwater Crayfish. Sites proposed and designated under the Habitats Directive are known as Special Areas of Conservation (SACs). Many sites support more than one protected habitat type and they may also support protected species. These sites are selected because they support the best national examples of important habitats, or they support important populations of protected species.

Most native Irish mammals, amphibians and birds, and some native fish and invertebrate species are protected. Of particular relevance are plant species listed under the Flora Protection Order; plant and animal species listed in the Habitats Directive; birds listed in the Birds Directive; and plant and animal species protected under the Wildlife Act. A listing of protected plant and animal species known to occur in Co. Cork is included in Volume Two

The Council has a role in

a) providing ongoing support and guidance to developers on incorporating biodiversity considerations into new development through preplanning communications and the Council's guidance document 'Biodiversity and the Planning Process – guidance for developments on the management of biodiversity issues during the planning process' and any updated versions of this advice;

b) Encouraging the retention and integration of existing trees, hedgerows and other features of high natural value within new developments;

c) Requiring the incorporation of primarily native tree and other plant species, particularly pollinator friendly species in the landscaping of new developments;

d) Fulfilling Appropriate Assessment and Environmental Impact Assessment obligations and carrying out Ecological Impact Assessment in relation to development and activities, as appropriate;

e) Ensuring that an appropriate level of assessment is completed in relation to wetland habitats subject to proposals which would involve drainage or reclamation. This includes lakes and ponds, watercourses, springs and swamps, marshes, heath, peatlands, some woodlands as well as some coastal and marine habitats;

f) Ensuring that the implementation of appropriate mitigation (including habitat enhancement, new planting or other habitat creation initiatives) is incorporated into new development.

Nature Recovery Networks and Connectivity - Site Context

Action is needed now and into the future to improve the condition and extent of Ireland's habitats and ecological networks. Bweeng is a busy quarry with much opportunity for biodiversity gain, planned future developments will have the opportunity to accommodate biodiversity gains in this harsh working environment.

Bweeng, along with other sites, has the opportunity to develop Nature's Recovery for wildlife, mammals such as Irish hare, Pine Marten and bats; birds such as peregrine falcons and kestrels; lizards and newts, along with pioneering wildflowers which provide for bumble and solitary bees/pollinators which take advantage of sandy sites and screened blinding for nesting, scrub woodland is developing and could be enhanced with additional planting.

Recovery Networks represent opportunities to consider the management of disparate sites following the principles of Sir John Lawton's management guidelines in his *Making Space for Nature* Report 2010, by providing sites that are *Bigger, Better Managed, and More Sites that are Joined Up.* In Ireland the National Biodiversity Plan focuses on retaining or enhancing natural sites to provide habitat and connectivity across the landscape.

Public Access

The Bweeng site is currently a busy working quarry and so Health and Safety considerations would preclude public access.

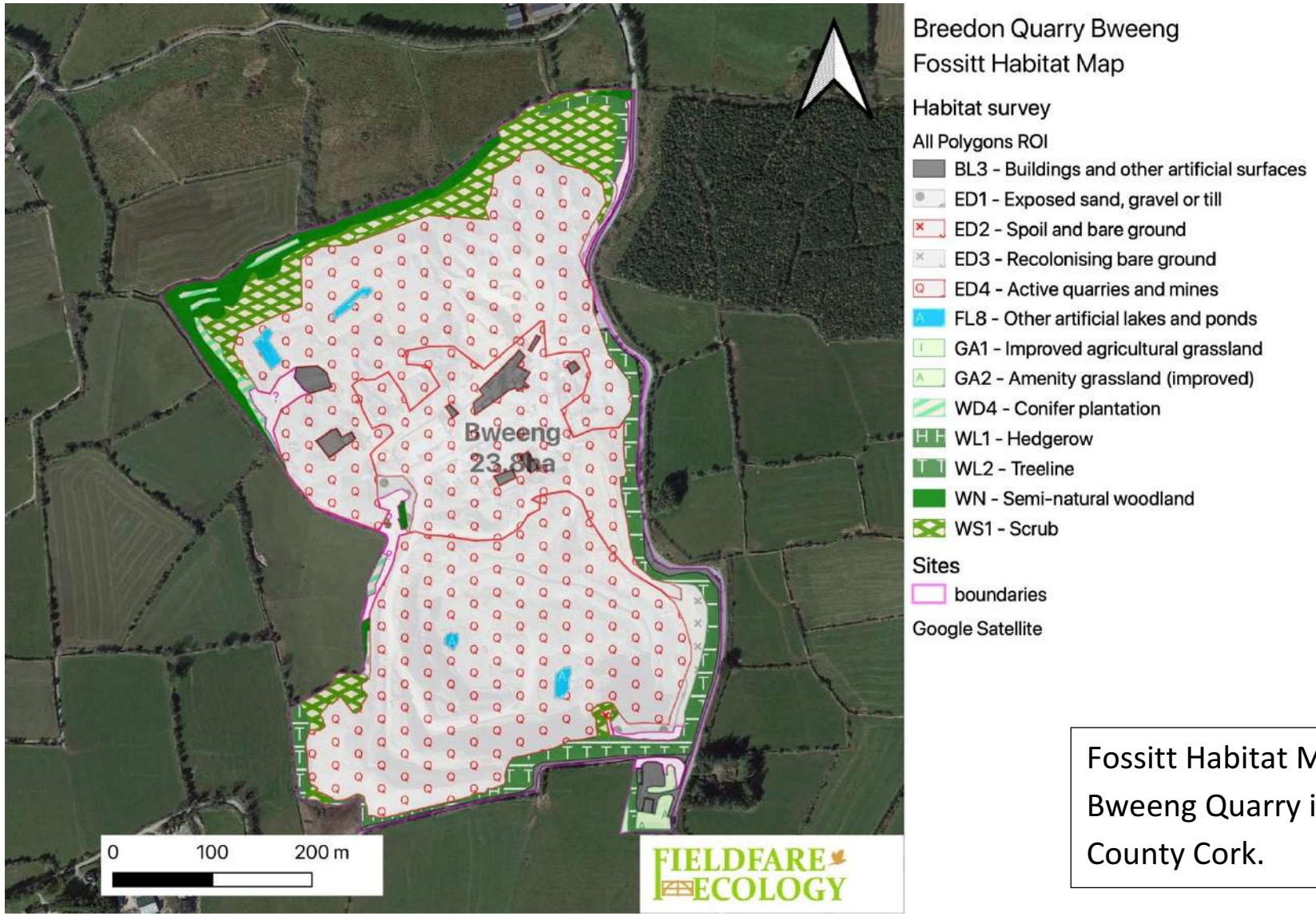
It may be suitable to facilitate organised educational visits from local wildlife groups for specific surveys by arrangement and with full Risk Assessment in place.

It may be possible to arrange educational visits for local schools/societies to learn about the geology and biodiversity of the area

Site Layout

Aerial layout of Bweeng Quarry site (Google Satellite, 2020)

Habitat Plan



Fossitt Habitat Map of Bweeng Quarry in County Cork.

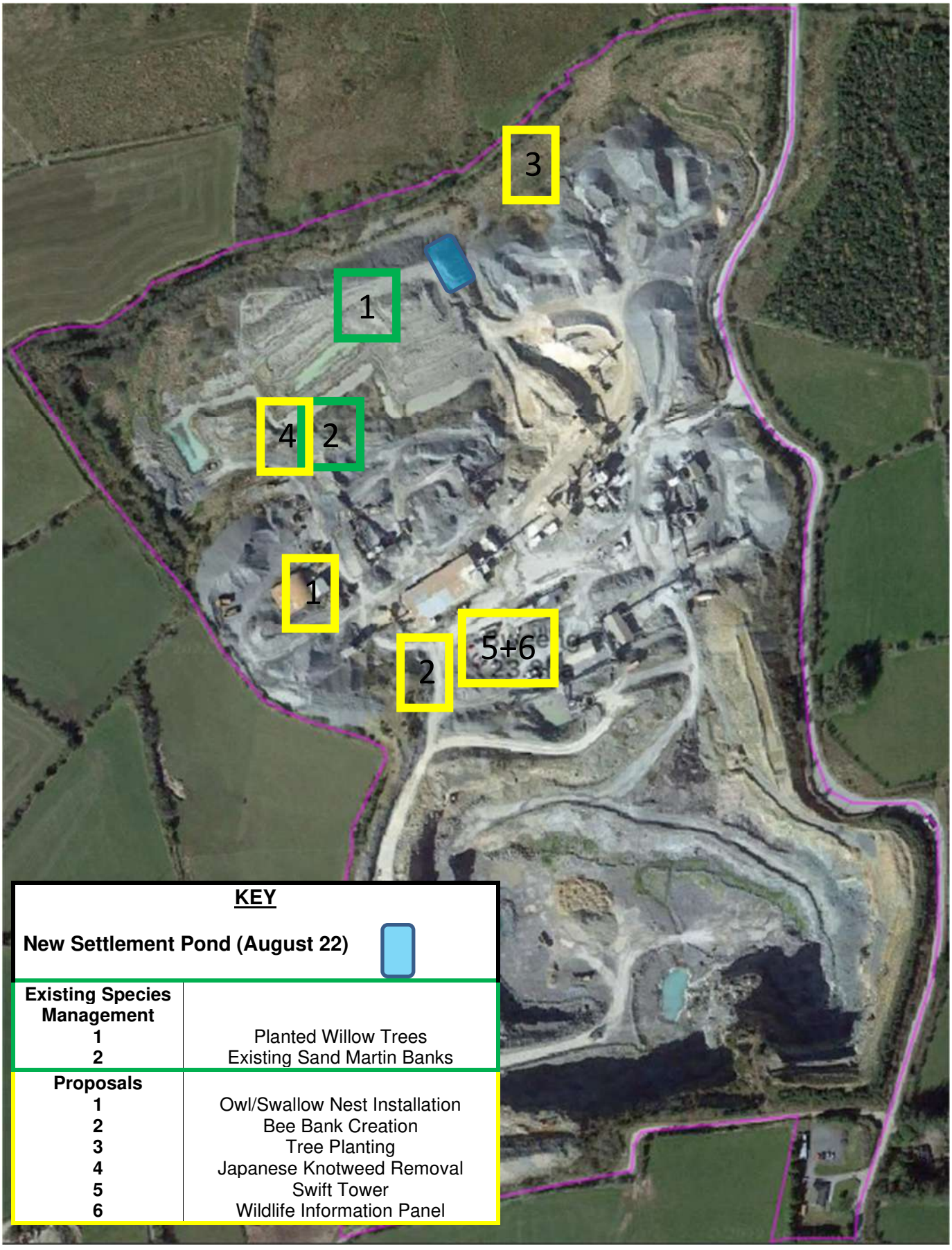
Existing Breedon Biodiversity Initiatives at Bweeng

Existing Sand Martin Nests

Willow Planting on Northern Site Boundary

Regeneration of bare ground

Local Biodiversity Action Plan Proposals



KEY

New Settlement Pond (August 22)

Existing Species Management	
1	Planted Willow Trees
2	Existing Sand Martin Banks
Proposals	
1	Owl/Swallow Nest Installation
2	Bee Bank Creation
3	Tree Planting
4	Japanese Knotweed Removal
5	Swift Tower
6	Wildlife Information Panel

Action Plan

Objective	Task	Assessing Indicator	Person Responsible	Due date (or completed /ongoing)	Priority / Year					
					1	2	3	4	5	- >10
Describe the objective and what feature/species is being targeted	Describe the specific task required to meet/contribute to objective	Describe the method for assessing if the objective has been completed	State the name or role of the person responsible	Enter the due date, or enter ongoing / completed if no specific end date.						
Assess all planned extraction areas	-Environmental Impact Assessments (EIAs) for protected species (badgers, bats, newts and lizards) should be conducted prior to opening new land. -Give opportunity to collect seed and translocate woodland and grassland plants to create new habitat.	-Completed Environmental Impact Assessment -Successful translocation of any protected species identified by EIA. -Planned extraction area cleared of any notable flora.	Site Manager/On-site designation.		*	*	*	*	*	
Raise Staff Awareness of Wildlife	-Produce Wildlife Awareness Booklet for quarry staff and workers -Wildlife Awareness Training Events -Prepare site information panel of Bweeng wildlife**(Yellow 6 on Action Plan Proposals)**	-Final production and completion of training events. -Information panel erected near pinch point for visitors and staff.	Site Manager		*					
Increasing Wildflower Population for Pollinators	-Allow areas to develop a natural flora. -Allow a mix of unvegetated, grassy and scrubby areas to develop.	-Record native flora by photography in spring or early summer each year.	Contractor to advise		*	*	*	*	*	

Tree Planting (Landscape Plan, Green 1 on Action Plan Proposals)	-Continuation of Landscape Plan**(Yellow 3 on Action Plan Proposals)** -Planting mix made up from native tree and shrub species (pioneer species)	-Plants protected by spiral guards or rabbit proof fencing. -Maintenance carried out 2 years after planting (weed control, replacement planting where required, adjustment of spiral guards)	Site Manager/Landscape Contractor							
Increase Habitat Potential for Sand Martin, other birds, Bats and Bees.	-Survey for sand martin. -Avoid destruction of nests whilst occupied and breeding **(Green 2 on Action Plan Proposals)** -Maintain any sand martin habitat, ensuring >45° slope available each year. -Potential for creation of sand martin banks. -Erection of Swift Tower **(Yellow 5 on Action Plan Proposals)** -Potential for creation of bee banks along eastern facing bank**(Yellow 2 on Action Plan Proposals)**	-Quarry staff to record any sand martin breeding colony locations in biodiversity log. -Plan to make and erect bird, bat and bug boxes with staff and local community. -Install bird, bat and bug boxes suitable for a variety of species. -Produce a bird box maintenance schedule for cleaning boxes after breeding season**(Yellow 1 on Action Plan Proposals)** -Develop a box monitoring scheme used by site staff (nest cameras?) for chosen locations across site in biodiversity log. -Bee Bank created and monitored for activity, record in biodiversity log.	Third party consultant/On-site designation	Annually in April-May	*	*	*	*	*	

Implement a controlled community programme to heighten awareness of Breedon work for biodiversity and environment.	-Reach out to organisations such as local primary schools or social groups to organise planned visits to Bweeng to increase awareness of the work Breedon does for the environment and biodiversity. -Consider the construction of a 'Breedon Bio-Hub' to act as a classroom and resource unit, powered by solar panel.	-Run taster events to gauge interest in programme, -Perform SWOT analysis of taster events to work on strengths and weaknesses of programme.	Site Manager	Ongoing	*	*	*	*	*	
Local School Involvement – Bug and Hedgehog Hotels	-Collaborate with local schools to make bug and hedgehog hotels.	-Run workshops on-site or in schools. -Produce and distribute construction kits to schools.	Site Manager/Designated Staff Member.		*	*	*	*	*	
Invasive Species Management: Japanese Knotweed (*Reynoutria japonica*)**(Yellow 4 on Action Plan Proposals)**	-Identification of area and removal.	-See IAS Plan for site specific recommended management.	-Suitably qualified contractor to remove IAS.		*	*	*	*	*	
Surveys for Key Species										
Butterflies	-Engage with the local community and site staff, and Butterfly Conservation. -Ensure Annex I species Marsh Fritillary, and other priority species in the area, are offered protection. -Ensure Irish Red List species in the area are protected. -Pollard Walk	-Butterfly Conservation Ireland is to be contacted to enquire about interest in butterfly surveys for the area and additional management recommendations if applicable to provide habitat for butterflies. -Ensure statutory requirements are followed in	On-site staff/Volunteer.	Weekly walk from April-September.	*	*	*	*	*	

		relation to protected species. -Designated quarry staff record presence of species of butterfly along transect in biodiversity log.								
Dragonflies	-Observational survey.	-Dragonfly observations noted and stored in biodiversity log.	On-site staff/Volunteer.		*	*	*	*	*	
Newts	-Nocturnal survey for newts in standing water	-Newt data collected and recorded in biodiversity log.	Appointed and licensed ecologist.		*	*	*	*	*	
Mammals (Camera Traps)	- Presence/Absence survey carried out using camera traps -In addition to in person sightings.	-Camera traps mounted to stable structures such as trees or posts using reusable cable ties and set to capture both image and video.	Appointed Ecologist.		*	*	*	*	*	
Bats (Comprehensive)	-Enhance foraging and potential roosting habitat for bats.	-Undertake bat detector surveys on site to determine species present. -Surveys conducted (dusk and dawn) to identify roosts or foraging places that may be disturbed by operations. -Erect bat boxes in various locations around site targeted to attract known species. -Local community engagement programme to involve local bat groups in bat box checks, approach local schools	Experienced bat surveyor.		*	*	*	*	*	

		regarding bat box building projects.								
Moths (Comprehensive)	-Light Trapping at key points in the year(Spring, Summer, Autumn)	-Moth species noted, pictured and records stored in biodiversity log.	Appointed Ecologist.		*	*	*	*	*	
Birds	-Breeding Bird survey. -Raptor survey -Survey to be carried out annually.	-Results of bird survey collated and forwarded to Irish Raptor Survey Group (IRSG).	Appointed Ecologist.		*	*	*	*	*	
Up-to-date Site Maps	-Note any changes to existing maps to ease updating in future.	-Clear and Concise site map with details of changes to the layout of Bweeng site.	Site Manager.		*	*	*	*	*	*

INDICATIVE COSTS FOR BWEENG QUARRY

(Relevant actions in bold)

BIODIVERSITY ACTIONS (REF MAP)	PRESCRIPTION	DELIVERY/ COSTS
4	Treat Japanese Knotweed approx 40m2	Contractor Costs €220/ day 2 days / year . 5 years Total €2,200 ex VAT
	Annual Survey for Invasive Alien Species	Specialist consultant approx€350/day Annually across all sites €175 per site.
	Treat / remove Invasive Alien Species	As required €220 per day
	Enhance hedgerows with new native trees None so Hardy and other stockists	**As required**
3	**Plant new woodland** **Native trees available None so Hardy and other stockists**	**Possible volunteer task**
	Maintain new woodland planting - Hand pull weeds	Possible volunteer task. Contractor Costs €220/ day 5 days / year Total €1100 ex VAT year 1. €5500 over 5 years
	Create pollinator /bee banks by scrapping vegetation of sections of stable south facing banks.	**Possible volunteer/ staff task.**
1	**Description** **1 No. Barn owl box** **2 No. Solitary bee boxes** **4 No. Bat boxes** **10 No. large bird boxes** **10 No small bird boxes**	**Mens Shed** **€60 each = €60** **€60/each= €120** **€30 = €120** **€25/each = €250** **€1000 Total to erect 3 days at €220/day =€660** **Total €1660 ex VAT. Monitoring use of nest boxes.**
5	**1 No Swift Tower** **Supply and erection on site**	
	1 No House Martin Tower Supply and erection on site	
	1 No Sand Martin Bank Supply and erection on site or maintain on site	

BIODIVERSITY ACTIONS (REF MAP)	PRESCRIPTION	DELIVERY/ COSTS
	Bug Hotel	
	Provide nest box cameras for live-streaming feed to web site.	Expert in web broadcast Costs to be agreed.
	Develop a Wildfire plan or the habitat on site	Consultant with Site manager. €1200
	Create ponds for dragonflies and newts Provide and install wildlife ramps on steep sided ponds	€50 per ramp
	Complete grazing lease in Year 1 Description – Introduce Grazing to on a 6 year lease following Site Specific Remedial Management plan grazing prescriptions @ 1 livestock unit/ha/year 1st May – 31st December	Charge out at €25 /acre x 56.25 acres = €1406/year Income = €1406/year
	Mammal survey ***Bats*** **Using sonic detectors 2No Echo meter touch 2** ***Other mammals*** **2 No Camera traps –Spypoint 1-6 infrared trail camera**	**Specialist consultant or volunteer approx€350/day 3days €1050 per year** **Specialist consultant or volunteer approx€350/day 5 days €1750 per year**
	Breeding bird survey **Wintering bird survey transects**	**Specialist consultant or trained volunteer approx€350/day**
	Bee/Pollinator Survey	**Specialist consultant or trained volunteer approx€350/day**
	Butterfly survey – Pollard walk	**Trained volunteer or specialist consultant Weekly transect €350/day**
	Moth survey – light trapping. **Cost of 4No light traps**	**Trained /volunteer / Entomologist €350/day 5 days = €1750**
	Dragonfly survey – observation	**€350/day 5 days = €1750**
	Arachnid survey – observation	**€350/day 5 days = €1750**
	Ground Beetle survey – pitfall trapping	**€350/day 5 days = €1750**
	Botanical– Annual Quadrat survey – Rapid Condition Assessment	**Specialist consultant or trained volunteer approx€350/day**
	Mammal survey – Annual Camera trapping	**Specialist consultant or trained volunteer approx€350/day**

BIODIVERSITY ACTIONS (REF MAP)	PRESCRIPTION	DELIVERY/ COSTS
	Butterfly Monitoring – Pollard Walk	**Specialist consultant or trained volunteer** **approx€350/day**
	Bumblebee survey – Using bumble bee monitoring protocols.	**Specialist consultant or trained volunteer** **approx€350/day**
	Breeding bird survey – Bird Watch Ireland **Annual - volunteers carrying out an annual bird survey using approved survey technique.**	**Specialist consultant or trained volunteer** **approx€350/day**
	Moth trapping –light trapping at key points in year (at least spring, summer, autumn)	Trained / volunteers
6	Produce and erect site name panels– Produce and erect panelnoting site hazards and access arrangements	€2500
	Produce and erect interpretation panels highlighting **1. Biodiversity and** **2. Geodiversity**	**To develop with artwork and text / make up / erect = approx. €3000per sign**
	Produce Breedon Ireland Calender with monthly wildlife tips.	€500/€1000 depending on number printed.
	Provide Bio-hub	Breedon to consider design and commissioning of a Unit to be provided at suitable sites.
	Breedon Wildlife Aware leaflets / blogs/ Wildlife and quarries booklet	
	Liaising with universities to provide ecological study opportunities by identifying projects to provide – baseline surveying and monitoring for species – establishing a GPS fixed point photography baseline – carry out a GPS baseline drone survey of habitat extents	Site Manager / Consultant to draw up project specifications

Images of wildlife, ideas and options

Swift tower

Pollinators

Owl box being installed

Appendix 5-E: Crean and Nelson – Peregrine Falcon and Bird Survey 2023

Bweeng Quarry

Carrigcleena, Co Cork

Breeding Bird Survey

& Peregrine Falcon Survey 2023

Aidan Crean & Debbie Nelson

Spring 2023

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        - 1.4.4 BOCC – Bird Survey Small Projects
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7. **Acknowledgements**
8. **References**

To determine Peregrine Falcon *(Falco Peregrinus)* status at Bweeng Quarry, Co Cork.

1.0 Background

1.1 General. When assessing Peregrine Falcon territory occupancy two aims are required. To determine if a breeding territory exists and to establish breeding success. Falcons no matter how successful the pair may be, do not always manage to produce a brood *every* year. The huge investment of additional energy required year on year, to catch extra prey to feed three fast-growing Peregrine juveniles from May to September and beyond into post juvenile dispersal is extraordinary. To then get, what must feel like a short five-month break November- April, before repeating the cycle sounds exhaustive and high risk. An occasional gap-year must be essential. This is why confirmed occupancy is so important even if the pair do not manage to breed.

1.2 Health & Safety & Licensing. Full PPE was worn at all times. Inductions at all quarries were followed by a personal site walk around the agreed survey route by the Quarry Managers to show Peregrine nesting location, Sand Martin banks & habitat features being zoned for biodiversity at all sites. All current permits and in-year named specific quarry licensing requirements under Wildlife Acts 1976 to 2018 – Section 9 and 22 were in place to cover Schedule 1 Peregrine photography disturbance NPWS Licence 154/2023, Kestrel, Buzzard & Sparrowhawk and Bird Ringing under Wildlife Acts 1976 to 2018 Section 32 NPWS Licence 080/2023. Likewise, all licences for 'All Raptors' named specific quarry survey work in quarries across N. Ireland were also in place under Article 18 (1)(a) of Wildlife (NI) Order 1985 or Article 39 (2)(a) of the Conservation (Natural Habitats, etc.) Regulations (NI) 1995 'To Disturb Wild Birds for Scientific Purposes' NIEA Licence DSB/56/23 and 'To Disturb Wild Birds for the purpose of Photography' NIEA Licence DFB/38/23 and NIEA Licence TRB/7/23 'To Disturb Schedule 1 Species for the purposes of ringing or marking across named N. Ireland quarries. British Trust for Ornithology BTO Raptor Trainer & Supervisors A Ringing Licence with full 'All Birds of Prey' Endorsements Permit S/4481 is also in place to cover all circumstances. All in year licences and raptor permits were required by the quarry company before access to Bweeng Quarry, Co Cork was facilitated.

1.3 Confidential. Due to the sensitive nature of the Peregrine nest site location at Bweeng Quarry & other raptor quarries surveyed across 2023, nest records remain confidential with information only provided to NPWS, NIEA & the quarry. While the Peregrine Falcon across Britain & Ireland has largely recovered from those 1960's organochlorine declines, in some area's numbers are still declining through organised persecution & the removal of young birds from nests in spring. Climate change, Ravens & criminal persecution would be the primary threats to the Peregrine across the island.

1.4 Birds of Conservation Concern (4) Ireland BOCC Ireland 2022. This well-regarded report is easy on the eye, appears every seven years and as a result, is the best measuring tool available to present a quick health check on the state of all our quarry birds. Supported by governments North & South, Birdwatch Ireland, RSPB & all the corresponding wildlife charities. The report operates a traffic light system & colour-prioritise key bird species Red & Amber. Red reflecting over 50% decline and Amber over 25% decline in the past 20 years. As well as the resident Peregrine Falcons Bweeng Quarry had 5 Red Listed & 8 Amber Listed species recorded. See attached BOCC chart schedules for details.

5x RED LISTED			Bweeng Quarry 2023 Bird Survey - 41x SPECIES									RED	
50%+ Decline			3x VISITS 2023	V1. Tues	V2. Wed	V3. Tues							
				14 March	19 April	23 May							
BOCC(4)				08:30-12:30	14:00-18:00	08:30-12:30					5	Red Listed	5
Birds of	O		Heron	Not Seen						O			
Conservation	1		Mallard	2	0	1		B		X	B	Breeding	36
Concern	2		Sparrowhawk	0	0	1		B		X			
Ireland	3		Buzzard	2	2	1		B		X	X	Present	41
	O		Kestrel	Not Seen						O			
Over 50%	4		Peregrine Falcon	2	2	2		B		X	O	Not Observed	9
Declince	5		Pheasent	2	2	0		B		X		*might expect to see*	
in 25 Years	6		Moorhen	1	0	2		B		X	41	Total Species	41
	7		Snipe	7	0	0		No		X			
	8		Wood Pigeon	4	1	10		B		X			
	9		Swift	0	0	3		No		X			
	O		Skylark	Not Seen						O			
	10		Swallow	0	3	6		B		X			
	11		Sand Martin	0	130	190		B		X			
	O		House Martin	Not Seen						O			
	12		Meadow Pipit	3	2	5		B		X			
	13		Grey Wagtail	1	0	1		B		X			
	14		Pied Wagtail	7	0	4		B		X			
	15		Wren	5	5	10		B		X			
	16		Dunnock	4	2	0		B		X			
	17		Robin	5	3	0		B		X			
	O		Stonechat	Not Seen						O			
	18		Blackbird	2	6	5		B		X			
	19		Song Thrush	3	7	3		B		X			
	20		Mistle Thrush	0	1	0		B		X			
	21		Redwing	30	0	0		No		X			
	22		Fieldfare	60	0	0		No		X			
	23		Sedge Warbler	0	0	1		B		X			
	24		Blackcap	0	1	4		B		X			
	25		Willow Warbler	0	16	9		B		X			
	26		Chiffchaff	0	4	8		B		X			
	27		Whitethroat	0	0	2		B		X			
	28		Goldcrest	1	0	3		B		X			
	29		Blue Tit	2	1	1		B		X			
	30		Coal Tit	2	0	2		B		X			
	31		Great Tit	0	2	2		B		X			
	32		Starling	100	2	15		B		X			
	O		Magpie	Not Seen						O			
	33		Jackdaw	100	60	80		B		X			
	34		Raven	2	2	2		B		X			
	35		Hooded Crow	12	2	3		B		X			
	36		Rook	0	19	36		No		X			
	O		House Sparrow	Not Seen						O			
	37		Chaffinch	4	8	5		B		X			
	38		Goldfinch	0	3	4		B		X			
	O		Bullfinch	Not Seen						O			
	39		Greenfinch	0	2	3		B		X			
	40		Redpoll	0	5	2		B		X			
	41		Linnet	0	27	22		B		X			
	O		Reed Bunting	Not Seen						O			
			Species Totals	25	29	34							

5 SPECIES

5x Amber			Bweeng Quarry 2023 Bird Survey - 41x SPECIES							
Listed			3x VISITS 2023	V1. Tues	V2. Wed	V3. Tues				
Over 25%				14 March	19 April	23 May				
BOCC(4)				08:30-12:30	14:00-18:00	08:30-12:30				
Birds of	O		Heron	Not Seen						O
Conservation	1		Mallard	2	0	1	B			X
Concern	2		Sparrowhawk	0	0	1	B			X
Ireland	3		Buzzard	2	2	1	B			X
	O		Kestrel	Not Seen						O
Over 25%	4		Peregrine Falcon	2	2	2	B			X
Declince	5		Pheasent	2	2	0	B			X
in 25 Years	6		Moorhen	1	0	2	B			X
	7		Snipe	7	0	0	No			X
	8		Wood Pigeon	4	1	10	B			X
	9		Swift	0	0	3	No			X
	O		Skylark	Not Seen						O
	10		Swallow	0	3	6	B			X
	11		Sand Martin	0	130	190	B			X
	O		House Martin	Not Seen						O
	12		Meadow Pipit	3	2	5	B			X
	13		Grey Wagtail	1	0	1	B			X
	14		Pied Wagtail	7	0	4	B			X
	15		Wren	5	5	10	B			X
	16		Dunnock	4	2	0	B			X
	17		Robin	5	3	0	B			X
	O		Stonechat	Not Seen						O
	18		Blackbird	2	6	5	B			X
	19		Song Thrush	3	7	3	B			X
	20		Mistle Thrush	0	1	0	B			X
	21		Redwing	30	0	0	No			X
	22		Fieldfare	60	0	0	No			X
	23		Sedge Warbler	0	0	1	B			X
	24		Blackcap	0	1	4	B			X
	25		Willow Warbler	0	16	9	B			X
	26		Chiffchaff	0	4	8	B			X
	27		Whitethroat	0	0	2	B			X
	28		Goldcrest	1	0	3	B			X
	29		Blue Tit	2	1	1	B			X
	30		Coal Tit	2	0	2	B			X
	31		Great Tit	0	2	2	B			X
	32		Starling	100	2	15	B			X
	O		Magpie	Not Seen						O
	33		Jackdaw	100	60	80	B			X
	34		Raven	2	2	2	B			X
	35		Hooded Crow	12	2	3	B			X
	36		Rook	0	19	36	No			X
	O		House Sparrow	Not Seen						O
	37		Chaffinch	4	8	5	B			X
	38		Goldfinch	0	3	4	B			X
	O		Bullfinch	Not Seen						O
	39		Greenfinch	0	2	3	B			X
	40		Redpoll	0	5	2	B			X
	41		Linnet	0	27	22	B			X
	O		Reed Bunting	Not Seen						O
			Species Totals	25	29	34				

8 SPECIES

1.4.1 BOCC Bird Survey - Conclusion

Exciting Numbers. It was exciting to discover 41 species of birds at Bweeng Quarry of which 36 were likely breeding. Judging by the variety of habitats, mixed woodland, mature hedgerows, ponds, reedbeds, cliff face & thick boundary landscaping we suspect this 41 species tally & 36 breeding to be an underestimate. However, these figures are still quite impressive and more than many of our local nature reserves.

BOCC. Birds of Conservation Concern Priority Red Listed x5 species (Swift, Snipe, Meadow Pipit, Grey Wagtail & Redwing) is excellent along with 8x Priority Amber Listed x8 species (Mallard, Swallow, Sand Martin, Willow Warbler, Goldcrest, Starling, Greenfinch & Linnet) totals x13 of the top priority bird species on the island. To give a sense of context these 13x species are on the same priority list as Golden Eagle, Barn Owl, Yellowhammer, Lapwing, Snowy Owl, Roseate Tern & Chough.

Potential. Quality birds are present on site. The opportunity is clear. We just need to design & create the best plan. Tremendous progress has been made recently.

1.4.2 BOCC Bird Survey - Small Achievable Conservation Projects

Practical. Hone-in on some iconic conservation species & deliver a well thought through practical project. Include staff, community & teachers. If successful & fits with the business, plan annually. Design out across 3-5 years.

Bird Boxes - various species. Visible, effective practical conservation projects e.g. Kestrel, Swift, Starling, Barn Owl & other bird boxes include school/staff. Year 1-2.

Sand Martin Bank. Create suitable location in peripheral open corner. Year 1-2.

Swift Tower. Home made by the business, stand alone (solar power caller) Year 2.

Swallow Porch. Home made by the business, stand alone, (solar power caller Year 3

Bat Colony Roost Boxes – staff car park. Wetland areas, boundary woodland, old buildings, sheds, local school partner, mature trees, old hedgerows. Plan. Year 1-3.

Pollinator Banks. Create boundary bund, perimeter screening, carpark banking, office view, smartly located, south facing pollinator banks butterflies, bees, moths with colourful sign posting. Year 2-3.

Lizards. Locate x4 observation/study points discreetly across site. Assess, liaise & focus in an action. Monitor & build-up quality biodiversity data base. Year 3.

Ponds. Creating new, opportunistic standing water scape areas is essential to helping biodiversity establish & thrive. Year 3.

Trail Cameras. Camera trap elusive creatures that we can confirm presence by droppings & footprints i.e. badger, fox, stoat, shrew, lizard, pine martin. Year 2.

People/Team. Build a new practical conservation dynamic of local volunteers (teachers & staff) & equipment to train & maximise the available habitat potential to enhance local wildlife & build the business. Key people are critical. Year 1-2.

1.5 Recent Increase in Peregrine Falcon Territories – Statistics RoI & NI.

1971 14x Occupied Territories (impact of 1950's-1960's organochlorine pesticides)

1978 First Peregrine Falcon Territory reported in any NI quarry.

1981 61x NI Peregrine Territories of which 40% in NI 160x Quarries.

1981 105-107x Occupied Territories across RoI.

1991 140-143x Occupied Territories across RoI (+23-26% increase)

2008-12 41x Occupied Territories in Wicklow Survey

2009 355-390x Occupied Territories across RoI (18% in Quarries)

2020 87x Territories NI

2023 occupancy & breeding success confirmed. This is the third consecutive year of fledged juvenile falcons successfully emerging from the quarry into the surrounding farmland. Bweeng Quarry, Co. Cork remains historically, a safe and important established breeding Peregrine Falcon quarry in the Rep. of Ireland.

1.6 Nesting Peregrine Falcon - Seasonal Timeline

Jan-Feb Breeding pairs typically return to nest site, occupancy established & territory confirmed.

March Evidence of Peregrine presence begins to build round nest site, whitewash, kills, feathers.

April Eggs laid first week-mid April & incubation period 30 days (29-32days).

May Eggs hatch around first week in May & take 6 weeks to fledge (35-44 days).

June By mid-June large juveniles become visible standing out & around the nest site.

July Young juveniles move out from the nest though still remain local and close-by.

August Large fully grown though still dependant juveniles, looking like adults practice flying further from nest site.

September Over 4-week period mid-August – mid September juveniles begin to leave the parents.

October Post Juvenile Dispersal – most young birds now fully independent from parents disperse ever further & reported widely moving out all over the country.

November/December Adult Birds extend feeding territory to increase feeding opportunity during winter months but still remain loyal & return to breeding site (Quarry) daily to maintain territorial hold over the site.

1.7 Peregrine Falcon Survey- Guidance General

Guidance on Peregrine surveys advise visits can commence from March & at least two visits should be made. Visit 1 preferably 1 March – mid-April, allow 2-6 weeks then Visit 3 &, if need be, a third visit in June to determine success. Flexibility is deliberate to allow for weather, the behaviour of individual birds & stresses causing breeding delay at some nest sites. It is also advised that favourable seasonal weather can bring events forward by a few weeks. Indeed, this was the case in February 2023. So, the initial round of quarry surveys commenced in mid-March 2023 & Bweeng was first surveyed 14 March. Again, the guidance suggests 3hr visits for random survey squares (as a bird, if present should be seen moving within that timeframe). However, a 2-hour visit is fine for established sites and even less where both birds are exactly where the manager shows you, which was the case at Bweeng.

A series of practical raptor occupancy/breeding codes are then available in the guidance to help advise on the likelihood of possible peregrine presence. However, when you first meet the quarry manager and he walks you over to a safety bund and points across precisely to both adult birds perched high on a quarry face littered with whitewash, prey remains, plucking posts, kills and moulted falcon feathers, its not a great leap to assume you are likely in an active Peregrine quarry and might not need to be searching for 3-hours for evidence. QM then points out the nest location & advises how the birds have produced 2 juveniles in 2022 and 3 juveniles in 2021 and been likely present for years before that but could not confirm details. QM advises how he & quarry staff 'all look out for the birds' and how the 'business operation never seems to impact on them'. Male & female Peregrine are observed on each quarry visit and the female observed sitting, apparently brooding eggs on 23 May on the nest ledge & exactly where QM advised the nest was successful in 2021 and 2022.

1.8 Context. The Peregrine Falcon in Ireland remains an Annex 1 raptor listed in EU Birds Directive (2009/147/EEC) and is protected under the Wildlife Act 1976 and Amendment Act 2000. The species suffered declines across the country in the 1960's with the use of organo-chlorine pesticides that accumulate in prey species taken by falcons causing infertility and the thinning of eggshell. The eggs were breaking in the nests leading to a dramatic collapse in productivity. Only 14 Peregrine Falcon nests were recorded across Ireland in 1970. Restrictions were imposed on the use of these pesticides and the first national Peregrine Survey in 1981 documented 225 occupied territories. The 2002 Peregrine Survey recorded 390 territories. EU Birds Directive Article 12 considered the conservation status of Peregrine to be favourable, so the species remains green-listed on the Birds of Conservation Concern Ireland 2022.

2. Introduction. The objective of this study is to confirm Peregrine occupancy, breeding status & nest location at Bweeng Quarry & record the on-site breeding birds in Spring 2023.

Specific aim is to provide baseline data on the presence of breeding Peregrine and identify any potential risk to breeding falcons.

To identify the precise nest location within the quarry, roosting and feeding ledges, observation points and general movement to assess disturbance levels and risk of any falcon displacement.

Provide a list of other important breeding birds. See BoCC species lists attached at item 1.5.

3. Methods

Survey format followed best practice falcon survey process as set out by Hardey et al. (2009) adapted for the precise requirements of this quarry survey based on the existing knowledge of use at Bweeng Quarry by Peregrine Falcon over recent years. Historical context, background advice and precise direction were provided by the Quarry Manager and the first vantage point observation from an appropriate and discrete position was set up on 14 March 2023 in suitable weather conditions. While both adults were seen on site outside the deep quarry, they were not observed within the quarry on our first visit but were on both further visits. Subsequent follow up visits were carried out on 19 April and 23 May 2023 with both adult birds always present either on the quarry walls or observed flying in from foraging in the surrounding countryside. Feathers from fresh kills could be seen at three locations and sufficient areas of fresh whitewash visible to confirm this clearly was an active quarry.

4. Results. A breeding pair of breeding Peregrine Falcons was confirmed at Bweeng Quarry, Co. Cork and observed both together & individually on numerous occasions during visits in spring 2023. The traditional nest location with the birds attending, was identified at the due north quarry wall. Quarry Manager and colleagues confirmed the nest site as the same location as 2021 and 2022 when juveniles fledged from the nest. The female was observed on 23 May incubating her eggs on the nest ledge at the precise location as advised by the quarry manager and several colleagues. Staff appear to all admire & have some connection to 'their' nesting Peregrine Falcons. There is an identifiable sense of responsibility, pride and care within the on-site quarry staff towards the birds. This duty of care has been observed in several 'Peregrine quarries' where historical pairs appear settled and maybe as a direct result become better established and more productive.

The visible contrast between the old original weather-worn, nesting quarry wall being clearly left untouched over many years as faded, discoloured rock, green and often noticeably overgrown with small trees, ferns, gorse, mosses, willow and various low level vegetation type compared to adjacent new rock walls, clear bench formations and a fresh quarry rock structure, quickly informs the observer there has been no blasting here for many years. It is abundantly clear '*at a glance'* that the traditional Peregrine nest site at Bweeng Quarry, Co. Cork is being successfully protected by the business operation on an annual basis. The birds also appear to be well aware of this, and this is the third consecutive year 2021, 2022 & 2023 of 2-3 emerging juvenile Peregrine Falcons being seen perched out around the historical nesting wall 'cliffing' as they learn to stretch & flap their wings. They wait patiently for the return of the adults with fresh kills from the surrounding farming landscape.

Traditional old nesting wall at Bweeng Quarry, Co Cork *(central)* stands out as faded, weather worn & overgrown in contrast to more recently worked bench structure & dust piles at either side of this historic Peregrine breeding site.

4.1 Survey Visit 1. 14 March 2023 (08:00-12:00)

Vantage Point Watch 09:00-09:50

Arrived at Bweeng Quarry 08:00hrs 14/03/2023 in dry, mild, favourable weather and immediately the female Peregrine was observed quietly flying in from the west over fields towards the quarry as we parked in the carpark. Unfortunately, no Peregrine observations were recorded during our first vantage observation point watch 09:00-09:50 at the nesting cliff but whitewash was visible across the quarry and at least two plucking posts with kill remains & feathers evident. More importantly, the quarry manager seemed quite surprised we didn't see the falcons on the cliff wall and assured us *'they are most certainly there as seen regularly by the drivers & staff who are always chatting about them'*.

Male Peregrine was observed 11:30hrs coming around from the east and gliding out along the south boundary of the quarry drifting westerly out over adjacent farmland, going outwards in that same direction from which the earlier female came in upon our arrival.

4.2 Survey Visit 2. 19 April 2023 (14:00-18:00)

Vantage Point Watch 14:30-15:30

Dry, low cloud, no wind, perfect. Both adult Peregrines immediately visible 14:30hrs, the male high on the traditional nesting cliff due north from our vantage observation point. The female then lifts from the right of the nesting cliff and moves west across to the left side of the cliff & perches on a high bank of quarry dust to gain a better view of us. Both birds continued to sit patiently with no noise from either until 15:00hrs when the female was suddenly no longer visible. She had quietly left unseen in a westerly outward direction from the quarry leaving the brightly coloured male on watch. We had missed her departure. Again, the fresh white droppings were evident at several spots on either side of the nest site and at least one definite kill remains could be seen just below to the right of the male. With a very faint 'keee-kee-kee', as if to remind us he can see us, the male at 15:20hrs drops from his perch and in a heartbeat, lifts east in a light breeze out over the skyline not to be seen again. Remain at point for about another ten minutes but neither bird reappears.

4.3 Survey Visit 3. 23 May 2023 (08:30-12:30)

Vantage Point Watch 09:00-09:50

Fine weather, thin 6/8 cloud cover, sun pushing through, light westerly breeze. No Peregrine Falcon obvious, a silent quarry. Some faraway black Jackdaw dots moving along the cliffs, two quiet Swallows on the skyline and the melodious 'pe-vit' and 'tslee-vit' reply of two nearby resident Pied Wagtails sums it all up, relative silence. Bright whitewash evident around the traditional cliff wall & through the scope we could see some fresh kill on a lower bench to the east, 80m from the nest site. As we moved between our two vantage points, we heard the 'keee-kee-kee' call & briefly observed the male lift east, over the skyline & not to be seen nor heard again. When we went outside & around to the Carrigcleena fairy path and came in along the huge rock buttress precipice fenced in, we looked east down the cliff face and just 20m along on a cliff edge, tucked-in behind a small tuft of grass, we observed clearly the steel-grey back and black moustachial stripe of the female fixing & turning herself as she hunkered-in low incubating her brood. Quietly & briefly, we got the scope on her 09:45. This was a quality surprise & important confirmation of breeding precisely where we were advised by the manager. Pleased with ourselves we felt a bit too close & withdrew immediately.

4.4 Site Synopsis

Based on the historic success of breeding falcons at Bweeng & this pair using the same nest location with the female brooding a clutch on 23 May 2023, nesting Peregrine Falcon can once again be confirmed. Quarry Manager confirmed the presence of emerging juvenile falcons' 'cliffing' around the nest site in mid July.

This historical site, active in 2023 also produced 3x juveniles in 2021 & 2x juveniles in 2022. The calm & relative silence of the adult pair implies a sense of safety & habituation to the quarry operation. Likewise, the protective care & awareness of staff on the falcon's whereabouts is impressive & instils great confidence going forward.

5.0 Disturbance. The nature of quarrying causes disturbance to falcons. However, there are levels of risk & reasonable mitigating factors to alleviate adverse impact.

5.1 Disturbance effects can become less once the birds are established. It helps if the birds have access to a reasonable choice of high perching ledges, moving-around scope & sense their nest location is safe. Site occupancy is likely in be established in these circumstances.

5.2 Likewise, where quarry staff are aware of the Peregrines presence & take sensitive steps to protect the birds, especially when breeding. A safe designated nesting location, bird habituation and a good level of staff awareness are all clear & visible at Bweeng Quarry.

5.3 Loss of cliff nesting habitat can occur when the quarry is unaware of the Peregrines presence. Quarrying can remove nesting locations, plucking sites, roosting ledges, foraging areas & observation points. Such requirements make a quarry suitable for a breeding pair to hold a residence. If these key requirements are reduced displacement will more likely occur.

5.4 Direct mortality. The potential loss of birds to the business operation is self-explanatory & can be mitigated against with quarry staff awareness & putting in signs & demarcated Peregrine zones, which Bweeng have done successfully. Any ability for Peregrine Falcon to recover favourably to extrinsic mortality will depend on local demographic parameters.

5.5 Displacement. While birds can be quite tolerant and generally habituate to the normal operational noise patterns within a quarry, the effect of disturbance can be varied. Any negative impact can be short term & lower depending on the individual tolerance levels of established birds. However, with immature birds locating into a new quarry, the operational impact can be more damaging and result in displacement.

5.6 Context. While quarry conditions can cause disturbance, it can be the effect of the presence of Ravens and the adverse impact of rainfall across spring and persecution (including theft of juveniles) that can ultimately cause Peregrines a more serious challenge. The problem with the presence of Ravens in the same quarry is never straightforward. Breeding Ravens and Peregrines are often associated with each other, but the effects vary. Peregrines are known to both actively displace Ravens from a cliff & productivity is known to be both negatively and positively affected by co-existence. Peregrines in quarries across Ireland are more likely to occur with Ravens than not, due to similar nesting habitat requirements. Likewise, Raven nests can provide great nesting ledges where breeding opportunities are at a premium. In some quarries peregrines appear not to fledge any young where Ravens exist alongside human disturbance. With Peregrine's flushing off the nest sooner from human disturbance this allows the Raven to predate the eggs or juveniles. Ravens were sometimes present briefly at Bweeng but interestingly do not breed there.

6. Conclusion

This survey provides confirmation on the repeat breeding success of Peregrine Falcon at Bweeng Quarry in the nesting season of spring 2023. Nest location was confirmed by staff to be in the same location as 2021 & 2022 & management remain aware & protective of the birds' requirements. This cannot be overstated. Awareness & responsibility is everything.

From site meetings with the manager & with staff it quickly became evident that these nesting Peregrines were in safe & knowledgeable hands. Where we see this care, we must state it as we believe it has a positive contributory impact in enabling the birds to feel safe.

This impressive repeat breeding success at Bweeng has not happened by accident as this same responsible approach to zoning habitats, cliff walls, breeding birds & all raptors (especially Peregrine & Kestrel) is evident in other related quarries surveyed in 2022 & 2023.

2023 is the third consecutive year that juvenile falcons have fledged from the same nest site on this high, old north quarry wall at Bweeng Quarry. This is a highly commendable result.

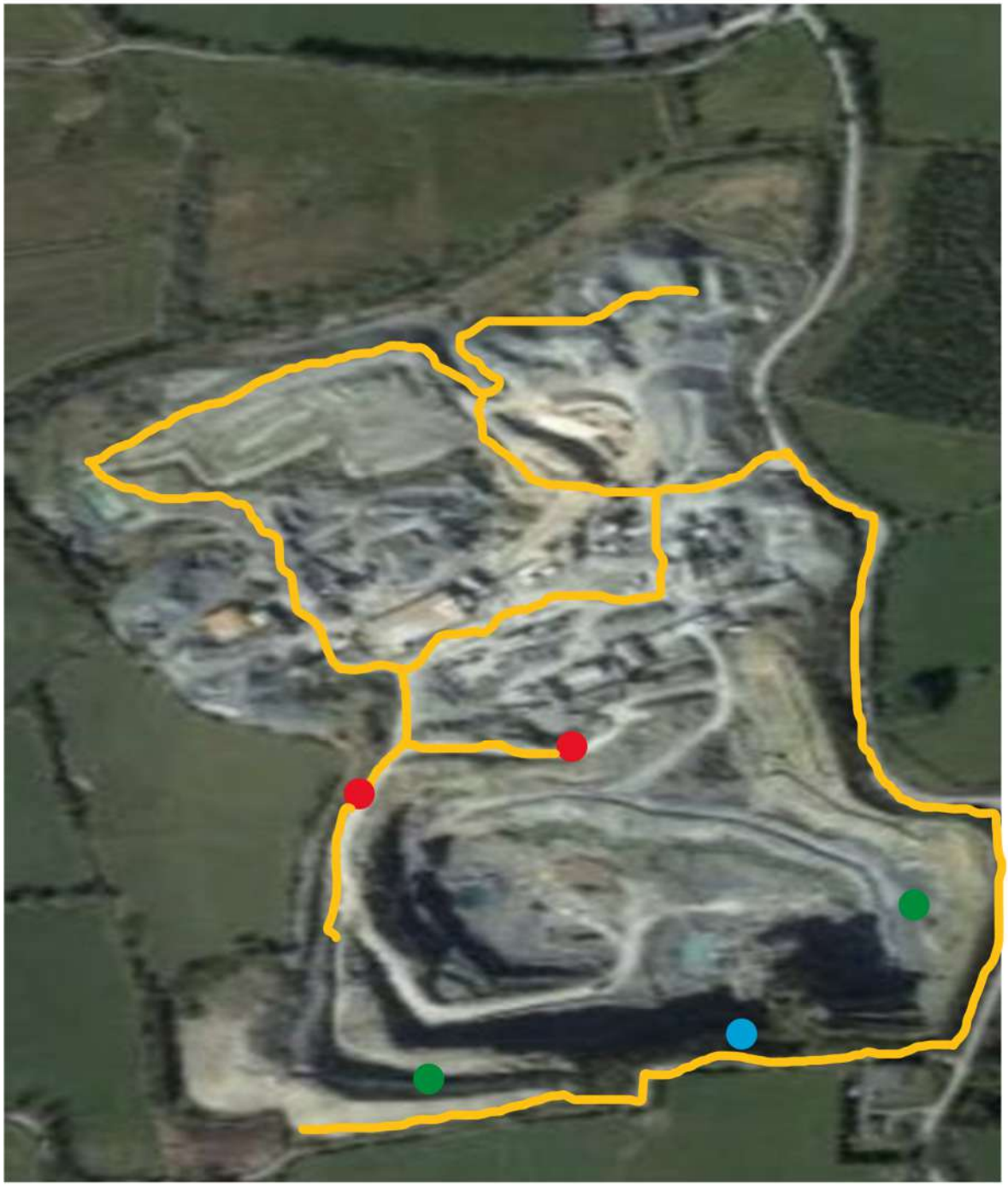
Raven predation, wet weather, cold spells and the struggle to provide sufficient food and human interference on different levels (including surveying) all directly contribute into the Peregrines annual 'risk assessment'. However, the caring levels of staff awareness and professional responsibility towards the birds & the old nesting wall at Bweeng Quarry over our three visits in spring 2023 was impressive. Be great to see some nice Peregrine sign boards raising immediate awareness of the bird's presence both at the car park and at the nesting wall. These are erected at other quarries & remain available within the business.

Likewise, similar Sand Martin awareness signs at the car park for all to see (raising awareness) but crucially at some of the many huge banks of quarry dust located around the site. Some perimeter banks could be 'set aside' for Sand Martins arrival in March but crucially, be prepared 'to allow' & enable Sand Martins to 'claim' an active bank of quarry dust by quickly coning it off & putting signs up to protect the nest colony & the dust bank. Again, this is happening in other quarries and these signs are available within the business.

What became obvious during our three visits to Bweeng quarry was the relative silence of the Peregrine Falcons even when we had telescopes fixed on them at their nesting wall. It appeared to us as if the birds did not perceive a problem & felt no need for alarm. They felt no sense of risk at any point during our survey visits. The slightest of calls were only heard once or twice. Even when the female was sitting on her brood. This is impressive and implies these birds continued to feel safe despite our attention on them. It is as if the falcons are aware they have been allowed this huge, old south facing quarry wall 50m plus high and 200m wide. Judging by the whitewash, kills & feathers, they joyously use all & slightly more of their space allocated. The birds are clearly habituated to the confines of business operation.

Both Peregrines were present at all survey visits & the female observed incubating eggs on 23 May. Allowing 30 days for incubation, it was mid-July before we received confirmed observation reports from staff & management that another three juveniles were beginning to be reported to be 'cliffing' around the quarry wall & taking off in small practice flights between the cliffs. This was another great conservation success story for all involved.

Vantage Observation Points – two red dots mark locations looking due south into the quarry towards the traditional Peregrine Falcon nesting cliff wall. This historical nest site in blue has successfully fledged juvenile birds in 2021 and 2022.



Bweeng Quarry. Important - yellow route line below blue quarry nest dot is a public road OUTSIDE the quarry perimeter fence & heavy landscape boundary causing no disturbance to the nesting birds.

2023 Observations

- Survey Route
- Peregrine Nest Site
- Perches & Plucking Posts
- Observation Vantage Points

7. Acknowledgements

Many thanks to National Parks and Wildlife Service who provided all the licencing cover and permissions to facilitate the 2023 quarries survey. No raptors were ringed in this quarry. Special thanks to Bweeng Quarry Manager & quarry colleagues for creating and maintaining a successful, viable breeding space within Bweeng Quarry for the Peregrines to thrive long term. Thanks also to Environment Manager at Breedon Quarries for taking a focussed interest in the Peregrines presence and wellbeing both at Bweeng and several other related quarries in 2023. The quarry has now arranged to have large coloured, 'Peregrine Falcon Breeding Area' fixed coloured sign boards to be erected on the internal quarry road approaching the nesting cliff to make everyone further aware of the breeding falcons at Bweeng Quarry.

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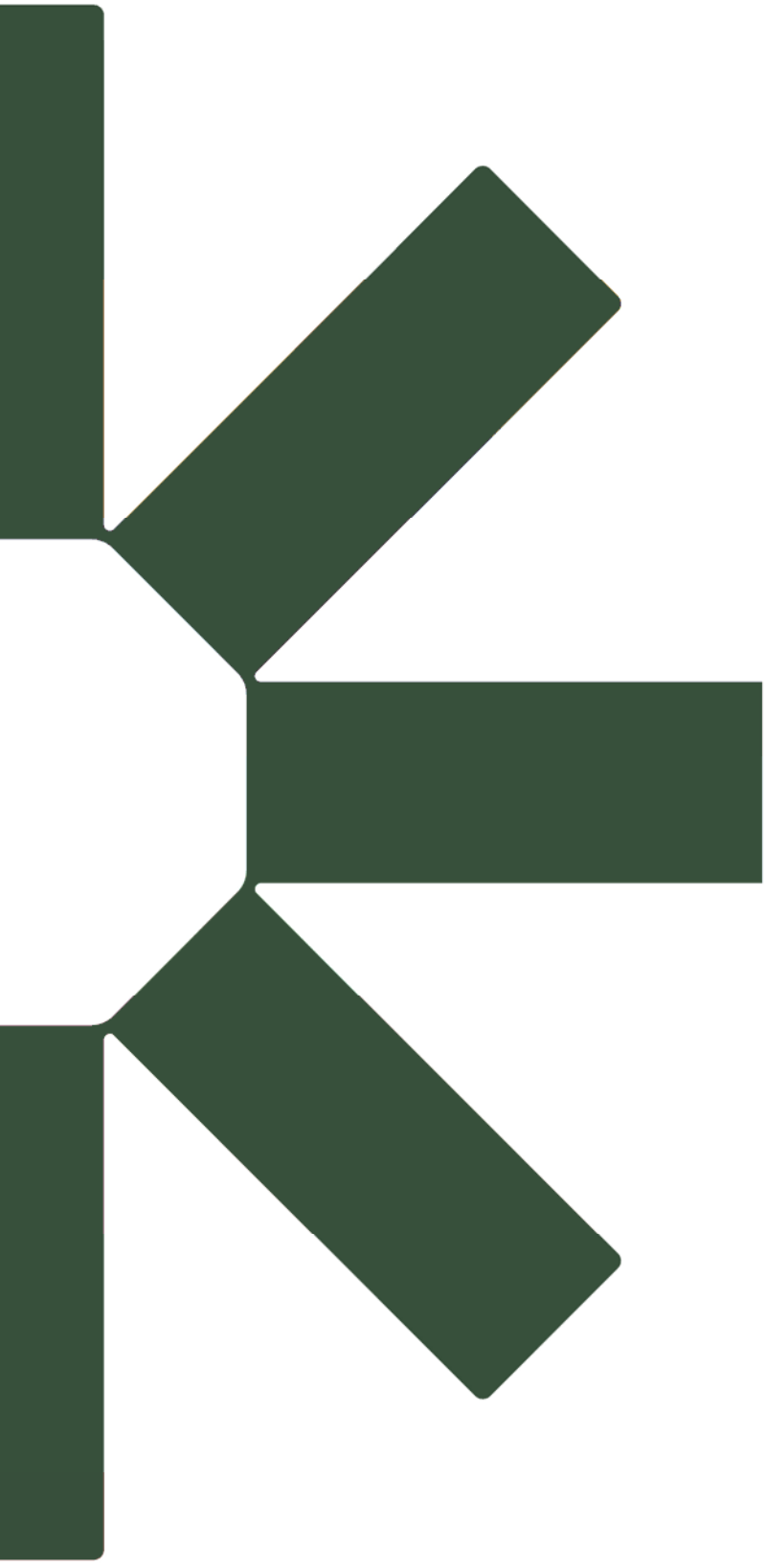
12 December 2023



Making Sustainability Happen

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Introduction

Background

6.1 This chapter of the Environmental Impact Assessment Report (EIAR) provides a description of the existing geological setting at the regional and local scale, an assessment of the impact of the proposed development on the geological features of the area and also other land and soils aspects of the development.

6.2 The current planning application outlines the following key components:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c. 3.7 hectares;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Overburden storage;
- Operation landscaping including perimeter screening berms around the proposed extension area
- Restoration of the quarry to natural habitat after-uses;

All related ancillary site works within an overall application area of c. 28.8 hectares, and all for a period of 20 years and a further 2 years to complete final restoration of the site.

6.3 The current quarry, in operation since around 1978, is authorised for rock extraction to 110 mOD, with an existing site layout shown in **Figure 2.1.**

6.4 Operations involve conventional stone extraction and processing to create High PSV aggregates for various applications.

6.5 An adjacent ready-mix concrete plant commenced operation in 2021, with plans for a block yard not yet implemented. An asphalt plant, permitted in 2006, was removed in c. 2019.

6.6 Ancillary facilities include a mobile processing plant, portacabin offices, weighbridge, and a wheelwash, which will continue in use.

Scope of Work / EIA Scoping

6.7 This EIAR is based on a desk study of the site / surrounding area using published geological data, site inspections of the existing site operations, site ground investigation data including boreholes, available information provided to SLR by Breedon Ireland.

Consultations / Consultees

6.8 A Pre-Planning consultation was undertaken with Cork Co Council for the proposed development, refer to EIAR Chapter 1.

6.9 A number of sources of information were consulted in the preparation of this EIAR Chapter for Land, Soils and Geology. The sources of information consulted are outlined below in this EIAR.

Author

6.10 This EIAR chapter relating to Land, Soils and Geology was prepared by:

- Peter Glanville BA, MSc, EurGeol, PGeo; and
- Nikolina Bozinovic BSc, MSc.

Limitations / Difficulties Encountered

6.11 This EIAR has been prepared based on available desktop and site-specific information. No specific limitations or difficulties were encountered in the preparation of this EIAR.

Regulatory Background

EU Directives

6.12 The following European Union (EU) Directive relate to Land, Soils and Geology at the site in this EIAR:

- Environmental Impact Assessment Directive (2011/92/EU);
- Environmental Impact Assessment Directive (2014/52/EU);
- The management of waste from extractive industries (2006/21/EC); and
- Environmental Liability Directive (2004/35/EC).

6.13 The EU EIA Directive regulates the information impact assessment process and information in this EIAR. The management of waste Directive and the Environmental Liability Directive regulates the activities at the site.

Irish Legislation

6.14 The following legislation relating to Land, Soils and Geology at the site in this EIAR:

- No. 349 of 1989, European Communities (Environmental Impact Assessment) Regulations, and subsequent amendments (S.I. No. 84 of 1994, S.I. No. 352 of 1998, S.I. No.; 93 of 1999, S.I. No. 450 of 2000 and S.I. No. 538 of 2001);
- S.I. No. 473 of 2011, European Union (Environmental Impact Assessment and Habitats) Regulations 2011;
- S.I. No. 584 of 2011, European Union (Environmental Impact Assessment and Habitats) (No.2) Regulations 2011;
- The Planning and Development Acts, 2000 to 2009; and
- The Planning and Development (Amendment) Act 2010, S.I. 600 of 2001 Planning and Development Regulations and subsequent amendments including, S.I. No. 364 of 2005 and S.I. 685 of 2006.

6.15 The above legislation regulates the information contained in an EIAR and planning at the site.

Planning Policy and Development Control

6.16 The following Planning Policy and Development Control relating to Land, Soils and Geology at the site in this EIAR is set out in the:

- Cork County Development Plan 2022-2028.

6.17 The County Development Plan sets out conservation objectives in relation to soils mineral reserves in the county:

6.18 CDP **Objective BE 15-10: Soils**

- *Ensure the protection and conservation of the soils in County Cork by encouraging sustainable management practices and the reuse of brownfield lands.*
- *Identify areas of poorer soil in the County acknowledge their potential value for wildlife, and respect their limitations, particularly in terms of their assimilative properties to prevent pollution.*

6.19 In the Cork County Development Plan 2022-2028, the Planning Authority recognises the essential role of Aggregates and the need for the preparation of a County Minerals Strategy which will support a sustainable extractive industry during the lifetime of the County Development Plan, therefore CDP includes specific objectives to this regard:

6.20 **EC :8-16 Safeguarding Mineral Reserves**

- *Protect and safeguard the county's natural mineral resources from inappropriate development, by seeking to prevent incompatible land uses that could be located elsewhere, from being located in the vicinity of the resource, since the extraction of minerals and aggregates is resource based.*
- *Prepare a Minerals Strategy Plan to support a sustainable extractive industry during the lifetime of the plan. This strategy will be prepared taking account of environmental, nature, conservation, heritage, landscape, and other planning considerations.*

Guidelines

6.21 The following guidelines relating to Land, Soils and Geology and have been used in the preparation of this EIAR:

- DoEHLG, 2010. Appropriate Assessment of Plans and Projects in Ireland - Guidance for Planning Authorities;
- Environmental Protection Agency, 2003. Advice Notes on current practice (in the preparation of Environmental Impact Statements);
- Environmental Protection Agency Guidelines on the Information to be contained in Environmental Impact Assessment Reports (2022);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018);
- Geological Survey of Ireland, Irish Concrete Federation, 2008. Geological Heritage Guidelines for the Extractive Industry;
- Institute of Geologists of Ireland, 2002. Geology in Environmental Impact Statements, A Guide;
- Institute of Geologists of Ireland, 2007. Recommended collection, presentation and interpretation of geological and hydrogeological information for quarry developments;

- Institute of Geologists of Ireland, 2013. Guidelines for the preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements;
- National Roads Authority, 2008. Environmental Impact Assessment of National Road Schemes - A Practical Guide; and
- National Roads Authority, 2008. Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.

6.22 The above guidelines are relevant to the preparation of a Land, Soils and Geology section of this EIAR.

Technical Standards

6.23 The following Technical Standard relating to Land, Soils and Geology at the site in this EIAR:

- British Standards (2015). Code of Practice for Site Investigations BS5930:2015.

6.24 The BS code of practice was used in the description of the subsoils encountered in the boreholes at the site and in the description of subsoils during the drilling programmes at the site.

Receiving Environment

Study Area

6.25 The study area for this Land, Soils and Geology section of the EIAR comprises two principal geographic areas:

- the proposed development site; and
- the immediate surrounding area within approximately 5 km of the application site boundary.

6.26 For the purposes of this assessment, the study area comprises the application site the surrounding area up to 5 km to reflect the sensitivity of the land, soils and geology; this is in line with the Institute of Geologists of Ireland's (IGI) guidelines (2013).

6.27 The IGI guidelines state that the minimum distance of 2 km should be reviewed in the context of the geological / hydrogeological environment as well as the scale of development and increased to reflect the sensitivity of the subsurface.

6.28 The figures for Chapter 6 are depicted at a scale of 1:25,000, and they accurately represent the surrounding environment within a distance of up to 5 kilometres from the Bweeng landholding boundary.

Baseline Study Methodology

6.29 The baseline study undertaken for Land, Soils and Geology, here involves a review of published literature and information, a review of available information from Breedon Ireland in relation to the site including resource boreholes and a geophysical survey across the extension lands, the findings from site inspections, and the context of the site within the surrounding area.

6.30 This section describes the receiving environment at and in the immediate vicinity of the site using the available baseline information gathered, specifically the:

Context of the receiving environment - location/ magnitude/ spatial extent and trends of the environmental factors***;***

Character of the receiving environment - distinguishing aspects of the environment being considered here;

Significance of the receiving environment - the quality, value or designation is assigned to the existing environment; and

Sensitivity of the receiving environment - how sensitive is the aspect of the environment to change.

6.31 The baseline study is a qualitative assessment of the available information based on professional experience.

Sources of Information

6.32 The following Table 6-1 summarises all sources of information consulted in the preparation of the receiving environment baseline study for Land, Soils and Geology:

Table 6.1:
Regional Data Consultation

Data	Dataset
Soils	• Irish Soils Information System - Teagasc
Subsoil Geology	• Teagasc/GSI/EPA Subsoil Mapping
Bedrock Geology	• GSI Data Viewer - Bedrock Geology
Protected Areas, Environmental Pressures	• Environmental Protection Agency, • Irish Geological Heritage Programme (www.gsi.ie); • National Parks and Wildlife Service
Site surveys across extension area	• Resource borehole drilling • Geophysical survey

Site Inspections

6.33 SLR geologists / geotechnical engineers have undertaken a number of inspections of the existing quarry as part of carrying out geotechnical assessments for the quarry. The most recent inspection was carried out in 2023.

Land Baseline

6.34 Land refers to the 'land take' required for the proposed development. Land can be considered to be a resource with a beneficial use to society, for example agricultural land use, extractive industry land use or urban residential land use.

6.35 The historical extraction at the site was a tied land use activity in the past, being dependant on the available reserves. The agricultural activity is related to the type of soils present at the site.

6.36 Within the EIA EU Directive (2014/52/EU) Land is recognised as a 'natural resource' and the Directive also refers to the importance of the sustainable use of soil and the need to

address the unsustainable increase in settlement areas over time ('land take'). Therefore, the issues of land as both a natural resource and land take must be considered in an assessment.

6.37 The introduction section to the EU Directive (2014/52/EU) notes that the:

'final document of the United Nations Conference on Sustainable Development held in Rio de Janeiro on 20-22 June 2012, which recognises the economic and social significance of good land management, including soil, and the need for urgent action to reverse land degradation. Public and private projects should therefore consider and limit their impact on land, particularly as regards land take, and on soil, including as regards organic matter, erosion, compaction and sealing; appropriate land use plans and policies at national, regional and local level are also relevant in this regard'.

6.38 The Corine land cover mapping is a standardised inventory of land cover across Europe which is split into 44 different land cover classes. The latest 2018 Corine land cover mapping for Ireland is a based on the interpretation of satellite imagery and national in-situ vector data. Land cover is mapped to the standard CORINE classification system and data specifications.

6.39 The Corine land cover mapping reflects land use at the time of survey, in this case the latest available land cover data for Ireland is 2018. The land cover types in the vicinity of the site are shown in Figure 6-1 below. The Corine Land cover classes at the site and in the wider area around the site is classified as principally agricultural land use and residential in the village of Bweeng.

6.40 In terms of land take, the proposed development will result in loss of c. six hectares of agricultural land at this location.

6.41 The soils from the site excavated as part of the existing development will be retained and stored on site and will be reinstated as part of the final restoration.

Soils Baseline

6.42 Soil is the top layer of the earth's crust and is formed by mineral particles, organic matter, water, air and living organisms. Soil is an extremely complex, variable and living medium and its characteristics are a function of parent subsoil or bedrock materials, climate, relief and the actions of living organisms over time.

6.43 Soil formation is an extremely slow process and can take thousands of years to evolve; soil can be considered essentially as a non-renewable resource.

6.44 As the interface between the earth, the air and the water, soil performs many vital functions; it supports food and other biomass production (forestry, biofuels etc.) by providing anchorage for vegetation and storing water and nutrients long enough for plants to absorb them. Soil also stores, filters and transforms other substances including carbon and nitrogen, and has a role supporting habitats serving as a platform for human activity.

National soils

6.45 The Irish Soil Information System (ISIS) project was undertaken by the EPA and Teagasc and has gathered together existing information and data from soil survey work in Ireland, which has been augmented with new field data, leading to the production of a new national soil map at a scale of 1:250,000 (www.teagasc.ie/soils).

6.46 The ISIS project has identified a number of Soil Associations across Ireland, which are each comprised of a range of soil types (or 'Series'), each of them different in properties, with

different environmental and agronomic responses. For each soil type, the properties have been recorded in a database maintained by Teagasc.

Site soils

6.47 The soils at the existing quarry have previously been removed to allow for the extraction of rock and development of processing plant.

6.48 The soil association at the site is classified by Teagasc as belonging to the Kilrush Series (reference 0700b). This is described as fine loamy drift with siliceous stones, comprising typical surface water gleys, see Figure 6-2.

6.49 Surface water gleys are soils characterized by a perched water table, where a specific layer in the soil impedes the water's flow. This leads to the soil above this layer having a grey appearance but not below. The degree of waterlogging is influenced by the season. With increased rainfall in winter, the soil is more prone to becoming saturated, while in drier conditions, the soil remains suitable.

6.50 Poorly to moderately drained soils have developed in the lands surrounding the quarry, with poorly drained soils and peat deposits forming at the northern end of the site adjacent the Reamanagh Stream.

Subsoils Baseline

Regional Subsoils

6.51 The Quaternary (Subsoil) deposits were deposited during the last 2 million years, and essentially comprise the unconsolidated materials overlying the bedrock. The two main types of quaternary subsoils in Ireland are glacial till, deposited at the base of ice sheets, and sand and gravel deposits associated with the melting of the ice sheets which are generally termed glaciofluvial outwash sands and gravels. Other extensive quaternary subsoils in Ireland include peat, river alluvium and coastal process deposits. Most Quaternary subsoils in Ireland were deposited since the maximum of the last glaciation, the Midlandian, which occurred approximately 17,000 years ago.

6.52 The subsoils across Ireland have been mapped on a national basis by Teagasc as part of the EPA Soil and Subsoil Mapping Project for the Irish Forestry Soils (IFS) project – refer to Error! Reference source not found.. The subsoil mapping was undertaken at a national basis using existing Quaternary Geology maps, publications, remote sensing and field mapping and sampling.

Site subsoils

6.53 The thickness of superficial deposits varies over the site from 2m to 13m. The subsoils within the existing extraction area have in most areas already been removed, see **Figure 2.1**. Where subsoils occur in the immediate vicinity of the proposed extension area they are composed of sandstone Devonian till, see Figure 6-3.

6.54 Subsoil at and immediately surrounding the existing quarry is also till derived from Devonian sandstones. The subsoil permeability surrounding the site is considered as moderate.

6.55 The depth to bedrock across the existing quarry is relatively shallow, with overburden thicknesses of 4.5-6.8m encountered in the boreholes drilled for the previous TMS assessment.

Bedrock Geology Baseline

6.56 The GSI 1:100,000 geology map Sheet 12 shows the existing Bweeng Quarry and the proposed extension to lie Ballytrasna Formation (Upper Devonian) comprising purple mudstone and sandstone, with a volcanic rock unit occurring within the Ballytrasna Fm. at Carrigcleena More known as the 'Carrigcleenamore Volcanics' (Error! Reference source not found.). The Carrigcleena Volcanics are described as pyroclastic deposits consisting of particle layers of rock-fragments (commonly pumice, lapilli and occasional vesicular bombs).

6.57 A major regional fault is mapped to the east of the quarry, trending north-north-west to south-south-east (Error! Reference source not found.).

6.58 Within the quarry void, bedding can be picked out by the green volcanic beds (tuffs) striking c. 058 degrees and dipping c. 40 degrees to the south-south-east (Plate 6.1). A strong cleavage is noted, particularly strong within the fine-grained purple mudstones, striking c. 062 degrees and dipping c. 60 degrees to the south-southeast (Plate 6.2). Jointing is apparent in the tuff beds but not in the mudstones. The overall structure in the bedrock within the quarry void is complex, with folding and faulting apparent. Unitt, R.P. & Meere, P.A. (2018) describe the bedrock in the quarry as being dominated by an easterly plunging ENE-WSW orientated synclinal structure, the core of which hosts the volcaniclastic deposits. Thrust faults from the south have placed related volcaniclastics deposits from the south into the southern quarry wall.

6.59 The bedrock is exposed at the existing site and this proposal involves the extraction of bedrock at the Bweeng extension area.

Local Geology

6.60 An assessment of the local geology at the site has been undertaken here based on borehole information from the eight groundwater monitoring wells undertaken at the site by Dunnes Drilling in 2017.

Table 6-2:
Summary Borehole Details (2017 Boreholes)

Borehole ID	Location	Borehole Depth (m)	Depth to Groundwater (m)	Depth to Bedrock (m)	Description
MW1	Western quarry face	47	-	0	Rock
MW2	Haul road	50	18	0	Rock
MW3	Off-site in farmer's field to the southeast	50	18	6	6m of sandy clay and sand overlying the rock
MW4	Off-site in farmer's field to the west	75	30	5	5m of clay overlaying the bedrock

Borehole ID	Location	Borehole Depth (m)	Depth to Groundwater (m)	Depth to Bedrock (m)	Description
MW5	Off-site in farmer's field further to the west and close to stream	75	6	6.8	6m of clay and gravels over the rock
MW6	Off-site in old office car park to the south	75	18	4.5	4.5m of sandy clay over the rock
MW7	Haul road in the middle of the quarry	70	32	0	6m of soft rock underlaid by hard rock
MW8	North of the quarry	4	-	-	Soft brown clay

6.61 Prior to this investigation, the only groundwater monitoring wells available were two supply wells off-site (BH1 and BH2) and two supply wells on-site (BH3 and BH4) – these supply wells have been used by TMS for routine groundwater sampling since August 2015. There was no previous record of groundwater levels or pumping rates from the quarry prior to this investigation.

6.62 Eight boreholes were drilled in May 2017 (7 No. deep boreholes and one shallow borehole) in three directions away from the quarry void: to the west, south and north, see Table 6-2.

6.63 The boreholes close to the quarry void were drilled to a depth approximately 30 metres (two extractive benches) below the existing floor level. The boreholes were completed as groundwater monitoring wells (MW1-MW8), open hole within the bedrock (as the rock was stable/not collapsing) over the depth drilled. Details of the monitoring wells are provided in Appendix 6-A.

6.64 According to the site investigation findings, the depth to bedrock across the quarry is relatively shallow, with overburden thicknesses of 4.5-6.8m encountered in the boreholes drilled for this assessment. The overburden regionally is mapped by the Geological Survey of Ireland (GSI) as glacial till derived from Devonian sandstones; clays (sometimes sandy/gravelly) were encountered in the boreholes. Deep well drained soils have developed in the lands surrounding the quarry, with poorly drained soils and peat deposits forming at the northern end of the site adjacent the Reamanagh Stream.

Geological Assessment for Extension Area (2019)

6.65 SLR Consulting Ireland conducted a geological resource assessment on the quarry extension lands in August 2019. The assessment included a desktop review, site inspection, rotary core drilling, petrographic analysis, and chemical testing. The goal was to confirm the quality of rock south of the quarry for potential aggregate production. More details of Geological Assessment can be obtained from Bweeng Geological Assessment Report.

6.66 The assessment was carried out by Professional Geologists Tom Moore and Dr. John Kelly, from SLR.

6.67 Three rotary cored boreholes (19-BWG-01, 19-BWG-02, and 19-BWG-03) were drilled in the quarry extension lands to identify the underlying geology and assess the potential for high-quality aggregates, particularly Carrigcleena Greenstone Volcanics, to extend the quarry southwards, refer to Appendix 6-B which also shows the existing adjacent MW09.

6.68 The drilling was carried out with an azimuth directed to true north, aiming to be as close to perpendicular to the strike and dip of the bedrock as possible. The boreholes were drilled at an angle of -60° to intersect the southernly dipping sequence effectively, see Table 6-3 below.

Table 6-3
Bweeng Quarry Extension 2019 Borehole Locations and Completion Details

Borehole ID	Easting	Northing	Total Length (m)	Azimuth (deg)	Dip (deg)
19-BWG-01	152425	90040	100	360	-60
19-BWG-02	152500	90005	103	360	-60
19-BWG-03	152570	90060	100	360	-60

6.69 Previous site investigations in 2017 and a 2019 geophysical survey were considered, along with reports from within the quarry as part of the geological assessment undertaken.

6.70 The boreholes revealed a sequence similar to the existing quarry, featuring green metasandstones, purple metasiltstones, metamudstones, and thick volcaniclastic sequences. Details of the borehole logs including the existing adjacent MW09 are provided in Appendix 6-C.

6.71 The Volcanoclastic sequences were thickest in the east and north, thinning westward and southward, gradually replaced by metasandstone units. Overburden thickness remained consistent at around 7 m across the extension area, as confirmed by the geophysical survey results.

6.72 The weathering profile varied from east to west, with boreholes in the west exhibiting deeper weathering penetration, typically in the form of buff moderately strong sandstone, up to 20m.

Geological Heritage Baseline

6.73 The Geological Survey of Ireland (GSI) Irish Geological Heritage (IGH) Programme has identified geological heritage sites in Ireland. The IGH programme has not identified any geological heritage sites at or close to the proposed development at Bweeng (www.gsi.ie).

6.74 There are no County Geological Heritage sites in the vicinity of the site at Bweeng. The Bweeng quarry is identified as unaudited Geological Heritage Site by GSI web map.

6.75 There is one SAC site in the study area at Bweeng surrounding, Blackwater River SAC (Site code 002170) which is approximately 3 km to the north east of the quarry. Blackwater River SAC is designated primarily for their habitat and ecological status, although soils and geology also play an important role in the nature of the habitats.

6.76 The proposed development will provide additional exposures of the Devonian volcanics deposits in the Bweeng area, for the geological record.

Sensitive Receptors

6.77 In terms of land, soils and geology baseline considered here the sensitive receptors are land, soils and bedrock.

Impact Assessment

Evaluation Methodology

6.78 The evaluation of impacts of the proposed development is based on a methodology similar to that outlined in the:

- National Roads Authority (2009) 'Guidelines for the Assessment of Geology, Hydrology and Hydrogeology for National Road Schemes'; and
- IGI (2013) 'Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements'.

Evaluation of Impacts

6.79 This assessment focuses on the potential impact of the proposed development on the land, soils, and geology at the site. It specifically describes the significance and sensitivity of the receiving environment.

6.80 Construction impacts will include soil stripping and vegetation removal across the lands. Operational impacts will include the removal of rock from the proposed quarry extension area.

6.81 The importance of existing land, soil, and geology attributes identified at the application site is assessed in Table 6-4 below.

Table 6-4:
Importance of Land, Soil and Geology Attributes

Attribute	Status / Occurrence	Importance
Land	The proposed development is for the continuation of use of the existing quarry and an extension to quarry. The extension area comprises greenfield lands that are currently in agricultural use.	The quarrying land use at the site is of local and regional importance as a high polished stone value (PSV) aggregate. In this respect the quarrying land use is considered to be **High** importance at the local and regional scale.
Soils	Kilrush Soil Association is comprising 'Typical Surface-water Gleys', associated with perched water tables, therefore, a poor drainage and low permeability soil type. The high silt content of these soils is mainly responsible for the poor drainage.	The soils are considered to be of **Low** importance at the local scale only. These soils are principally used for grassland, and additional usage has a limited potential. As the soils are poorly draining, they can't be used for agriculture without the requirement for drainage improvement works. The soils are not considered to be significant or particularly important.

Attribute	Status / Occurrence	Importance
Subsoils	Any sandstone till at the site will be removed and used for screening. The subsoils do not have any designated status.	The subsoils are considered to be of **Low** importance at the local scale. Sandstone tills are the most widespread subsoil type found in County Cork and therefore are not considered to be significant or particularly important.
Geology	Bedrock is exposed in the current quarry area at the site. The bedrock is a source of high PSV aggregate.	In terms of the proposed development, the Bedrock geology is considered to be of **High** importance at the local and regional scale.
Geological Heritage	The Bweeng quarry is identified as unaudited Geological Heritage Site.	In terms of geological knowledge, the exposures of bedrock at Bweeng site are considered as **High** importance.

6.82 The magnitude of the potential impacts proposed development on the Land, Soils and Geology attributes is assessed in Table 6-5 .

Table 6-5:
Significance of Impacts on Land, Soil and Geology with no Mitigation

Attribute	Impact of Proposal on Land, Soil and Geology	Magnitude of Potential Impact
Land	Permanent loss of c. six hectares of agricultural land.	The significance of the impact is considered to be Not Significant only with the permanent loss of a small land area.
	The restored lands at the site will allow the return of the worked-out area to a beneficial ecological after-use area.	Neutral with restoration of the worked-out area to a beneficial ecological after-use area.
Soils	Removal of soil over the extension area. The removed soils will be placed into temporary storage area and screening bunds or within worked out areas of the existing quarry as part of the progressive restoration scheme.	The significance of the impact is considered to be Not Significant, as the soils to be removed will be reused on site for final restoration works.
Subsoils	Permanent loss of till subsoils as part of overburden removal over the extension area.	Not Significant as the subsoils to be removed will be reused on site for final restoration works.
Geology	Permanent extraction of high PSV aggregate from proposed extension area.	Significant. Permanent extraction of high PSV aggregate resource, a long term secure supply of which is of local and regional importance to the construction industry.
Geological Heritage	More exposures of local geology within the quarry extension area.	Positive in terms of geological knowledge and education.

Indirect Impacts

6.83 It is considered that there will be no indirect impacts on Land, Soils or Geology as a result of the proposed quarry extension at the site.

Unplanned Events

6.84 Unplanned events within the application site, such as accidents, have the potential to impact on the land, soils and geology adjoining the site.

6.85 Ground instability, particularly the long-term stability of quarry faces, has the potential to impact on adjoining lands. Operations at the site will continue to adhere to the Health and Safety Authority Safe Quarry Guidelines (2020) in relation to the Safety Health and Welfare at Work (Quarries) Regulations 2008 (As Amended) and this will limit the potential for unplanned events such as instability of quarry faces or instability in adjacent lands. With the continued compliance with these regulations , it is considered unlikely that instability of quarry faces would result in an impact on the land, soils, and geology at the site.

Human Health

6.86 From a land, soils and geology perspective, any potential impacts on human health from the extraction and processing of the extracted rock at the site would not be via the land-use, soils and geology pathways but via other pathways such as air and water, which are addressed in the relevant chapters of this EIAR.

Cumulative Impacts

6.87 The proposed development includes an extension to the existing quarry as well as the continued use of the existing quarry and associated existing ancillary facilities for the processing of aggregates.

6.88 There will be no increase in annual extraction rate from the development. Cumulative impacts within the development will not arise.

6.89 There are no other developments within the vicinity of the site that would result in cumulative impacts.

Interaction with Other Impacts

6.90 Interaction between Land, Soils & Geology and Water is addressed in EIAR Chapter 7 – Water.

'Do-nothing Scenario'

6.91 If the proposed quarry extension is not permitted, the proposed extension site will remain undeveloped in its current agricultural land use.

Mitigation Measures

6.92 Mitigation measures are outlined here for the construction and operational stages of the proposed development. The construction stage is relatively short lived (< 1 year) and will involve the removal of the soil and topsoil from across the extension area to facilitate future realignment of section of local road.

Construction Stage

6.93 Soils will be managed on-site in line with best practice national guidelines (National Roads Authority, 2006) and Specification for Road Works Series 600 – Earthworks (Transport Infrastructure Ireland, March 2013).

6.94 A specific Soil Management Plan will be developed for the site.

6.95 During the construction stage the topsoil will be stripped off and placed into dedicated landscaping berms/bunds along boundaries where they will provide the most benefit in terms of acoustic and visual screening. The soils will be stripped and stored in accordance with best practice guidance including MAFF (2000) *Good Practice for Handling Soils (Sheet 1 and Sheet 2)*.

6.96 The soil handling method can affect the quality of the restoration through severe soil deformation (compression and smearing); this is primarily caused through trafficking, the effects of which increases with increasing soil wetness.

6.97 Good practice measures will be implemented at the site to preserve the structure and integrity of the soils and limit the effects of erosion on the stored soil during excavation and storage.

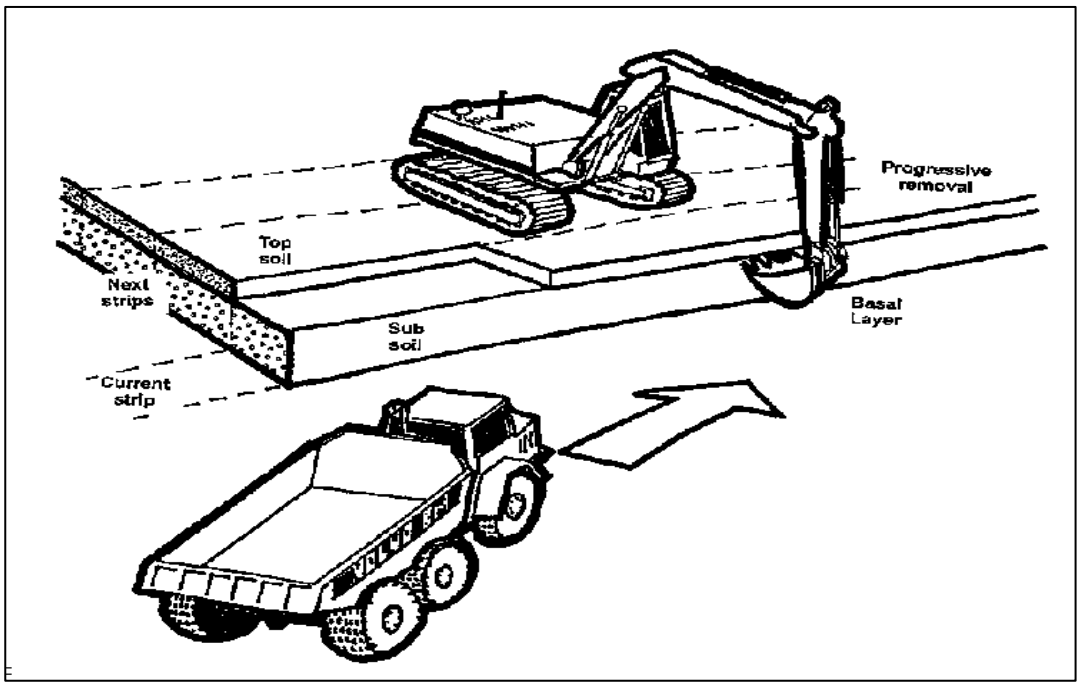
6.98 The key operational points to ensure avoidance of severe soil deformation and to minimise compaction using excavators and dump trucks are as follows:

- the dump trucks must only operate on the 'basal'/non-soil layer, and their wheels must not, on any circumstances, run on to the soil layer(s);
- the excavator should only operate on the topsoil layer;
- the adoption of a bed/strip system avoids the need for the trucks to travel on the soil layers; and
- the machines are to only work when ground conditions enable their maximum operating efficiency.

6.99 For soil stripping with excavators and dump trucks:

- the area to be stripped is to be protected from in-flow of water, ponding etc. Wet sites should be drained in advance;
- if significant rainfall occurs during operations, the stripping must be suspended;
- all machines must be always in a safe and efficient working condition. The machines are to only work when ground conditions enable their maximum operating efficiency. The operation is to be suspended before traction becomes a problem and haul routes fail;
- the operation should follow a detailed stripping plan showing soil units to be stripped, haul routes and the phasing of vehicle movements;
- the soil layer should be stripped to its natural thickness without incorporating material from the lower subsoil layers;
- the haul routes and soil storage areas must be defined, and should be stripped first;
- the excavator is only to work on the topsoil layer; the dump trucks are only to travel on the basal/formation layer; and
- stripping is to be undertaken by the excavator standing on the surface of the topsoil and digging the topsoil to its maximum depth and loading into dump trucks. The dump trucks draw alongside the exposed soil profile, standing and travelling only on the basal layer, see Diagram 6.1

Diagram 6.1
Removal of Topsoil: Stripping Using Excavator and Dump Truck (MAFF 2000)

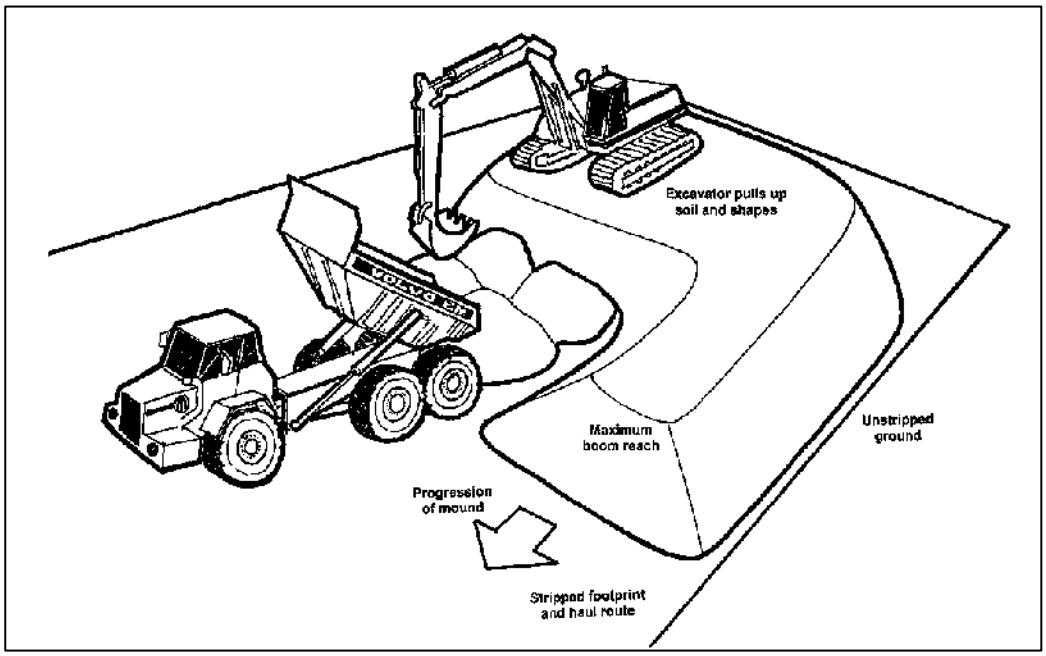


6.100 In order to avoid compaction single-tier mounds are preferred to multi-tier mounds for soil storage as it avoids the need for trafficking on the soil being stored.

6.101 For the building of soil storage mounds with excavators and dump trucks:

- the mounds should be sited on dry ground, not in hollows and should not disrupt local surface drainage. Where necessary, mounds should be protected from run-off/ponding by a cut-off ditch. Where the storage mound is in a hollow due to the removal of surface soils, measures should be undertaken to ensure that water is not able to pond within the storage area;
- the dump trucks must only travel within the haul route and operational areas. The trucks should enter the storage area, reverse and back-tip the soil load starting at the furthest point of the mound from the point of access. The excavator pulls up the soil into a mound of the required dimensions. The excavator operates by standing on the mound (see Diagram 6.2) below). The excavator bucket can be used to shape and firm the sides as the mound is progressively formed to promote the shedding of rain; particularly at the end of each day, but also on the onset of rain during the day. This should include any exposed incomplete surfaces;
- the process is repeated with the tipping of soil against the forming mound, and without wheels traversing onto previously tipped material;
- work should stop in wet conditions with measures undertaken to prevent ponding at the base of the mound and on the basal layer. At the start of each day ensure there is no ponding on the basal layers and operating areas; and
- topsoil storage mounds will not exceed 2 m in height.

Diagram 6.2
Soil Storage Mound / Screening Berm Construction Using Excavator and Dump Truck (MAFF 2000)



6.102 Stockpiles of soil will be re-vegetated where they are in place for a sufficient length of time to justify such a measure. The re-handling of soil material will be minimised as much as possible to preserve the integrity of the topsoil material. This is also an economically prudent practice.

Operational Stage

6.103 During the operation stage the bedrock will be extracted using industry standard blasting techniques. Processing of the extracted rock will be carried out using the existing processing plant.

6.104 Mitigation measures outlined above for the Construction Stage will continue to be implemented throughout the Operation Stage.

6.105 Operations at the extraction area will adhere to the Health and Safety Authority Safe Quarry Guidelines (2020) in relation to the Safety Health and Welfare at Work (Quarries) Regulations 2008 (As Amended) and this will limit the potential for unplanned events such as instability of quarry faces or instability in adjacent lands.

6.106 No other specific mitigation measures are required at the site in terms of land, soil and geology at this stage.

Residual Impact Assessment

6.107 The residual impacts on land, soil and geology are those impacts which remain following the implementation of the mitigation measures outlined above.

Construction and Operational Stage

6.108 The residual impact on land will be a loss of c. six hectares of agricultural land within the extension area. Considering the limited area and extent of agricultural lands in the region the residual impact will be Not Significant.

6.109 The soil and subsoil will be reused within the site as part of the final restoration.

6.110 There will be a residual impact on the geology with permanent extraction of the high PSV aggregate within the c. six hectare extension area. A long-term secure supply of high PSV aggregate is a critical for the local and regional construction industry.

6.111 Considering the above the residual impact on the land, soils and subsoils, and geology will be Not Significant.

Monitoring

6.112 No aftercare or monitoring is required for the restoration proposals for the application area.

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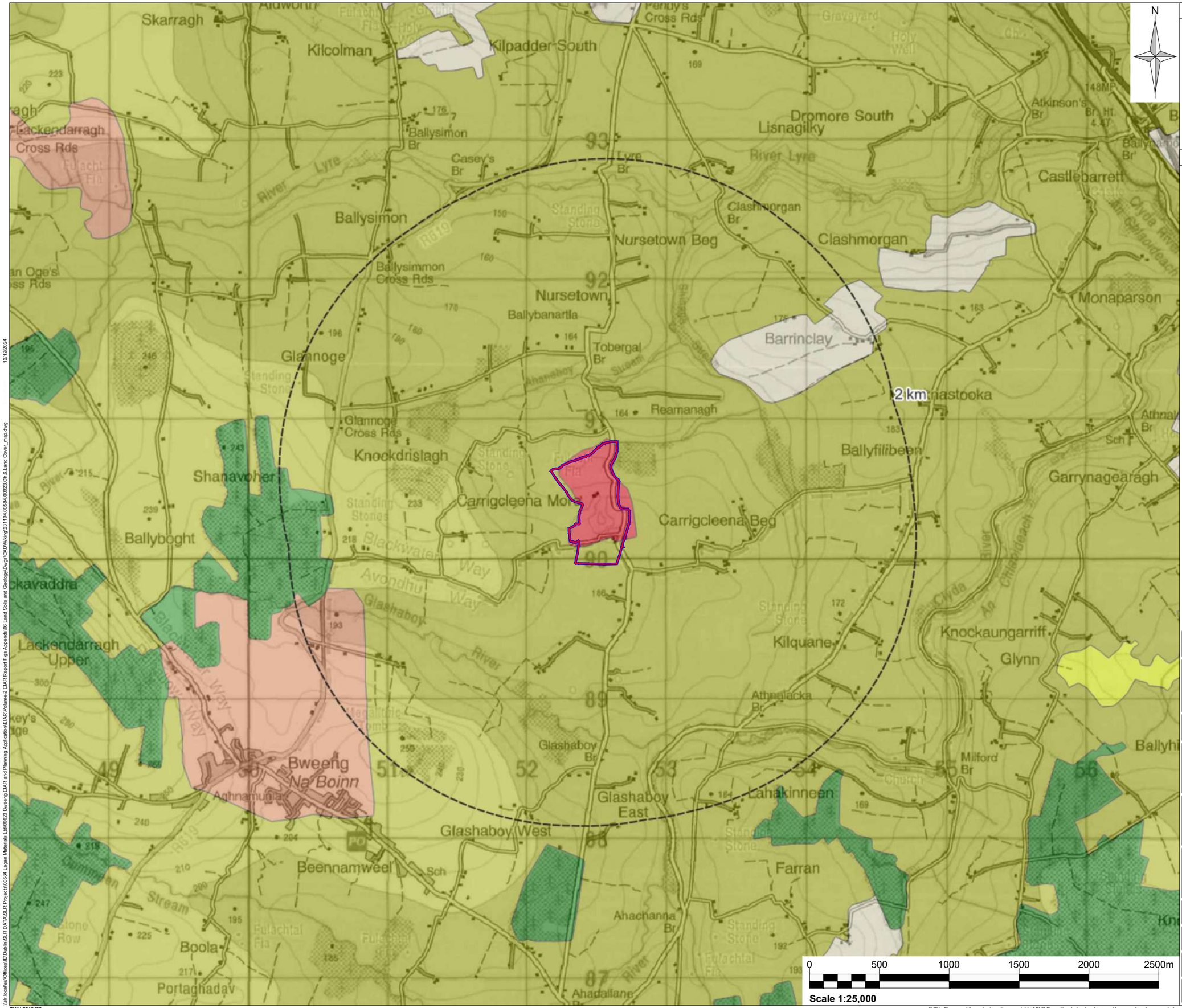
FIGURES

Figure 6.1:
Land Cover Map

Figure 6.2:
Soil Association Map

Figure 6.3:
Subsoil Map

Figure 6.4:
Bedrock Geology



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3. Extract from EPA Corine 2018 Data Mapping © EPA

Legend:

- BREEDON LAND INTEREST (c.28.8 Ha)
- APPLICATION BOUNDARY
- AGRICULTURAL AREAS: PASTURES (CODE:231)
- ARTIFICIAL SURFACECES: MINERAL EXTRACTION SITES (CODE:131)
- AGRICULTURAL AREAS: NON-IRRIGATED ARABLE LAND (CODE: 211)
- FOREST AND SEMI- NATURAL AREAS: CONIFEROUS FOREST (CODE: 312)
- AGRICULTURAL AREAS: LAND PRINCIPALLY OCCUPIED BY AGRICULTURE, WITH SIGNIFICANT AREAS OF NATURAL VEGETATION (CODE: 243)

Rev	Amendments	Date	By	Chk	Auth

SLR

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Client: BREEDON IRELAND

Project: CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Figure Title: LAND COVER MAP

Scale	SLR Project No.
1:25000 @ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
NB	NB	PG	TP
Date 12/24	Date 12/24	Date 12/24	Date 12/24

Figure Number: **FIGURE 6-1** Rev. **0**

12/12/2024

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Legend:

- BREEDON LAND INTEREST (c.26.3 Ha)
- APPLICATION BOUNDARY
- KILRUSH SOIL ASSOCIATION
- PUCKANE SOIL ASSOCIATION
- RIVER ALLUVIUM
- BROOMHILL SOIL ASSOCIATION
- PEAT

Rev	Amendments	Date	By	Chk	Auth

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Project
CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Figure Title
SOIL ASSOCIATION MAP

Scale	SLR Project No.
1:25000 @ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
NB	NB	PG	TP
Date 12/24	Date 12/24	Date 12/24	Date 12/24

Figure Number **FIGURE 6-2** Rev. **0**

0 500 1000 1500 2000 2500m

Scale 1:25,000

16/12/2024

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3. Extract from EPA Subsoils Data Mapping © EPA

Legend:

- BREEDON LAND INTEREST (c.28.8 Ha)
- APPLICATION BOUNDARY
- TILL DERIVED FROM DEVONIAN SANDSTONES
- BEDROCK OUTCROP
- RIVER ALLUVIUM
- GRAVELS DERIVED FROM DEVONIAN SANDSTONES
- PEAT

Rev	Amendments	Date	By	Chk	Auth

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Project: CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Figure Title: SUBSOIL MAP

Scale	SLR Project No.
1:25,000 @ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
NB	NB	PG	TP
Date	Date	Date	Date
12/24	12/24	12/24	12/24

Figure Number: **FIGURE 6-3** Rev. **0**

0 500 1000 1500 2000 2500m

Scale 1:25,000

16/12/2024

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Legend:

- BREEDON LAND INTEREST (c.28.8 Ha)
- APPLICATION BOUNDARY
- BALLYTRASNA FORMATION
- CARRIGCLEENAMORE VOLCANICS
- GYLEEN FORMATION
- OLD RED SANDSTONE
- BEDROCK OUTCROP

0 500 1000 1500 2000 2500m

Scale 1:25,000

Rev	Amendments	Date	By	Chk	Auth

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Project
CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Figure Title
BEDROCK MAP

Scale		SLR Project No.	
1:25,000	@ A3	00584.00023.00001	
Designed	Drawn	Checked	Authorised
NB	NB	PG	TP
Date	Date	Date	Date
12/24	12/24	12/24	12/24

Figure Number **FIGURE 6-4** Rev. **0**

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PLATES

Plate 6.1:
Bedded volcaniclastic deposits dipping to the south – southeast (TMS)

Plate 6.2:
Cleavage in mudstones (absent in volcanics) (TMS)

APPENDICES

Appendix 6-A:
Monitoring Well Details & Wellhead Photographs

APPENDIX I

Monitoring Well Details & Wellhead Photographs

Monitoring Well Summary Details

	Date Drilled	Easting	Northing	Ground Level	Drilled Depth	Diameter	Open Section	TOC Elevation	TOC Elevation	Notes
		ITM	ITM	mOD	mbgl	mm	mbgl	magl	mOD	
MW1	02/05/2017	552324.856	590329.023	174.746	47	150	2.0 - 47.0	0.87	175.616	
MW2	03/05/2017	552464.096	590417.544	164.67	50	150	6.0 - 50.0	-	-	
MW3	03/05/2017	552673.227	590075.404	185.22	50	150	12.0 - 50.0	0.382	185.602	
MW4	04/05/2017	552305.418	590314.072	179.129	75	150	6.5 - 75.0	0.215	179.344	
MW5	05/05/2017	552242.435	590285.536	177.101	75	150	12.0 - 75.0	0.464	177.565	
MW6	08/05/2017	552593.764	590219.45	189.065	75	150	6.0 - 75.0	0	189.065	Flush completion
MW7	09/05/2017	552524.448	590498.089	176.368	70	150	6.0 - 70.0	1.18	177.548	
MW8	09/05/2017	552218	590611	163	4	200	1.0 - 4.0*	0	163	Flush completion, *screened
MW9	08/05/2017	552605.279	590197.632	188.898	70.5	76	1.0 - 70.5	0.294	189.192	
Site Well	-	552401.819	590560.962	168.784	-	160	-	0.37	169.154	
Old Office Well	-	552604	590144	187.719	-	160	-	0.45*	188.169*	*top of wall
Derelict House Well	-	552650.879	590194.127	187.861	-	160	-	0.634*	188.499*	*top of wall

Notes:

ITM - Irish Transverse Mercator

mOD - meters above Ordinance Datum

mbgl - meters below ground level

mm - millimeters

magl - meters above ground level

TOC - Top Of Casing

DUNNES DRILLING

DRILLERS LOG

WELL DRILLING AND HORIZONTAL DRILLING ENGINEERS
Dublin Road, Dromiskin, Dundalk, Co. Louth.
E-Mail: info@dunnesdrilling.com website: www.dunnesdrilling.com
Tel: +353 42 9372188 Fax: +353 42 9372714

Borehole for: Lagan
at Bweeng
Co. Cork

MW1 (far side of quarry)

Date	Depth m	Diam	Conditions
05/02/2017	0 - 2	200mm	Rock. Install 2m x 150mm steel lining.
	2- 6	150mm	Soft rock. Dry.
	6 - 12	"	Rock. Small inflow. Estimate 0.1m3/hr
	12 - 30	"	Purple & grey rock.
	30 - 47	"	Grey rock. Very hard. Dry.
			Abandon drilling due to drill bit losing buttons.

Total depth of well 47m
Estimated yield Dry.
Depth to rock Ground Level
Steel casing installed 2m of 150mm steel
PVC casing installed
Well screen
Other remarks Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

WELL DRILLING AND HORIZONTAL DRILLING ENGINEERS
Dublin Road, Dromiskin, Dundalk, Co. Louth.
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Tel: +353 42 9372188 Fax: +353 42 9372714

Borehole for: Lagan
at Bweeng
Co. Cork

MW2 (half way down haul road)

Date	Depth m	Diam	Conditions
05/02/2017	0 - 6	200mm	Grey rock. Install 6m x 150mm steel lining.
05/03/2017	6 - 10	150mm	Grey rock. Hard. Dry.
	10 - 12	"	Soft brown rock. Dry.
	12 - 18	"	Soft brown rock. Water at 18m - 0.8m3/hr.
	18 -24	"	Hard grey rock into purple rock.
	24 - 30	"	Hard purple rock.
	30 - 36	"	Purple rock into grey rock at 35m. 0.8m3/hr.
	36 - 42	"	Soft grey rock.
	42 - 48	"	Grey and purple rock.
	48 - 50	"	Purple rock. 0.8m3/hr.

Total depth of well 50m
Estimated yield 0.8m3/hr
Depth to rock Ground Level
Steel casing installed 6m of 150mm steel
PVC casing installed none
Well screen none
Other remarks Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

WELL DRILLING AND HORIZONTAL DRILLING ENGINEERS
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E-Mail: info@dunnesdrilling.com website: www.dunnesdrilling.com
Tel: +353 42 9372188 Fax: +353 42 9372714

Borehole for: Lagan
at Bweeng
Co. Cork

MW3 (Patrick Flemings field - across road from bungalow)

Date	Depth m	Diam	Conditions
05/03/2017	0 - 6	200mm	Sandy clay into sand. Dry.
	6 - 10	"	Sand into very soft sandy rock.
	10 - 12	"	Soft rock. Damp. Install 12m x 150mm steel.
	12 - 18	150mm	Soft brown rock. Water at 18m - 0.1m3/hr.
	18 -24	"	Soft brown rock. Water at 24m - 2m3/hr.
	24 - 30	"	Purple rock. Brown rock. Water increasing. 7 to 8 m3/hr.
	30 - 36	"	Purple rock. Brown rock. Very soft. 8m3/hr.
	36 - 42	"	Purple rock.
	42 - 48	"	Purple rock.
	48 - 50	"	Purple rock. 8m3/hr.

Total depth of well 50m
Estimated yield 8m3/hr
Depth to rock 10m
Steel casing installed 12m of 150mm steel
PVC casing installed none
Well screen none
Other remarks Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

WELL DRILLING AND HORIZONTAL DRILLING ENGINEERS
Dublin Road, Dromiskin, Dundalk, Co. Louth.
E-Mail: info@dunnesdrilling.com website: www.dunnesdrilling.com
Tel: +353 42 9372188 Fax: +353 42 9372714

Borehole for: Lagan
at Bweeng
Co. Cork

MW4 (Ml. Riordans field - top corner)

Date	Depth m	Diam	Conditions
05/03/2017	0 - 5m	200mm	Clay.
	5 - 6.5m	"	Soft brown rock. Install 7m x 150mm steel.
	6.5 - 8	150mm	Brown rock.
	8 - 12	"	Grey rock. Dry.
	12 - 18	"	Grey into purple rock. Dry.
05/04/2017	18 - 24	"	Very hard purple into very hard grey/green rock. Dry.
	24 - 30	"	Grey/green rock. 0.1m3/hr at 30m.
	30 - 36	"	Grey/green rock. Softer from 33m. 0.2m3/hr at 36m.
	36 - 42	"	Grey/green rock. Purple rock from 38m. 0.23m3/hr at 42m.
	42 - 48	"	Grey rock. Softer.
	48 - 54	"	Grey rock.
	54 -60	"	Grey rock. 0.23m3/hr.
	60 - 66	"	Purple rock.
	66 -72	"	Grey rock.
	72 - 75	"	Purple rock. 0.23m3/hr.

Total depth of well	75m
Estimated yield	0.23m3/hr
Depth to rock	5m
Steel casing installed	7m of 150mm steel
PVC casing installed	none
Well screen	none
Other remarks	Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

WELL DRILLING AND HORIZONTAL DRILLING ENGINEERS
Dublin Road, Dromiskin, Dundalk, Co. Louth.
E-Mail: info@dunnesdrilling.com website: www.dunnesdrilling.com
Tel: +353 42 9372188 Fax: +353 42 9372714

Borehole for: Lagan
at Bweeng
Co. Cork

MW5 (Ml. Riordans field - bottom corner)

Date	Depth m	Diam	Conditions
05/04/2017	0 - 6m	200mm	Clay into gravels/shattered rock.
	6 - 12	"	Broken, shattered brown rock. Lot of water - 3m3/hr. Install 6m x 200mm steel
			Install 12m x 150mm steel lining c/w heavy duty casing shoe.
05/05/2017	12 - 18	150mm	Soft grey rock. 2m3/hr at 18m. (some water closed off with lining)
	18 - 24	"	Soft grey rock. 2m3/hr.
	24 - 30	"	Soft grey rock into purple rock at 29m. 3m3/hr at 30m.
	30 - 36	"	Soft purple rock. 4m3/hr at 36m.
	36 - 42	"	Soft purple rock. 4m3/hr at 42m.
	42 - 48	"	Soft purple rock. 5m3/hr at 48m.
	48 - 54	"	Harder grey rock. 5 - 6m3/hr at 54m.
	54 - 60	"	Green rock. 6m3/hr at 60m.
	60 - 66	"	Very hard purple rock.8m3/hr at 66m.
	66 -72	"	Very hard purple rock into grey rock at 71m. 8m3/hr.
	72 - 75	"	Very hard grey rock. 8m3/hr.

Total depth of well	75m
Estimated yield	8m3/hr.
Depth to rock	6m
Steel casing installed	6m of 200mm steel. 12m of 150mm steel.
PVC casing installed	none
Well screen	none
Other remarks	Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

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Borehole for: Lagan
at Bweeng
Co. Cork

MW6 (corner of bungalow car park)

Date	Depth m	Diam	Conditions
05/08/2017	0 - 4.5m	200mm	Sandy clay.
	4.5 - 6	"	Soft brown rock. Dry.
			Install 6m x 150mm steel lining.
	6 - 8	150mm	Soft brown rock.
	8 - 12	"	Hard purple rock. Dry.
	12 - 18	"	Purple into brown into hard green rock. 0.5m3/hr at 18m.
	18 - 24	"	Very hard green rock. 0.5m3/hr.
	24 - 30	"	Very hard green rock. Brown patch at 27m. 0.5m3/hr.
	30 - 36	"	Very hard green rock. 0.5m3/hr.
	36 - 42	"	Very hard green rock. Occassional softer patches. 0.5m3/hr.
	42 - 48	"	Very hard green rock. 0.5m3/hr.
	48 - 54	"	Very hard grey/green rock. Some white bits at 48 - 50m. 0.5m3/hr.
	54 - 60	"	Very hard green rock. Some purple bands. 0.6m3/hr at 60m.
	66 - 72	"	Very hard green rock into purple rock. 0.6m3/hr.
	72 - 75	"	Very hard purple rock. 0.6m3/hr.

Total depth of well	75m
Estimated yield	0.6m3/hr.
Depth to rock	6m
Steel casing installed	6m of 150mm steel.
PVC casing installed	none
Well screen	none
Other remarks	Flush cover fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

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Borehole for: Lagan
at Bweeng
Co. Cork

MW7 (at top of haul road)

Date	Depth m	Diam	Conditions
05/09/2017	0 - 3	200mm	Fill. Soft brown rock.
	3 - 6	"	Soft brown rock. Dry.
			Install 6m x 150mm steel lining.
	6 - 7	150mm	Soft brown rock.
	7 - 12	"	Purple rock. Dry.
	12 - 18	"	Grey, brown and purple rock. Dry.
	18 - 24	"	Medium into soft purple rock. 0.9m3/hr at 32m.
	24 - 30	"	Brown rock into purple rock. 3.2m3/hr at 30m.
	30 - 36	"	Alternating purple and brown rock - softer. 4.7m3/hr.
	36 - 42	"	Purple rock into hard green rock at 38 - 39m. 4.7m3/hr at 42m.
	48 - 54	"	Purple rock into very hard green rock. 4.7m3/hr.
	54 - 60	"	Very hard grey/green rock. Some white bits at 48 - 50m. 4.7m3/hr.
	54 - 60	"	Purple rock - hard and soft. Some white bits. 4.7m3/hr.
	60 - 66	"	Soft to medium purple/red rock. 4.7m3/hr.
	66 - 70	"	Purple into hard green rock. 4.7m3/hr at 70m.

Total depth of well	70m
Estimated yield	4.7m3/hr
Depth to rock	1m
Steel casing installed	6m of 150mm steel.
PVC casing installed	none
Well screen	none
Other remarks	Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

WELL DRILLING AND HORIZONTAL DRILLING ENGINEERS
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Borehole for: Lagan
at Bweeng
Co. Cork

MW8 (shallow bore beside lagoon)

Date	Depth m	Diam	Conditions
05/09/2017	0 - 4	200mm	Soft brown clay.
			Install 3m x 50mm PVC screen, 1m x 50mm PVC plain casing.
			Place stone chippings to 0.7m below GL.
			Place and hydrate bentonite pellets from 0.7m to GL.

Total depth of well 4m
Estimated yield Damp only.
Depth to rock none
Steel casing installed none
PVC casing installed 1m x 50mm plain
Well screen 3m x 50mm screen
Other remarks Upstand pipe fitted.

Operator Brendan Dunne

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer

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Rev. DRAFT

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
02-05 0.00						0.00 - 6.80 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(6.00)					
6.00					6.00					
02-05		NR			(0.80)			No recovery.		
	67 (43) 11				6.80					
7.50		23				6.80 - 30.40 Discontinuities, very closely spaced, locally closely spaced to 16.10m then medium spaced, locally closely spaced, dipping 14 to 16°, stepped, rough, with 0.5 to 3mm thick grey silt smear.		Strong thinly foliated pinkish grey fine and medium grained META-MUDSTONE as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics.		
02-05		18								
	100 (83) 20									
		19			(6.70)					
10.50										
02-05		12								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
02-05-17	17.00	10.50	6.00	76	48		7.30
03-05-17	08.00	10.50	6.00	76	48		8.10

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	70.50	water	100

GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit Design: NQ	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer

Sheet 2 of 7

Rev. DRAFT

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Discontinuities / Detail	DESCRIPTION Main	Geology	Instrument/ Backfill
	100 (95) 23	16 28 16			13.50		Strong thinly foliated pinkish grey fine and medium grained META-MUDSTONE as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics. *(continued)*		
02-05					(1.10) 14.60	14.00 - 14.30 Joint, vertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear and dark orange brown iron stain, open.	13.50m: carried out packer test. Strong thinly flow banded green 'mottled' white calcitic fine grained with fine grained flat and elongate lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS.		
	100 (85) 20	15 17			(0.70) 15.30	15.00 - 15.20 2 No parallel joints, subvertical dip, stepped, rough, with 0.5 to 1mm thick grey silt smear, open. 15.30 - 15.50 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick grey silty fine sand smear, open.	Strong thinly foliated pinkish grey fine and medium grained META-MUDSTONE as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics.		
16.50 02-05		8 17				15.85 - 16.20 Joint, subvertical dip, stepped, tight, 15.85m to 15.90m open as drilling induced?	Strong thinly foliated dark green and green fine and medium grained META-SANDSTONE with some mica as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics.		
	100 (93) 60	2 9				19.10 - 19.55 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick grey silty fine sand smear and minor dark orange brown iron stain, open.			
19.50 02-05	100 (95) 68	5			(10.40)	20.55 - 20.80 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick pinkish grey silt smear, open.	20.50m: carried out packer test.		
20.50 02-05	100 (93) 18	9				21.25 - 22.00 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick orange brown silt smear and			

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit Design: NQ	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer

Sheet 3 of 7

Rev. DRAFT

RUN DETAILS						STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Discontinuities / Detail	DESCRIPTION Main	Geology	Instrument/ Backfill
22.50						much orange and dark orange brown iron stain and powder, open.	Strong thinly foliated dark green and green fine and medium grained META-SANDSTONE with some mica as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics. *(continued)* 22.55m to 22.80m: 30mm wide vertical milky white quartz vein. 23.00m to 23.40m: light green 'marbled' with milky white calcitic veinlets. 24.15m to 24.50m: medium strong coarse grained. 24.50m to 24.55m: grey silt. 24.90m to 25.00m: 30mm wide dipping 60° milky white quartz vein. 25.00m to 25.45m: medium strong orangish brown coarse grained 'vuggy'.		
02-05	100 (94) 51	7							
		0				23.60 - 23.85 Joint, subvertical dip, stepped, smooth, with 0.5mm thick orange brown silt smear and dark orange brown iron stain, open.			
		18							
25.50									
02-05		15			25.70				
	100 (94) 46	11				25.75 - 26.00 Joint, subvertical dip, stepped, smooth, with 0.5 to 5mm thick bluish grey silt smear, open to moderately wide.	Strong thinly foliated light greyish purple fine grained META-SILTSTONE as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics.		
27.50									
02-05	100 (95) 58	12			(4.70)		27.50m: carried out packer test.		
28.50									
02-05		16				28.55 - 29.55 Joint, vertical dip, stepped, rough, with 0.5mm thick dark orange brown iron stain and powder, open.			
	100 (95) 60	5							
		11			30.40	30.00 - 30.35 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orange brown silt smear and minor orange and orange brown iron stain and powder, open. 30.40 - 57.10 Discontinuities, medium spaced, locally widely spaced, dipping 18 to 20°, stepped, rough, with 0.5 to 3mm thick grey silt smear.	29.90m to 30.40m: medium strong orangish brown coarse grained 'vuggy'. Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS.		
31.50									
02-05		4							
	100	3							

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
03-05-17	17.00	25.50	6.00	76	48		8.10
04-05-17	08.00	25.50	6.00	76	48		8.10

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit: NQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer

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Rev. DRAFT

RUN DETAILS						STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Geology	Instrument/ Backfill
	(95) 93	2						Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS. *(continued)*		
34.50		2						34.50m: carried out packer test.		
02-05	100 (96) 95	0								
		1								
37.50		2								
02-05	100 (97) 96	0								
		0								
40.50		0								
02-05	100 (99) 98	2						41.00m to 41.15m: with anastomosing milky white quartz.		
41.50								41.50m: carried out packer test.		
02-05	100 (98) 97	1								
43.50		2								
02-05										

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
04-05-17	17.00	41.50	6.00	76	48		8.10
05-05-17	08.00	41.50	6.00	76	48		8.10

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit: NQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer

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Rev. DRAFT

RUN DETAILS						STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Geology	Instrument/ Backfill
46.50	100 (98) 97	0 1 1			(32.30)			Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS. *(continued)*		
02-05 48.50	100 (97) 96	0 0								
02-05 49.50	100 (98) 97	0 1						48.50m: carried out packer test.		
02-05 52.50	100 (98) 97	1 0 1								
02-05	100 (97) 96	2 2								

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing

Rotary Flush			
From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit: NQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer	Sheet 6 of 7
	Rev. DRAFT

RUN DETAILS						STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
55.50								Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS. *(continued)*		
02-05		2						55.50m: carried out packer test.		
		2								
	100 (97) 87	6				57.10 - 70.50 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 2mm thick grey silt smear.				
58.50		6				57.20 - 57.45 Joint, subvertical dip, stepped, rough, with 0.5mm thick brown clay smear, open.		58.10m to 58.15m: medium strong fissile.		
02-05		0								
	100 (98) 94	0				60.60 - 60.75 Joint, vertical dip, stepped, tight.				
61.50		2								
02-05	100 (91) 59	6			62.70	61.75 - 61.95 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick green silt smear, open. 62.15 - 62.35 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick green silt smear, open.		62.50m: carried out packer test.		
62.50					(1.10)	62.70 - 63.70 Joint, vertical dip, undulating, smooth, with 0.5 to 3mm thick grey silt smear and dark orange brown iron stain, open to moderately wide.		Strong thinly foliated purplish grey fine grained META-SILTSTONE as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics.		
02-05	100 (97) 42	11			63.80	64.20 - 64.30 Joint, dipping 60°, stepped, rough, with 0.5 to 1mm thick greenish grey silt smear, open. 64.70 - 64.80 Joint, dipping 60°, stepped, rough, with 0.5 to 1mm thick greenish grey silt smear, open.		Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS.		
64.50										
02-05		6								
	100	2								

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
05-05-17	17.00	58.50	6.00	76	48		8.10					50mm solid pipe installed to 9.00m bgl.
08-05-17	08.00	58.50	6.00	76	48		8.10					

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit Design: NQ	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer	Sheet	Rev.
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RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
	(92) 77	1						Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS. *(continued)*		
67.50		7			(6.70)	67.30 - 67.55 Joint, subvertical dip, stepped, rough, with 0.5mm thick grey silt smear and minor orange brown iron stain, open.				
02-05		3				68.45 - 68.90 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick brown silt smear, open.				
	100 (97) 80	5								
70.50		2			70.50					
								70.50m: carried out packer test. BH terminated at 70.50m bgl on REs instruction.		

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
08-05-17	17.00	70.50	6.00	76	48		8.10

Rotary Flush			
From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit: NQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

MW1, close to western quarry face (22/8/2018)

MW2, on haul road down into quarry void, steel casing damaged/removed (22/8/2018)

MW3, off-site in farmer's field to the southeast (22/8/2018)

MW4, off-site in farmer's field to the west (22/8/2018)

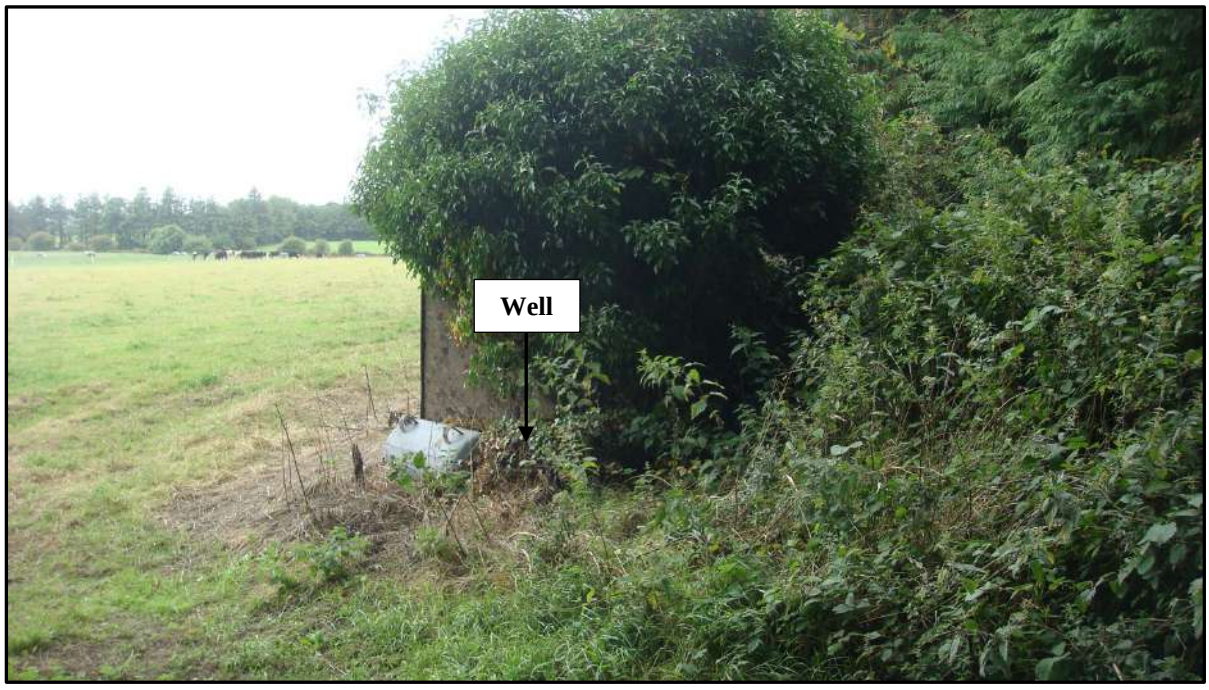
MW5, off-site in farmer's field further to the west, close to stream (22/8/2018)

MW6, off-site in old office car park to the south (22/8/2018)

MW7, on haul road in the middle of the quarry (22/8/2018)

MW8, close to the lagoons in the north of the quarry (22/8/2018)

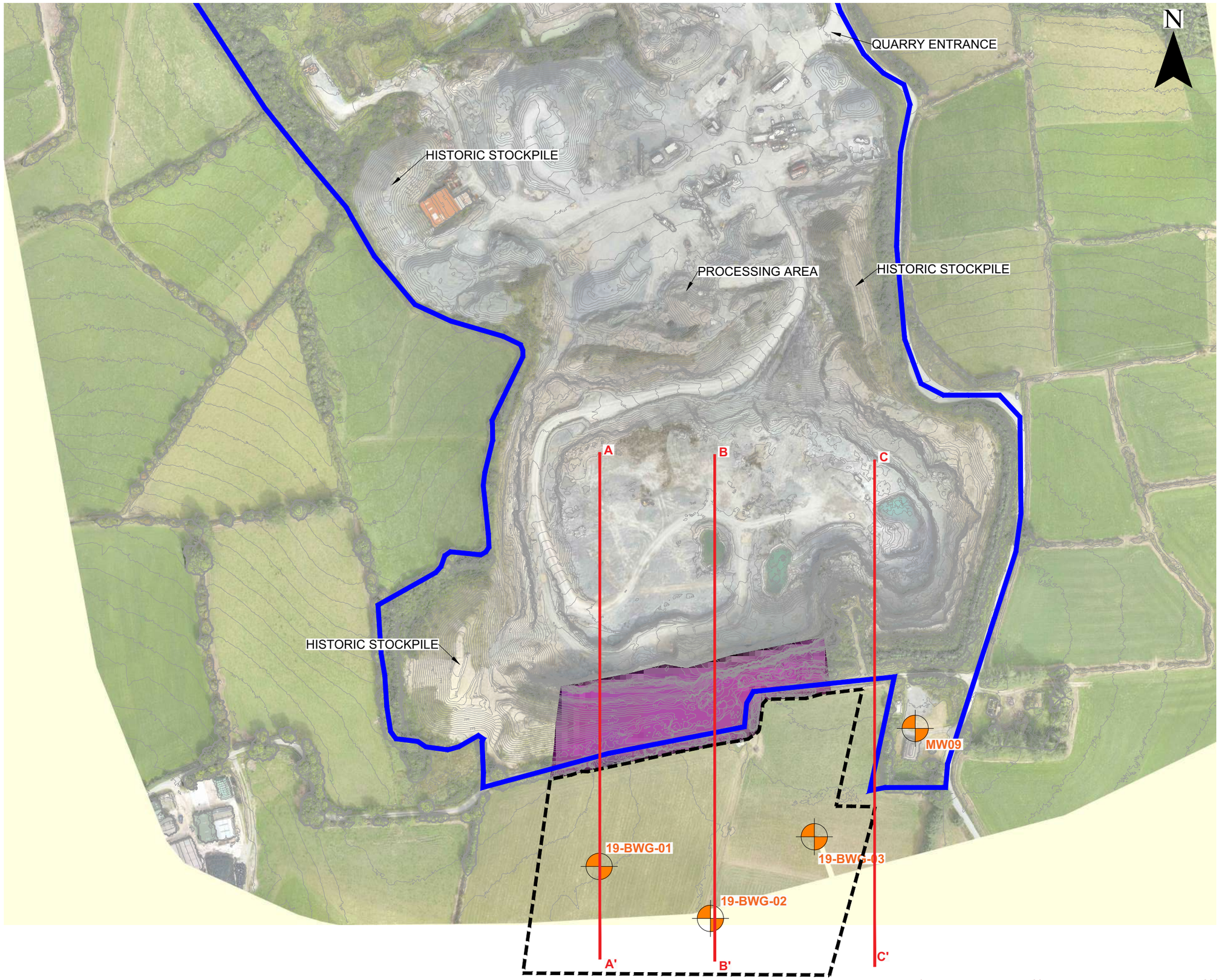
MW9, off-site in old office car park to the south (22/8/2018)



Old Office Well, off-site to the south (22/8/2018)

Derelict House Well, off-site, opposite the old office car park (22/8/2018)

Appendix 6-B:
Existing Site Layout Plan for Extension Area with Boreholes



NOTES

'*Orthomosaic produced from Aerial Photography flown* ***September 2018*** *by SLR Consulting Ireland (IAA Permit No. 04/2015) www.slrconsulting.com Tel. +353-1-2964667.*

Orthomosaic produced using Ground Control Points; Related to Irish Transverse Mercator Coordinate System and OS Malin Head Level Datum.

The accuracy of the orthomosaics and the digital elevation models (DEM) strongly depends on the flight height, lighting conditions, availability of textures, image quality, overlap, and type of terrain. Contours / 3D data relates to the surface model and not terrain levels. Typical accuracies: E: 0.05 m; N:0.05 m; Levels: 0.30 m.

All Dimensions and Levels are to be checked on site.

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LEGEND

- LAND INTEREST BOUNDARY
- PROPOSED EXTENSION AREA
- EXISTING SECTION LOCATIONS
- EXISTING QUARRY - Additional Reserves

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EXISTING SITE LAYOUT PLAN
SEPTEMBER 2018 SURVEY

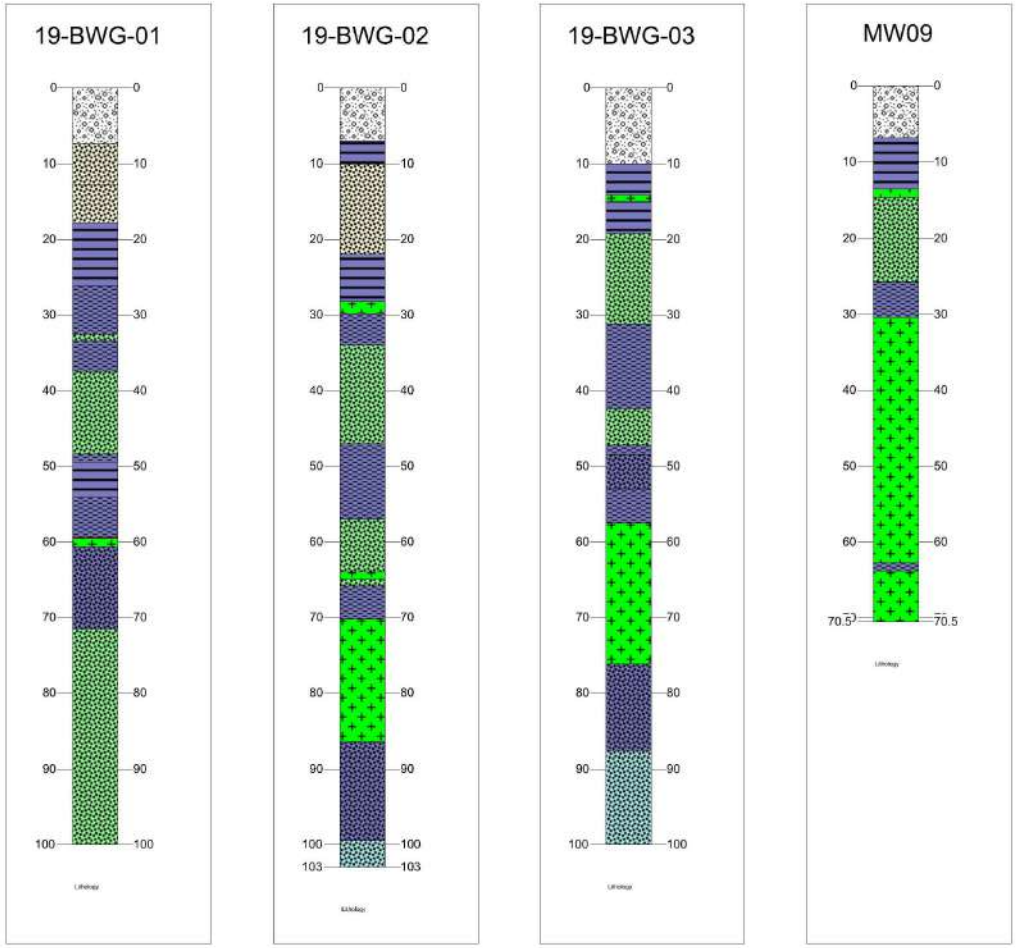
FIGURE 4

Scale: 1:2,500 @ A3

Date: OCTOBER 2019

00586.00001.0.FIG_4.Site Layout Map.dwg

Appendix 6-C:
2019 Extension Borehole Logs



0 10 20 30 40m 60 80 100

Metres 1:1000

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BOREHOLE LOGS

APPENDIX 1

Scale
1:1,000 @ A4

Date
OCTOBER 2019

00586.00001.0.App_1.Borehole Logs.dwg

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Introduction

Background

7.1 This Chapter of the Environmental Impact Assessment Report (EIAR) addresses the potential impacts on surface water and groundwater of the proposed development at Carrigcleena More, Bweeng, Co. Cork.

7.2 The proposed development is shown on EIAR Figure 2-2 and Figure 2-3 and will consist of:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a floor depth of 115 m AOD and a sump depth of depth of c. 110 m AOD over c. 3.7 hectares;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Landscaping including perimeter screening berms around the proposed extension area; and
- Restoration of the quarry to natural habitat after-uses.

All related ancillary site works within an overall application area of c. 28.8 hectares, and all for a period of 20 years and a further 2 years to complete final restoration of the site.

7.3 Stone extracted from the quarry will be processed within the quarry void itself. After processing, it will be transported to the existing processing area located on the northern portion of the existing quarry development using dump trucks where it may be washed or stockpiled prior to being sold.

7.4 The extraction scheme for the quarry extension is designed to maintain access to and the fenced boundary around a location known as "Carrigcleena." This is in compliance with Condition 67, attached to a previous reference (P. Ref. QR073, as amended by ABP Ref. 04.QC.2156).

Scope of Work

7.5 This chapter describes the local hydrological and hydrogeological environment at and around the Bweeng Quarry; the study area comprises the application site and the surrounding area up to 2 km radius around the site boundary (IGI EIS Guidelines, 2013).

7.6 This chapter has been compiled based on a thorough examination of various sources, including published hydrological, hydrogeological, and geological data concerning the existing quarry, the application site, the surrounding area and a comprehensive data set of site-specific field data on surface water and groundwater.

7.7 It also encompasses an on-site inspection of the current excavations in the existing quarry lands, a topographic survey of the application site, consultations with Inland Fisheries Ireland (IFI) and Cork Co. Council, monitoring records, and analysis of previous investigation data. This data includes information presented in the 2018 Hydrogeological Assessment prepared for the quarry.

7.8 The scope of this chapter includes:

- An assessment of the existing water environment (hydrology and hydrogeology) within the study area;
- An assessment of the potential impact of the proposed development extension on surface water and groundwater;
- An assessment of the surface water management regime at the site, and record of the recent improvements in relation to source control of silt across the site; and
- Where necessary, recommendation(s) of mitigation measures to reduce or eliminate any potential impacts.

Consultations / Consultees

7.9 In the preparation of this Environmental Impact Assessment Report (EIAR) chapter pertaining to hydrology and hydrogeology, a number of information sources were referenced. The relevant sources of information are cited within the subsequent text.

7.10 The Inland Fisheries Ireland (IFI) were consulted by Cork Co. Council with respect to Planning Application Reference No 24/04069 (January 2024) which was for an extension to the quarry. This application was withdrawn by Breedon Ireland in March 2024.

7.11 The IFI consultation response (dated 12th March 2024 to Cork Co. Council) stated that while they were not opposed to the proposed development in principal, there had been historical issues at the site regarding water and more detail regarding expansion of the water management systems seemed worthy in light of conservation objective site connectivity and biodiversity of water dependent species.

7.12 Following the withdrawal of the application, a review of the consultation response from the IFI was undertaken and improvements to the water management system at the site were undertaken in consultation with IFI and Cork Co. Council.

7.13 Two site meetings were held between representatives of Breedon Ireland, IFI and Cork Co. Council on 22nd October 2024 and 22nd November 2024 respectively. During the first meeting a number of measures were proposed with the aim of ensuring continued environmental improvement at the site in respect of the surrounding water environment and silt source control internally within the site and on the public road. These measures were implemented prior to the second meeting on 22nd November, during which the measures were inspected by Cork Co. Council and IFI.

7.14 The issues raised by the IFI in their correspondence to Cork Co. Council are addressed in detail in the Hydro-G and Envirologic Water Management report for the Bweeng site, see copy of report in Appendix 7-A. The response to the IFI consultation is summarised later in this section.

Contributors / Author(s)

7.15 This chapter of the Environmental Impact Assessment Report (EIAR) was authored by SLR Consulting Ireland. The project team is comprised of:

- Nikolina Bozinovic, Project Hydrogeologist, BSc., MSc.;
- Dominica Baird, Technical Director (Hydrogeology), BSc., MSc., CGeol, EurGeol; and
- Dr. Peter Glanville, Technical Director (Hydrology), PhD, PGeo, EurGeol.

Significant hydrological, hydrogeological and hydroecological technical contributions were also provided by the following specialist consultants:

- Dr. Pamela Bartley (Hydro-G);
- Dr. Colin O'Reilly (Envirologic); and
- Dr. Ross Macklin (Triturus Environmental Ltd.).

7.16 Nikolina Bozinovic, a member of International Association of Hydrogeologist (IAH), holds a BSc and MSc in Engineering Geology and Hydrogeology. She works as Project Hydrogeologist with SLR and has over four years' experience in the sector. She specializes in hydrology and hydrogeology environmental assessments for planning applications. Nikolina has supervised ground investigations, conducted hydrogeological assessments, investigated water supply, prepared certifications for national wastewater authorisation programme and written geology and the water environment chapters of Environmental Impact Assessment Reports (EIARs) for a wide range of projects across Ireland and the UK, including wind farm projects.

7.17 Dominica is a Chartered Hydrogeologist with twenty-two years' consultancy experience. Dominica has practised hydrogeology, groundwater risk assessment and contaminated land in London, Edinburgh and Dublin and leads groundwater monitoring, water resources and due diligence projects. Key competencies include hydrogeological assessments and aquifer characterisation, developing conceptual site models, quantitative and qualitative groundwater risk assessments and groundwater investigations. Dominica has presented findings of hydrogeological assessments at oral hearings and prepared briefs of evidence. Dominica has project managed numerous water sections for EIARs, which included assessment of potential impacts on the water environment.

7.18 Peter is a technical and project Director in the Water (Hydrology and Hydrogeology) team in SLR's Dublin office. He has over 20 years' experience in environmental consulting including hydrology, geomorphology and geology and is a Professional Geologist (PGeo. EurGeol.) with the Institute of Geologists of Ireland. Peter's specialist experience is in the field of water assessments, hydrological monitoring (hydrology and hydrogeology) and hydromorphology. He has overseen the design and practical implementation of a number of field scientific monitoring programmes, supported the management, analysis and interpretation of the scientific data collected, and written and reviewed the resultant technical reports. Peter has worked on a wide range of projects in the minerals and mining, power, commercial and infrastructure sectors. He leads as project manager on multi-disciplinary projects and also acts as project director for multi-disciplinary teams.

7.19 Dr. Pamela Bartley (Hydro-G) and Dr. Colin O'Reilly (Envirologic) completed this work together. Multiple site visits, an audit of how water moves through the site and how it is managed, GPS surveying and discussions with the site led to the designed Water Management System enhancements now presented in this report.

7.20 Pamela Bartley (Hydro-G) is a water focussed civil engineer with almost 30 years field-based experience in hydrogeology: borehole drilling, groundwater monitoring and resource evaluation. Dr Colin O'Reilly (Envirologic) has over 20 years of professional experience as a hydrological engineer: evaluating and managing surface water runoff, modelling flooding and all associated Hydrogeological components. Both Colin O'Reilly and Pamela Bartley's practical experience is complimented by their PhDs, which were followed by postdoctoral academic research at field based at research centres. They have very practical footings in instrumentation and evaluation of resultant data. Both Pamela and Colin members of the

Irish Branch of the International Association of Hydrogeologists (IAH) and both have served on its committees at various stages as well as 3 years each as conference secretaries.

7.21 Dr. Pamela Bartley's primary qualification is a Diploma in Water and Wastewater Technology from Sligo RTC. She then completed her primary degree in Civil Engineering at Queens University, Belfast, followed by an M.Sc. in Environmental Engineering and then a field based, Hydrogeological focussed, Ph.D. within the School of Civil Engineering at Trinity College, Dublin. She completed academic research at postdoctoral level and lectured at 3rd level institutions but left to work in consultancy in 2005. Her key work areas are groundwater development from large scale water supply boreholes, hydrogeological assessment of quarries and successful receipt of discharge permits for quarry discharges to groundwater and surface waters. Hydro-G is the registered trading name of Pamela Bartley's company Bartley Hydro-Geology Ltd and the company holds employer's and public liability insurances and professional indemnity insurance of €2million for each and every claim in each period. Pamela is qualified and IOSH certified to act as PSDP (Project Supervisor Design Phase) & PSCS (Project Supervisor Construction Stage) as defined by the Construction Regulations, is a registered Irish Water Supplier (no. 1855) and is HSQE approved within Irish Water.

7.22 Envirologic is an environmental consulting practice established by Dr. Colin O'Reilly in 2010 and based in north Dublin. Colin's doctorate degree was awarded by the Centre for Water Resources Research, School of Architecture, Landscape and Civil Engineering, University College Dublin. Envirologic has key competencies in Hydrogeology (groundwater) and hydrology (surface water). Expertise is delivered to a varied customer base in both private and public sectors. The practice offers a wide range of solutions to meet client specific needs and to satisfy environmental and planning legislation. Envirologic has insurance cover for professional indemnity and public liability. Sample quarry projects completed by Envirologic can be viewed at http://www.envirologic.ie/projects#/industrial/. Envirologic has also successfully developed complex flood risk assessments and solutions for projects such as the Tullamore Medical Centre. Mitigation measures included a development-free zone between the main building and the Tullamore River, and specifications for widening of the river channel adjacent to the site. Envirologic operates either as sole consultancy on a project, but more typically as part of a collaboration or consortium. The company has formed strong collaborations with several leading environmental consultancies, planning firms, consulting engineers, architectural practices and frequently Hydro-G for quarry sites.

7.23 Hydro-G has delivered successful planning and discharge licence applications for regionally important quarries in SAC environments: Bennettsbridge Limestone, Churchill Stone Letterkenny, McGraths Quarries, Harringtons Quarries, Mortimers Quarry, Esker Readymix and MC Group. As a result of work in evaluating planning appeals, Pamela has become specialist in planning evaluations in the context of enacted Irish Regulation and EU Directives concerning the water environment such as the Groundwater Regulations (S.I. No. 9 of 2010), Surface Water Regulations (S.I. No. 272 of 2009), Water Framework and Habitats' Directives. She has been an invited guest speaker at An Board Pleanála, The Irish Concrete Federation, The Health Service Executive, Environmental Health Officers National Conference, The Irish Planning Institute's National Conference, The International Association of Hydrogeologist's National Conference (Irish Branch) and has delivered hydrogeological lectures to the public during Science Week.

7.24 Ross Macklin PhD (Candidate) BSc (Hons) Applied Ecology HDip GIS Dip IPM MCIEEM IFM is an environmental scientist specialising in freshwater and fisheries ecology. He studied a bachelor's degree in applied Ecology at UCC and later completed a higher diploma in Geographical Information Systems at UCC and a diploma in Integrated Pest Management at UCD. He is currently completing his PhD at UCC in fisheries ecology. Ross has an in-depth knowledge of all freshwater ecosystems and riparian corridors. He has

undertaken river habitat, lake habitat, canal habitat and fisheries assessments in professional work for 19 years. His specialist freshwater experience lies in biological and physiochemical water quality analysis, fisheries ecology, riparian habitat assessments, habitat mapping, protected species, mammal surveys, geographical information systems, ecological design and invasive species. Ross has expert experience in identifying and assessing macrophyte plant, aquatic bryophytes, fish and macroinvertebrates from a variety of aquatic habitats. He routinely undertakes fisheries assessments, protected species surveys, invasive species surveys, river hydromorphology surveys, habitat mapping; surface water management plans, CEMP, EcIA and EIAR reporting. He holds full national licences for freshwater pearl mussel (*Margaritifera margaritifera*), white-clawed crayfish (*Austropotamobius pallipes*) and amphibians inclusive of an open photography licence for numerous protected species. He has held over 300 section 14 licences for electro-fishing and netting surveys spanning the breadth of Ireland. Ross is widely considered as an expert in aquatic ecology.

Limitations / Difficulties Encountered

7.25 The evaluation of the hydrological and hydrogeological environment provided here relies on a number of hydrogeological assessments undertaken at the site, including:

- hydrogeological assessment (2018);
- water management report;
- hydrogeological report; and
- hydrogeological assessment all undertaken in 2024.

7.26 In addition, visual inspections conducted during site visits, a comprehensive dataset of monitoring records, publicly available information and conversations with on-site personnel.

7.27 No constraints or challenges were encountered during the compilation of this chapter in the Environmental Impact Assessment Report (EIAR).

Regulatory Background

Legislation

7.28 The key European Directives / European Union Legislation which apply to this Chapter of the EIAR and the hydrology and hydrogeology assessment presented herein are:

- Environmental Impact Assessment Directive (2011/92/EU); and
- Directive of the European Parliament and of the Council amending Directive 2011/92/EU on assessment of effects of certain public and private projects on the environment (2014/52/EU).

7.29 Other European Directives to which this EIAR makes reference or have been utilised in this EIAR are listed in Appendix 7-B.

7.30 Irish Government Acts, National Legislation and Regulations which apply to this Chapter of the EIAR and the hydrology and hydrogeology assessment presented herein are also listed in Appendix 7-C.

7.31 Most notably, under Regulation 4 of the Groundwater Regulations 2010, a duty is placed on public authorities to promote compliance with the requirements of the regulations and to

take all reasonable steps including, where necessary, the implementation of programmes of measures, to:

a. prevent or limit, as appropriate, the input of pollutants into groundwater and prevent the deterioration of the status of all bodies of groundwater;

b. protect, enhance and restore all bodies of groundwater and ensure a balance between abstraction and recharge of groundwater with the aim of achieving good groundwater quantitative status and good groundwater chemical status by 2015 or, at the latest, by 2027;

c. reverse any significant and sustained upward trend in the concentration of any pollutant resulting from the impact of human activity in order to progressively reduce pollution of groundwater; and

d. achieve compliance with any standards and objectives established for a groundwater dependent protected area included in the register of protected areas established under Regulation 8 of the 2003 Regulations [S.I. No. 722 of 2003] by not later than 2015, unless otherwise specified in the Community legislation under which the individual protected areas have been established.

Guidelines and Technical Standards

7.32 The following key guidelines apply to this hydrology and hydrogeology assessment:

- Institute of Geologists of Ireland (IGI) (April 2013): Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements;
- National Roads Authority (NRA) (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports: Environmental Protection Agency;
- Environmental Protection Agency, 2006. Environmental Management in the Extractive Industry: Non-Scheduled Minerals; and
- Geological Survey of Ireland - Irish Concrete Federation, 2008. Geological Heritage Guidelines for the Extractive Industry.

7.33 Additional guidelines and technical standards which apply to this Chapter of the EIAR and the hydrology and hydrogeology assessment presented herein are listed in Appendix 7-D.

Existing Development

7.34 The existing infrastructure and activities at Bweeng Quarry are outlined in detail in Chapter 2 of this EIAR.

7.35 The landholding can be broadly grouped into three areas - a northern area where the settlement lagoons and ancillary buildings and facilities including weighbridge, wheelwash, portacabin office, toilet, site entrance and all other associated site works, and ancillary objects are located. A central area of the site comprising the current extraction and processing area. A southern area of the site which comprises the proposed lateral extension area and is currently in agricultural use (grassland pastures).

Existing Quarry Area

7.36 The existing quarry site area, which encompasses approximately c. 22 ha., is located within the Blue Line (the Landholding) as shown in Figure 7-1. All of the existing infrastructure and facilities within this area will continue to be utilised for ongoing operations and are included within the proposed development.

Proposed Development

7.37 The proposed quarry lateral extension area covers approximately 3.7 ha., while the overall application area is c. 28.8 ha., refer to EIAR Figure 2-2 and Figure 2-3.

7.38 The overall quarry development is shown on Figure 2-4.

Existing Site Water Management

7.39 A conceptual diagram of the existing quarry water management system is shown in Figure 7-6 and it is described in the Water Management Audit & Future Design Proposals report in Appendix 7-A.

7.40 The elements of the existing quarry water management system are shown in more detail in Figure 7-7 se also Appendix 7-A.

7.41 The waters at the site which require management includes direct rainfall to the site and groundwater inflows to the quarry void. However, given that the bedrock at the site is High PSV then rainfall will be the dominant input in terms of the site water balance (high PSV bedrock generally comprises competent bedrock with limited transmissivity or ability to transmit water).

Quarry Sump

7.42 The quarry sump collects all rainfall-runoff generated within the quarry void and groundwater inflow to the void also. The waters are attenuated in the sump which also provides for the preliminary settlement of any sediment.

7.43 From the quarry floor's sump, clean rainfall runoff and groundwater is now pumped (via storage tanks at the wash plant) to the final settlement pond SP5 in the northern part of the site. Excess sump water outfalls from the rising main into the slipway under the washing plant and the tank underneath is called the dirty water holding tank, which is designed to collect dirty water from the conveyor belts of the washing plant; ultimately the excess water is further treated and discharged in compliance with the site's Section 4 Licence to the Reamanagh Stream at the discharge point.

7.44 The water level in the sump was estimated to be at c. 126 m AOD. The current sump is c. 300 m^2 and is c. 5 m deep, with an estimated volume of 1,500 m^3, see Appendix 7-A.

7.45 Water collected in the current quarry sump consists of all rainfall-runoff generated within the quarry void area. As rainfall-runoff on topographically upgradient agricultural lands is captured in perimeter field drains and routed towards the Reamanagh Stream, it has been assumed that there is no contribution of rainfall-runoff from topographically upgradient agricultural lands to the quarry void, see Appendix 7-A.

Washing Plant

7.46 There is a washing plant for the High PSV aggregates prior to their use in road and other infrastructure projects. The washing plant is located immediately adjacent to the water storage tanks. Stockpiled material that has been screened previously is tipped into the washing plant using a loading shovel.

7.47 The washing of the High PSV aggregates generates wash water, or dirty water, which contains silt material. The wash water from the plant goes to a holding tank, where previously it mixed with clean water pumped up from the sump; this mixing of clean and process waters increased the volume of dirty water at the site requiring treatment to remove suspended solids prior to discharge. In order to reduce the volume of water requiring treatment, clean water from the sump is now directed to the final settlement pond (SP5), reducing pressure on the overall settlement pond system, see Figure 7.8.

Concrete Batching Plant

7.48 The concrete batching plant includes a closed-loop settlement system for treating runoff from the hard stand area and truck washout with water recycled back to the washing plant with an overflow to settlement pond SP1 which is utilised during exceptional rainfall events.

7.49 Yard runoff and truck washout water enters the Concrete Truck Washout Tank with overflow chambers for the settlement of fines. The washout tank is a bath type structure with an angled base which allows for the easy removal of sediment using a loading shovel.

7.50 The overflow from the washout tank goes to a three-chamber settlement tank which is covered by a steel grate for H&S. The settlement tank has a total capacity of c. 60 m^3 and the clarified water in the final chamber is recycled back to the for batching plant for use in concrete production with excess directed to settlement pond SP1.

Settlement Lagoons

7.51 Details of the existing settlement lagoons at the site are set out in Appendix 7-A and the lagoon layout is shown in Figure 7-6 and Figure 7-7.

7.52 There are a total of 11 interconnected settlement lagoons with a total capacity of c. 3,200 m^3, see Appendix 7-A for details of each settlement lagoon at the site.

Wheel Wash

7.53 To prevent the dispersing of clay and dust onto the public road network, a wheelwash facility continues to be utilised for all HGV traffic leaving the site, following the requirements of Condition 25 outlined in P. Ref. QR073. All HGV traffic departing from the quarry is mandated to go through this established wheelwash. The existing wheelwash will remain in operation for the proposed development.

7.54 As mandated by Condition 17 specified in P. Ref. QR073, the section of the internal road between the wheelwash and the site entrance has been surfaced to ensure minimise dust generation by quarry traffic exiting the quarry.

7.55 A road sweeping programme in in place at Bweeng Quarry, with the roads cleaned using a mechanical sweeper a number of times per week as detailed in the operational procedure contained in the site EMS.

Water Supply

7.56 Water from the quarry sump is pumped up to two water storage tanks next to the washing plant; the water is used for non-potable supply on site (washing plant, dust suppression, wheel wash and toilets). The storage capacity of the water tanks is c. 197 m^3. The water in the tanks is primarily used to wash High PSV stone at the adjacent washing plant.

7.57 There are three water supply wells at the site, the Site Well, the Old Office Well and the Derelict House Well, see Figure 7-6. The wells are no longer used for site water supply purposes and instead are used for groundwater monitoring.

7.58 An existing onsite borehole (MW7) is utilised for site water supply to toilets, Figure 7.9.

Oil Storage and Fuel

7.59 No bulk fuels are stored at the site. Local fuel suppliers bring fuel to the site on an as need basis for refuelling plant and machinery.

7.60 The only hydrocarbons held at the site are small quantities of lubricating oils / hydraulic oils, which will continue to be stored on certified spill pallets in the garage area. Dedicated storage bins are provided in the garage for used oil filters, grease cartridges and oily rags.

Foul Water Drainage / Treatment

7.61 There is an existing wastewater treatment system with polishing filter on the site to treat effluent from the welfare facility. This was installed in 2018 in compliance with condition 44 of quarry registration ref. QR073. The system will continue in operation for the duration of the proposed development.

Site Discharge Licence

7.62 A current valid Section 4 Local Government (Water Pollution) Acts 1977 to 2007 Licence to Discharge a Trade Effluent to Water is in place at the site, Ref. WP(W)03/19. All discharge from the site is undertaken in compliance with the conditions referenced in this discharge licence at SW01, shown on Figure 7-6.

7.63 The conditions in the discharge licence are detailed below:

- The daily discharge of treated water shall not exceed 1,100 m^3/day (12.73 l/s);
- Agreed monitoring location, designated as SW01;
- Provision of a water monitoring program covering the parameters listed in the licence, refer to **Table 7-1**;
- With the exception of pH, ensure that eight out of ten consecutive water quality test results do not exceed the emission limit values (ELV's) set out in the licence. Individual test results should not exceed 1.2 times the ELV stated in the licence;
- pH of discharge water to be within the specified pH range set out in the licence;
- Conduct quarterly monitoring of BOD, suspended solids, and ammonia (N) in the Reamanagh Stream both upstream and downstream of the discharge point;
- Maintain records of all monitoring activities for at least five years; and
- Submit the results of all monitoring conducted during the previous quarter to the Licensing Authority (Cork Co. Council) on a quarterly basis.

Table 7-1:
Monitoring Requirements in Discharge licence WP(W)03/19 (For Discharge Point SW01)

Parameter	Unit	ELV*	Frequency
pH	pH units	6.0-9.0	Quarterly
BOD	mg/l	10	Quarterly
Suspended solids	mg/l	35	Quarterly
Total nitrogen	mg/l	15	Quarterly
Total mineral oil	mg/l	5	Quarterly
Total heavy metals (Ba, Cd, Cr, Cu, Hg, Ni, Pb, Zn)	mg/l	1	Annually
Chromium VI	mg/l	0.15	Annually
* Emission Limit Value			

7.64 It is expected that there will be no change in the discharge water chemistry as a result of the proposed extension to the quarry. The groundwater entering the quarry void and the rainfall to the site will be of similar chemistry to that at the site now and which is covered by the existing discharge licence.

7.65 The water from the site will continue to be treated via settlement lagoons at the site to remove suspended solids.

7.66 There will be no change in the processing activities at the site with the proposed quarry extension, so there will be no change in the discharge water chemistry as a result of ongoing activities at the site.

Surface Water and Groundwater Abstractions

7.67 Groundwater is abstracted at the site from the sump in the quarry void for the purpose of dewatering. The abstraction of water is registered with the EPA in accordance with the requirements in the Abstractions and Associated Impoundments Act (2022). The abstraction registration number is R00512-01 and a copy of the abstraction registration details are set out here in Table 7-2 below.

Table 7-2:
Abstraction Registration Details

Reg No	R00512-01
Abstraction Point Code	APR000850
Abstraction Point Name	QSW1
Abstraction Purpose / Primary Use	Quarrying
Abstraction Type	Groundwater Well / Borehole
Maximum Daily Volume Estimate for Abstraction (m^3/d)	718
Site Cumulative Max. Daily Vol. Est. for Registration (m^3/d)	718
Total Annual Volume (m^3/yr)	262,070
County	Cork

Reg No	R00512-01
ING Easting	152413
ING Northing	90250
Townland Name	Carrigcleena More
Waterbody or Water Feature	Glenville Groundwater Body
Waterbody Code	IE_SW_G_037
Do Restrictions Exist?	No
Registration Status	Active

7.68 No surface water is abstracted from local rivers or streams for use at the existing site. It is not proposed to abstract any surface water as part of the proposed development.

Water Monitoring

Groundwater Monitoring

7.69 The existing groundwater monitoring program, originally established in compliance with Condition 43 of P. Ref. QR073, will be continued for the proposed development.

7.70 From February 2022, the groundwater quality monitoring boreholes include the Old Office well (formerly known as BH1), the Derelict House Well (formerly BH2), and MW7. Historically, groundwater quality was assessed in all of these wells, including well MW2.

7.71 Continuous groundwater level monitoring loggers have been installed in six boreholes at the site (MW1, MW3, MW4, MW5, MW6 and MW9), refer to monitoring locations shown on **Figure 7-1.**

Surface Water Monitoring

7.72 The existing surface water monitoring programme (undertaken in compliance with the requirements of the existing discharge licence Ref. WP(W)03.19) will continue to be implemented for the proposed development.

7.73 There are three surface water monitoring locations situated along the northern quarry boundary and comprise the discharge water (SW01), the Reamanagh Stream upgradient of the discharge point and downgradient of the discharge point (SW02 and SW03 respectively) refer to Figure 7.1.

7.74 Condition 2.7 in the discharge licence stipulates macroinvertebrate monitoring in the Reamanagh Stream, both upstream and downstream of the site discharge point, is to be undertaken every three years.

7.75 For the purpose of monitoring water quality in the Reamanagh Stream, Breedon have undertaken macroinvertebrate monitoring on an annual basis in the stream since 2018.

Quarry Void Pumping

7.76 The water pumped up from the quarry void is measured daily by way of a flow meter. The flow meter is recording the combined groundwater and surface water inputs to the quarry void.

Receiving Environment

Study Area

7.77 For the purposes of this assessment, the study area comprises the application site the surrounding area up to 2km to reflect the sensitivity of the hydrology and hydrogeology; this is in line with the Institute of Geologists of Ireland's (IGI) guidelines (2013).

7.78 The IGI guidelines state that the minimum distance of 2 km should be reviewed in the context of the geological / hydrogeological environment as well as the scale of development and increased to reflect the sensitivity of the subsurface.

7.79 The IGI guidelines also state that maps should be sourced to allow for the review of the geological and hydrogeological conditions that exist within a minimum of 2km of the site boundary (from the outer limit of the planning and/or licence area) and presented at a scale of 1:25,000, capturing the study area of up to 2 km from site boundary.

Baseline Study Methodology

7.80 The methodology used in the investigation follows the guidelines and advice notes provided by the Environmental Protection Agency (EPA) on environmental impact assessments and the IGI's guidance on Geology in Environmental Impact Statements.

7.81 Existing information on the geology, hydrogeology and hydrological features of the area and its surrounds was collated and evaluated. Monitoring data comprising groundwater chemistry, groundwater levels, surface water chemistry and discharge volumes were assessed.

7.82 The methodology involved in the assessment of the hydrology and hydrogeology in the area around Bweeng quarry is summarised as follows:

- a desk study, in which existing data and relevant regional data sources for the area were examined;
- field visits, in which key aspects of the local hydrology and hydrogeology at the quarry and surrounding area were identified and assessed;
- historical and other relevant data provided by Breedon Ireland; and
- the analysis of the information gathered.

Sources of Information

7.83 The desk study involved the examination of available datasets to determine the geological and hydrogeological setting of the area (Required Information, IGI Guidelines), together with all available studies and technical reports available at the time of preparation of this report, as detailed in Table 7-3

Table 7-3:
Required Information - Data Sources

Data	Data Source
Topography and aerial photography	Tailte Éireann GeoHive map viewer

Data	Data Source
Designated Sites	• Environmental Protection Agency; • Geological Heritage Sites and County Geological Sites; and • Natura 2000 Sites (National Parks and Wildlife Service
Bedrock Geology	• GSI Groundwater Data Viewer - Bedrock Geology
Subsoil Geology	• Subsoil mapping (GSI)
Soils	• Irish Soils Information System (Teagasc)
Groundwater	• GSI Groundwater Data Viewer - bedrock and gravel aquifers, vulnerability, water supplies; • GSI Groundwater body description documents and • Environmental Protection Agency water maps.
Surface Water	• Watercourses and water quality (EPA); • Water Framework Directive (EPA); and • Flooding (OPW CFRAM).
Abstractions	• Surface water and groundwater abstractions (EPA abstractions register)
Permitted Sites	• EPA licence register
Rainfall and Evapotranspiration	• Met Éireann
Environmental Pressures	• Water Framework Directive (EPA)

7.84 In addition to the regional desktop data consulted above site specific data and information was provided for the purpose of preparing this EIAR. The site-specific data and sources are set out in Table 7-4 below. This data was reviewed and is presented in this EIAR chapter.

Table 7-4:
Site specific data and sources

Data / Report	Source
Groundwater level logger data	Breedon Ireland
Discharge water quality data	Breedon Ireland
Groundwater quality data	TMS Environmental Ltd. quarterly groundwater monitoring reports (ongoing)
Borehole logs	Dunnes Drilling (2017) and Irish Drilling (2017)
Bweeng Quarry Water Management Audit and Proposals Report	Hydro G and Envirologic (2024)
Detailed Hydrogeological Assessment Report	TMS Environmental Ltd. (2018)

Data / Report	Source
Aquatic & fisheries baseline report for the continued operation of a quarry development at Bweeng, Co. Cork	Triturus Environmental Ltd. (August 2024)
EPA Abstraction Register	EPA (December 2023)

Topography, Physical Features, and Land-use

7.85 The site is located within the townland of Carrigcleena More, approximately 2.5 km north-east of Bweeng village, Co. Cork, and lies on the eastern side of the Boggerah Mountains.

7.86 The OS 1:50,000 Discovery Map contours indicate that site elevations are in the range 150m - 190 mAOD, see Figure 7-1.

7.87 As per the EPA's Corine 2018 land use mapping data, the study area is predominantly characterized by agricultural land used for pasture. The existing quarry area is categorised as a mineral extraction area, whereas the surrounding area features intermittent patches of forested areas and diverse agricultural land uses.

7.88 The application area is defined by its physical boundaries, namely the Reamanagh Stream to the north and west, the L1214 local road along the eastern edge and agricultural land to the south and west of the site.

7.89 Access to the existing quarry is from the east via the L1214 local road.

Rainfall, Evapotranspiration and Effective Rainfall

7.90 The annual average rainfall, the evapotranspiration rate and effective rainfall have been estimated in Appendix 7-A and the values are shown below in Table 7-5.

Table 7-5:
Estimated Rainfall, Evapotranspiration and Effective Rainfall

Variable	Value (estimated)
Annual Average Rainfall (AAR) (Met Éireann Long-term Average 1991 - 2020)	1,442 mm/yr.
Annual Average Potential Evapotranspiration (PE) (Met Éireann Moorepark Synoptic Station Potential Evapotranspiration (2021-2023).	511 mm/yr.
Actual evapotranspiration (AE) (PE*0.95)	485 mm/yr.
Effective Rainfall (ER) (AAR – AE)	957 mm/yr.

Soils and Geology

7.91 A detailed description of the local and regional soil, subsoil, and bedrock geology at and around the quarry is provided in Chapter 6 of this EIAR. A summary is provided is provided here.

Soils and Subsoils

7.92 The soils within the overall landholding have already been removed in north and central areas to facilitate previous rock extraction.

7.93 Geological Survey of Ireland (GSI) maps show that soils in the locality are predominantly shallow and well-drained with an acidic hydrochemical signature.

7.94 The soils within the proposed extension area are still in-situ and according to EPA mapping encountered as Kilrush Series, which are described as fine loamy drift with siliceous stones, comprising typical surface water gleys soils.

7.95 The subsoils underlying the existing quarry have in most areas already been removed and within the extension area are mapped as sandstone Devonian till. As per groundwater borehole logs (2017), the superficial deposits are mainly present as sandy clay or clay deposits. The soils within the extension area will be removed to facilitate the realignment of a section of local road and future stone extraction.

Local Bedrock Geology

7.96 The online map viewer from the GSI (showing a geological map at a scale of 1:100,000) reveals that the majority of the landholding area is underlain by Devonian Old Red Sandstone from the Ballytrasna Formation, which is dated to the Upper Devonian period. This formation is primarily composed of purple mudstone and sandstone, with the noteworthy presence of a volcanic rock unit within the Ballytrasna Formation at Carrigcleena More, referred to as the 'Carrigcleena More Volcanics' (as shown on EIAR Figure 6.4). The Carrigcleena Volcanics are characterized as pyroclastic deposits composed of strata containing rock fragments, typically including pumice, lapilli, and occasional vesicular bombs.

7.97 A significant fault that spans the region is identified on the eastern side of the quarry, running in a north-northwest to south-southeast direction, as shown on Figure 6.4.

7.98 Typically, there is a weathered zone present at the uppermost layer of the bedrock, and its thickness varies depending on the geological conditions. This weathered layer was characterized as being soft when drilled, frequently exhibiting a brownish alteration in the rock colour, with thickness ranging from 4 m at MW6 to 42 m at MW5.

7.99 In August 2019, SLR Consulting Ireland conducted a comprehensive geological resource assessment for the proposed quarry extension area. The objective was to verify the quality of rock in the extension area for potential aggregate production.

7.100 Three rotary cored boreholes (19-BWG-01, 19-BWG-02, and 19-BWG-03) were strategically drilled in the agricultural lands south of the existing quarry. A detailed account of the geological findings, including green metasandstones, purple metasiltstones, metamudstones, and substantial volcaniclastic sequences, is provided in the borehole logs (Appendix 6-C).

Surface Water - Hydrology

Catchments

7.101 On a regional scale, the overall landholding area its environs are located in the southern part of the Blackwater (Munster) Catchment area (WFD catchment ID18), refer to Figure 7-5. Further details on the catchment are provided as part of the Water Framework discussion in this chapter.

7.102 This catchment includes the area of River Blackwater and all streams entering tidal water between East Point and Knockaverry, Youghal, Co. Cork, draining a total area of 3,310 km².

7.103 In terms of local catchments under the WFD, the site is situated in the Blackwater (Munster) Sub-Catchment (ID 18_23) and falls within the Lyre River Sub-Basin (ID IE_SW_18L021100).

Surface Water Bodies

7.104 Within the wider area around Bweeng Quarry, specifically along the northern quarry boundary, there is a single hydrological feature, known as the Reamanagh Stream.

7.105 The Reamanagh Stream starts as a groundwater spring located at the southwestern corner of the site; this is the start of the stream surface water course.

7.106 The Reamanagh Stream flows eastward and converges with the South Kilpadder River at a point approximately 1.1 km to the east of the site. Subsequently, the Kilpadder River flows north and eventually meets the Lyre River, which continues its eastward course.

7.107 The Lyre River 3.2 km downstream of the site is designated as part of the Blackwater River SAC (Site code 002170), and therefore the site is hydrologically linked to the SAC via the surface water streams and the River Lyre.

Surface Water Quality

7.108 Discharge water and receiving water quality is monitored in accordance with the monitoring requirements in the site discharge licence (ref. WP(W)03/19).

7.109 Breedon Ireland currently utilise TMS Environment Ltd. for the provision of environmental services which include quarterly collection and analysis from three surface water monitoring points (SW01, SW2 and SW3), refer to Figure 7-1. All samples are analysed using an accredited laboratory.

7.110 SW01 is the discharge monitoring point, and the location was agreed with the Licensing Authority, as per the Discharge Licence. SW2 is the Reamanagh Stream upstream sampling location from the discharge point and SW3 is the Reamanagh Stream downstream sampling location from the discharge point.

Discharge Water Quality (SW1)

7.111 The discharge water quality results are shown in Table 7-6 with the Discharge Licence Emission Limit Values (ELV). The Discharge Licence states that the ELV must not be exceeded in 8 out of 10 consecutive test results, except for pH.

7.112 The monitoring results show that the results are below the ELV for all parameters tested. As no exceedances have been observed in the ELVs, the discharge from the site is in compliance with the requirements of Condition 2.4 of the discharge licence.

7.113 A summary of results is shown for SW1 in Table 7-6 below.

Table 7-6:
Discharge Water Quality at SW1 (May 2020 - November 2024)

Parameters	Units	Emission Limit Value (Discharge Licence WP(W)03/19)	SW1 - Discharge			
			Max	Min	Average	Sample Count
Temperature	Deg C		17.7	4.1	11.9	18
pH	pH Units	6.0 - 9.0	8.4	6.7	7.6	19
Conductivity	uS/cm @25°C		460	221	316	19
DO	mg/l		10.97	4.78	9.03	16
BOD	mg/l	10	5.54	2.20	3.26	12
Suspended Solids	mg/l	35	16.2	<3	8.1	14
Total Nitrogen	mg/l	15	6.10	1.85	3.64	19
Mineral Oil	ug/l	5000	<10	<10	<10	19

Surface Water Quality (SW2 and SW3)

7.114 The surface water quality results in the receiving waters at SW2 (upstream) and SW3 (downstream) of the discharge point (SW1) are shown in Table 7-7 below.

7.115 The receiving water quality results indicate an improvement in surface water quality downstream of the discharge point (SW1) for BOD and Suspended Solids with an increase in Ammonia downstream at SW2, see Table 7-7. The ammonia is likely to be coming from the surrounding catchment into the quarry with groundwater inflows and/or from runoff from adjoining lands to the stream.

Table 7-7:
Surface Water Quality at SW2 and SW3

Parameters	Units	EQS Inland Surface Waters	SW2 (upstream)	SW3 (downstream)
			Average	Average
BOD	mg/l	High status ≤1.3 (mean) or ≤2.2 (95%ile) Good status ≤1.5 (mean) or ≤2.6 (95%ile)	3.01	2.98
Suspended Solids	mg/l	-	80.33	26.37
Ammonia	mg/l	High status ≤0.040 (mean) or ≤0.090(95%ile). Good status ≤0.065 (mean) or ≤0.140 (95%ile)	0.17	0.30

Surface Water Biological Quality in the Reamanagh Stream: Q Values

7.116 Condition 2.7 in the discharge licence stipulates macroinvertebrate monitoring in the Reamanagh Stream, both upstream and downstream of the site discharge point, is required to be undertaken every three years. Breedon Ireland undertake macroinvertebrate monitoring every year in the Reamanagh Stream and the results from 2018 to 2023 are shown in Table 7-8 below.

7.117 The monitoring was undertaken by TMS Environment Ltd. (TMS) who also prepared annual reports detailing the biological assessment of the surface water quality in Reamanagh Stream. Samples were taken from both upstream and downstream of the site discharge point in accordance with the EPA Q-Rating Methodology and European Communities Environmental Objectives (Surface Waters) Regulations 2009 S.I. No. 272 of 2009. The sampling upstream and downstream of the discharge point was undertaken to assess the impact of discharge on the receiving waters.

7.118 In 2018 the biological quality Q Value was the same upstream and downstream of the site discharge and the TMS report concluded that the discharge emission from the site did not have a deleterious effect on the macroinvertebrate fauna in the stream.

7.119 The monitoring results for 2019 indicated a decline in water quality and the TMS report states that the stream has been significantly polluted upstream of the discharge, between the previous survey in June 2018 and the July 2019 survey.

7.120 The TMS Q value results for 2021, 2022 and 2023 show that the water quality has improved since 2020 when the upstream sample (Q Value 1) indicated that the waters were classified as being seriously polluted and the downstream sample (Q Value 2-3) indicated that the waters were classified as being moderately polluted, with an improvement in the water quality occurring as it flows past the licenced discharge point.

7.121 A macroinvertebrate biological survey was undertaken in May 2024 by TMS Environmental Ltd. with samples taken from both upstream and downstream of the discharge point in accordance with the EPA Small Streams Risk Scoring (SSRS) Methodology and European Communities Environmental Objectives (Surface Waters) Regulations 2009 S.I. No. 272 of 2009. The results from the SSRS study found that:

- The results of the macroinvertebrate survey indicate a SSRS of 5.6 (At Risk) for both the upstream and the downstream monitoring locations on the Reamanagh stream; and
- As the SSRS score is the same both upstream and downstream of the quarry discharge, it is concluded that the discharge from the quarry at Carrigcleena is not having a deleterious effect on the macroinvertebrate assemblages present in the stream.

Table 7-8
Macroinvertebrate Sampling Results for the Reamanagh Stream

Monitoring Year	Q Value Upstream	Q Value Downstream
2018	Q Value of 3-4 (Slightly Polluted Waters)	Q Value of 3-4 (Slightly Polluted Water)
2019	Q Value of 1 (Seriously Polluted Waters)	Q Value of 2-3 (Moderately Polluted Water)

2020	Q Value of 1 (Seriously Polluted Waters)	Q Value of 2-3 (Moderately Polluted Water)
2021	Q Value of 3 (Moderately Polluted Water)	Q Value of 3 (Moderately Polluted Water)
2022	Q Value of 3 (Moderately Polluted Water)	Q Value of 3 (Moderately Polluted Water)
2023	Q Value of 3 (Moderately Polluted Water)	Q Value of 3-4 (Slightly Polluted Water)
2024	SSRS Risk Score 5.6 (At Risk)	SSRS Risk Score 5.6 (At Risk)

7.122 Overall, the TMS reports state that, based on the Q values upstream and downstream of the discharge emission point from the site indicate that the discharge has not had a deleterious effect on the macroinvertebrate fauna in the stream. In some years discharge from the site served to improve the quality of the water in the stream.

Aquatic Survey

7.123 An aquatic and fisheries baseline survey was undertaken by Triturus Environmental Ltd. in July 2024 across eight river locations and is discussed in the biodiversity chapter of this EIAR. The aquatic survey covered the receiving waters into which site water is discharged, downstream for c. 3.2 km to the River Lyre, and included biological water quality (Q sampling). Also included in the assessment were surrounding waters which are upstream of, and are not hydrologically connected to the quarry licenced discharge point.

7.124 In terms of biological water quality, none of the survey sites met the target good status (≥Q4) requirements of the European Union Environmental Objectives (Surface Waters) (Amendment) Regulations 2019 or the Water Framework Directive (2000/60/EC). Eutrophication (enrichment) and siltation pressures were evident during the survey both at sites hydraulically connected to the quarry and at the adjacent South Kildapper Stream which is not hydraulically connected to the quarry licenced discharge point. Both siltation and enrichment pressures are considered to have contributed to biological water quality decline.

7.125 The aquatic survey report concluded that while siltation pressures are present at the sampling points (both those connected to, and not connected to the quarry licenced discharge point), apart from suspended solids the physiochemical water quality is good overall. The presence of juvenile trout in high abundance indicates that trout are spawning and using the Reamanagh Steam as a nursery.

7.126 The aquatic baseline study found that the biological quality in the receiving waters upstream of the discharge point form the quarry was Poor Quality (Q3) as were the two samples immediately downstream of the discharge.

Flooding

7.127 The Office of Public Works (OPW) is the government agency with statutory responsibility for flooding in Ireland. Flooding is a natural river channel / floodplain process designed to accommodate larger flows than can be passed by the river channel alone.

7.128 The available OPW flood datasets do not cover potential flooding along the Reamanagh Stream to the north of the Bweeng Quarry.

7.129 According to the OPW website (www.floodinfo.ie) and the National Indicative Fluvial Mapping, there is a medium probability (1%) of flooding along the South Kilpadder river channel, approximately 1km in northeast direction downstream of the Bweeng Quarry area, which corresponds to a 1% Annual Exceedance Probability (AEP).

7.130 The GSI's Groundwater flood dataset was reviewed and does not indicate any groundwater flooding potential within the study area.

Groundwater - Hydrogeology

Aquifer Classification

7.131 The bedrock at the proposed extension is classified by the Geological Survey Ireland (GSI) as a Locally Important Aquifer - bedrock which is moderately productive only in local zones (Ll), refer to Figure 7-2.

7.132 Aquifers in this category tend to have a network of fractures that are relatively poorly connected, giving a low permeability which tends to decrease with depth. A shallow zone of higher permeability may exist within the top few meters of more fractured/weathered rock; higher permeability may also occur along individual deeper fractures (e.g. fault zones). These zones may be able to provide larger 'locally important' supplies of water. In general, the lack of connection between the limited fractures results in relatively poor aquifer storage and flow paths that may only extend a few hundred meters.

7.133 The overburden material (glacial till) is not classified as an aquifer by the GSI.

Table 7-9:
Summary of Ll bedrock aquifer characteristics

Aquifer Characteristics	Description
Aquifer Class	Locally Important (Li)
eT values (m^2/d)	Some >50. A few >500
Productivity	Average III-IV, some II
BH Yields	Some excellent yields
Extent of flow system	Local
Large springs	Perhaps but unusual
Lithology	Type: Impure limestones, sandstones, shales, others Dolomitic: Perhaps but not extensive Karst: Occasional
Structure	No criteria
Surface water discharge zones	High drainage density, low baseflows
Annual fluctuations in water levels	No criteria

Local Aquifer Characteristics

7.134 High PSV stone, by its very nature this tends to be low permeability bedrock.

7.135 Within the existing quarry void, very few groundwater inflows are present in the faces; most are shallow, the only deep groundwater seepages noted during extended dry weather were in the south-eastern quarry face (**7-1**).

Diagram 7-1:
Deep groundwater seepage from base of southeastern quarry face

7.136 Groundwater monitoring boreholes were drilled at the site in 2017 as part of a detailed Hydrogeological Assessment in respect of compliance with Condition no. 3 of Section 261 Quarry registration ref. QR073. These monitoring boreholes were supervised by TMS and encountered water strikes generally within the top 15m - 30m of bedrock, with no additional water strikes at depth. The estimated yields of the boreholes were low (<100m3/d) to moderate (100-400m^3/d), typical of a locally important aquifer.

7.137 One borehole MW9, located to the northeast of the proposed extension, was drilled as part of the investigation for the previous TMS assessment. The Rock Quality Designation (RQD), which is a rough measure of the degree of fracturing in a rock mass, was low for the top 25m of rock indicating a more fractured rock, but rapidly increases below that. The fracture index (the number of fractures in each 1m interval) mirrors the RQD, with few fractures below 25m from the top of rock.

7.138 Packer tests carried out during coring returned higher hydraulic conductivity (permeability) values for the upper 20 m-25 m of bedrock (median value 0.23 m/d), but much lower values for the bedrock below this (median value 0.005 m/d) which would be expected. The packer

test results indicate that the upper weathered/fractured zone of bedrock has a low permeability; bedrock below this upper zone has a permeability orders of magnitude lower than the upper zone. Therefore, most groundwater flow in bedrock occurs in the upper weathered zone, as expected, with little or no flow deeper in bedrock apart from the odd deeper fracture which may/may not be interconnected with the fracture network.

Groundwater Bodies

7.139 The application area is located in the central portion of the Glenville Groundwater Body (GWB). This groundwater body encompasses an area of 1,107 km^2 and is situated within the topographic range between sea level and an elevation of 200 mAOD, primarily covering the upland area, see Figure 7-3.

7.140 The GWB description states that the bedrock lithologies within this GWB have no intergranular permeability, groundwater flow is through fractures and joints only. Regionally in this GWB most groundwater flow occurs in the upper weathered zone and a zone of interconnected fractures that normally does not extend more than 15-30m from the top of rock. Permeability mirrors the fracture pattern and decreases rapidly with depth.

7.141 Transmissivities for this GWB are expected to be in the range 2-20 m^2/day. Well yields are usually low however some higher yielding wells can be encountered, usually related to fault zones. Summer yields are sometimes unsustainable. Aquifer storativity is low. Groundwater gradients are likely to be in the range 0.01-0.04.

7.142 The GWB description states that the groundwater is generally unconfined and local groundwater flow is towards rivers/streams with short flow paths in the order of hundreds of meters.

Groundwater Vulnerability

7.143 The GSI has developed a groundwater vulnerability classification for Ireland, refer to **Table 7-10**. The groundwater vulnerability at a particular point is controlled by the natural geological and hydrogeological characteristics at that point. The vulnerability depends on the nature of the subsoils (i.e., their permeability characteristics), the type of recharge (point or diffuse) and the thickness of the unsaturated zone (depth to groundwater).

7.144 Groundwater within the bedrock is classified by the GSI as being extremely vulnerable to potential pollution in the area of the quarry (category X) due to outcrops opened by quarrying and the absence of overburden cover. Groundwater is extremely vulnerable in the area immediately surrounding the quarry (category E) due to the thin cover of overburden. Beyond this, the groundwater is highly vulnerable (category H).

7.145 Within the extension area, where the overburden is in-situ, a vulnerability classification, based on GSI mapping is spanning from High to Extreme. The groundwater vulnerability map is shown in **Figure 7-4**.

7.146 The groundwater vulnerability rating of High to Extreme is expected for quarries where rock is close to the surface. The rating system is for informational purposes and intended to be used in conjunction with numerous other aquifer properties and site-specific information. Groundwater vulnerability rating utilised in isolation does not indicate a risk to groundwater users in the study area as a result of a proposed development.

Table 7-10:
GSI Vulnerability Rating Screening

Vulnerability Rating	Hydrogeological Conditions				
	Subsoil Permeability (Type) and Thickness			Unsaturated Zone	Karst Features
	High permeability (sand / gravel)	Moderate permeability (e.g. Sandy subsoil)	Low permeability (e.g. Clayey subsoil, clay, peat)	(Sand/Gravel aquifers only)	(< 30 m radius)
Extreme (E)	0-3.0m	0-3.0m	0-3.0m	0-3.0m	-
High (H)	>3.0m	3.0-10.0m	3.0-5.0m	>3.0m	N/A
Moderate (M)	N/A	>10.0m	5.0-10.0m	N/A	N/A
Low (L)	N/A	N/A	>10.0m	N/A	N/A
Notes: (i) N/A= not applicable (ii) Precise permeability value cannot be given at present. (iii) Release point of contaminants is assumed to be 1-2m below ground surface.					

Groundwater Recharge

7.147 Local groundwater recharge potential has been modelled by the Geological Survey of Ireland (GSI) based on subsoil characteristics, aquifer type, soil drainage and bedrock geology.

7.148 Recharge coefficients can be utilized to estimate the proportion of water infiltrating to bedrock, against that moving laterally as shallow subsurface flow and surface overland flow.

7.149 The lithological profile at the site is described in, as follows:

Table 7-11:
Summary Site Lithological Profile

Lithological Unit	Detail
Soils across extension area	Kilrush Series. Poorly to moderately drained soil, typical surface water Gley.
Subsoils across extension area	Sandstone Devonian glacial till with moderate permeability
Bedrock	Ballytrasna Formation (Upper Devonian) with volcanic rock unit (Carrigcleena More Volcanics)

7.150 The GSI assigns a Groundwater Recharge Coefficient of 85% to bare rock surfaces such as quarries. When this recharge coefficient is applied to the GSI ER of 898 mm/yr. the resultant potential recharge rate to the bedrock aquifer is 763 mm/yr. However, the GSI has assigned a groundwater recharge 'cap' of 200 mm/yr. to the bedrock type at the quarry.

7.151 The recharge coefficient, within most of the extension area (assuming undisturbed soil remaining in-situ), is indicated as 60% at GSI data base, therefore the average recharge would be:

Average Recharge = Effective Rainfall x recharge coefficient = 898 mm/yr. x 0.6 = 538.8 mm/yr.

7.152 Within the proposed extension area, the vegetation, soils and subsoils will be removed, eliminating evapotranspiration. Consequently, direct rainfall to the quarry void will primarily runoff to the sump with only 200 mm/yr. recharge to the groundwater aquifer.

7.153 As the quarry extension gets deeper and the permeability is significantly lower than in the top 20m-25m of bedrock then the groundwater recharge will be minimal with the majority of rainfall runoff going directly to the quarry sump.

Groundwater Supply Wells

7.154 There are three former groundwater supply wells on-site (site well, old office well and derelict house well), which were previously employed for supply purposes. These wells are no longer used for supply but continue to be used for groundwater monitoring, refer to Figure 7-1.

7.155 The national well database from GSI shows that there are seven agricultural or domestic wells within a 5km radius of the site. The nearest well, identified as GSI ID: 1407NWW103, is located approximately 1.5km in the west to southwest direction of the site at its closest point. This well is registered for both agricultural and domestic purposes, has a depth of 48.8m, and encounters bedrock at a depth of 6.7m.

7.156 It is important to note that the GSI well database is primarily for informational purposes and does not include all wells in the study area.

Local Groundwater Well Survey

7.157 A local well survey was undertaken in the local area by TMS in to identify private and public groundwater abstractions within the vicinity of the quarry, see **Table 7-12** below with summary well details and well locations shown in **Figure 7-2**.

Table 7-12:
Private/public wells in the vicinity of Bweeng Quarry

Well No.	Distance (m)	Owner(s)	Use	Details
1	890	Private	Domestic & agricultural	In use, pumps on demand
2	360	Private	Domestic	In use, pumps on demand
3	112	Old Office	Agricultural (former office supply)	Not in use.
4	67	Derelict House	Agricultural	Not in use.
5	379	Private	Domestic	In use, no further information
6	672	Cork Co. Council	Group Water Supply	In use, supplies c. 10-12 local houses, pumps on demand, c. 6-7m^3/day
7	544	Private	Unknown	Farm likely to have well, no information available
8	602	Private	Unknown	Farm likely to have well, no information available

7.158 The group water scheme borehole located 672 m to the east of the quarry was visited by TMS with a Water Services Engineer from Cork Co. Council. The well serves c. 10-12 local houses and pumps on demand only (pressure switch). The borehole is 150 mm diameter, the depth is unknown. The typical daily volume pumped is c. 6-7 m^3/day. Abstracted water is chlorinated only, and the well is managed by Cork Co. Council. No zone of contribution has been mapped for the well.

Source Protection Areas

7.159 The Public Supply Source Protection Areas dataset are reviewed from GSI web map. These data sets comprise Source Protection Areas (SPAs) around groundwater abstraction points that are managed by Irish Water to supply Public Water Supply Schemes across Ireland.

7.160 There is no recorded Public Water Supply Sources, neither the Source Protection Zones in the study area. The closest Public Supply Source Area is Grenagh Public Water Supply c. 8km south-east of the site in Grenagh Village.

7.161 With regard to National Federation of Group Water Schemes (NFGWS) - Group Scheme Source Protection Areas, data was obtained from EPA web map. The nearest scheme is Faran NFGWS, situated approximately 20 km south to southwest from the site.

Groundwater Monitoring

7.162 Nine monitoring wells (MW1 - MW9) were drilled at the site in May 2017 as part of a detailed Hydrogeological Assessment at the site, refer to Figure 7-1. Four groundwater monitoring wells were set up to the 2009 excavation's full depth at 148.14 m AOD, at this time considering nearby private wells situated to the southwest, southeast and north of the proposed extension area.

7.163 The wells were strategically positioned to the north, west, and south of the quarry void, consisting of eight deep wells labelled MW1 through MW7 and MW9, along with one shallow well, MW8. Those in proximity to the quarry void were drilled to a depth of approximately 30m below the 2009 floor level, equivalent to two extractive benches. MW9, completed as a monitoring well, was drilled to a depth of 118.4 m AOD or 70.5m below ground level (bgl). The majority of these wells were installed as open holes in stable bedrock.

7.164 Additionally, three supply wells were repurposed as monitoring wells (as outlined in 7.109 above). An investigation in April 2021 found most monitoring wells operational, except for MW2 and the site well. Further details are included in the monitoring well logs in **Appendix 7-E** and **Table 7-13** below.

Table 7-13:
Bweeng quarry Groundwater Monitoring Wells

BH ID	Grid reference (ITM)	Top of Casing elevation (mAOD)	Drilled depth (mAOD)	Open hole section (m bgl)	Location
MW1	552324 590329	175.62	127.75	2-47	West of existing quarry
MW2	552464 590417	-	114.67	6-50	North of existing quarry
MW3	552673 590075	185.60	135.22	12-50	East of proposed extension

BH ID	Grid reference (ITM)	Top of Casing elevation (mAOD)	Drilled depth (mAOD)	Open hole section (m bgl)	Location
MW4	552305 590314	179.34	104.13	6.5-75	West of existing quarry
MW5	552242 590285	177.57	102.10	12-75	West of existing quarry
MW6	552593 590219	189.07	114.07	6-75	Northeast of proposed extension
MW7	552524 590498	177.55	106.37	6-70	Northeast of existing quarry
MW8	552218 590611	163.00	159	1-4*	Northwest of processing area
MW9	552605 590197	189.19	118.4	1-70.5	Northeast of proposed extension
Site Well	552401 590560	169.15	-	-	Central processing area
Old Office well	552604 590144	188.17	-	-	Northeast of proposed extension
Derelict House well	552650 590194	188.50	-	-	Northeast of proposed extension

Groundwater Levels and Flow

2017-2018

7.165 TMS conducted groundwater level monitoring on the site from August 2017 to August 2018. They measured groundwater levels manually on-site and continuously using Solinist Levelogger Edges (datalogger), as depicted in Diagram 7-2. A summary of these levels is detailed in Table 7-14.

7.166 At MW3 and MW5, situated east and northeast of the proposed lateral extension, the distance to the water table from the quarry void averaged 2.8 and 2.6 m below ground level (bgl), respectively.

7.167 Continuous monitoring from August 2017 to August 2018 revealed varying seasonal fluctuations in groundwater levels. MW3 and MW5 experienced an approximate 4-5 meters range, while MW1, MW4, MW6, and MW9 displayed a range of 9-12 meters. These differences relate to the variable storage in the bedrock aquifer caused by differing fracturing.

7.168 The groundwater levels in the monitoring wells responded uniformly to recharge, indicating an even, widespread recharge across the area through the till cover.

7.169 The supply wells, intermittently monitored by dataloggers (Derelict House Well, Old Office Well, Site Well, Patrick Fleming Farm Well), showed periodic pumping as needed. Water levels recovered between pumping, preventing the formation of a 'cone of depression' around these wells. The TMS report concluded that these supply wells had no significant impact on the nearest monitoring wells.

Table 7-14:
Summary of groundwater levels from 31/07/2017-22/08/2018

	MW1	MW3	MW4	MW5	MW6	MW9
Maximum (mAOD)	159.47	184.55	164.14	177.22	176.54	181.20
Minimum (mAOD)	149.06	180.73	153.85	172.11	164.91	171.81
Average (mAOD)	152.07	182.40	158.90	174.47	170.40	176.62
Range (m)	10.41	3.82	10.29	5.11	11.63	9.39
* 0.12 m above ground level, 0.34 m below top of casing						

2019-2021

7.170 Resetting of loggers took place in January 2019. On the 10th and 11th of May 2021, SLR Consulting conducted downloads from loggers installed in MW1, MW3, MW4, MW5, MW6, and MW9, alongside manual measurements of groundwater levels. While adjustments were made to the logger data to align with the manual readings taken on these dates, no other manual groundwater measurements are available for this specific period, as indicated in Diagram 7-2. A summarized overview of groundwater levels is provided in Table 7-15.

7.171 SLR Consulting reconfigured the loggers on the 10th and 11th of May 2021 to capture hourly readings. In MW1, a barometer was installed within a borehole, set to record atmospheric pressure variations at hourly intervals. A single barometer serves a 25 km^2 area, hence only one is necessary for this site.

7.172 At MW1 and MW4, the average groundwater levels are approximately 2 m lower than the monitoring average of 2017-2018. MW9 displayed around a meter decrease, while MW6 maintained a similar average level. For the groundwater monitoring boreholes, MW3 and MW5, the average groundwater level stood at approximately 2.8 and 2.4 m below ground level (bgl).

7.173 Continuous monitoring of groundwater levels from January 2019 to May 2021 indicates varying seasonal fluctuations. There was an estimated 4 m to 5 m range in MW1, MW3, and MW5, while MW4, MW6, and MW9 exhibited a range of 9-11 m. These differences in range are associated with the variable fracturing and storage within the bedrock aquifer.

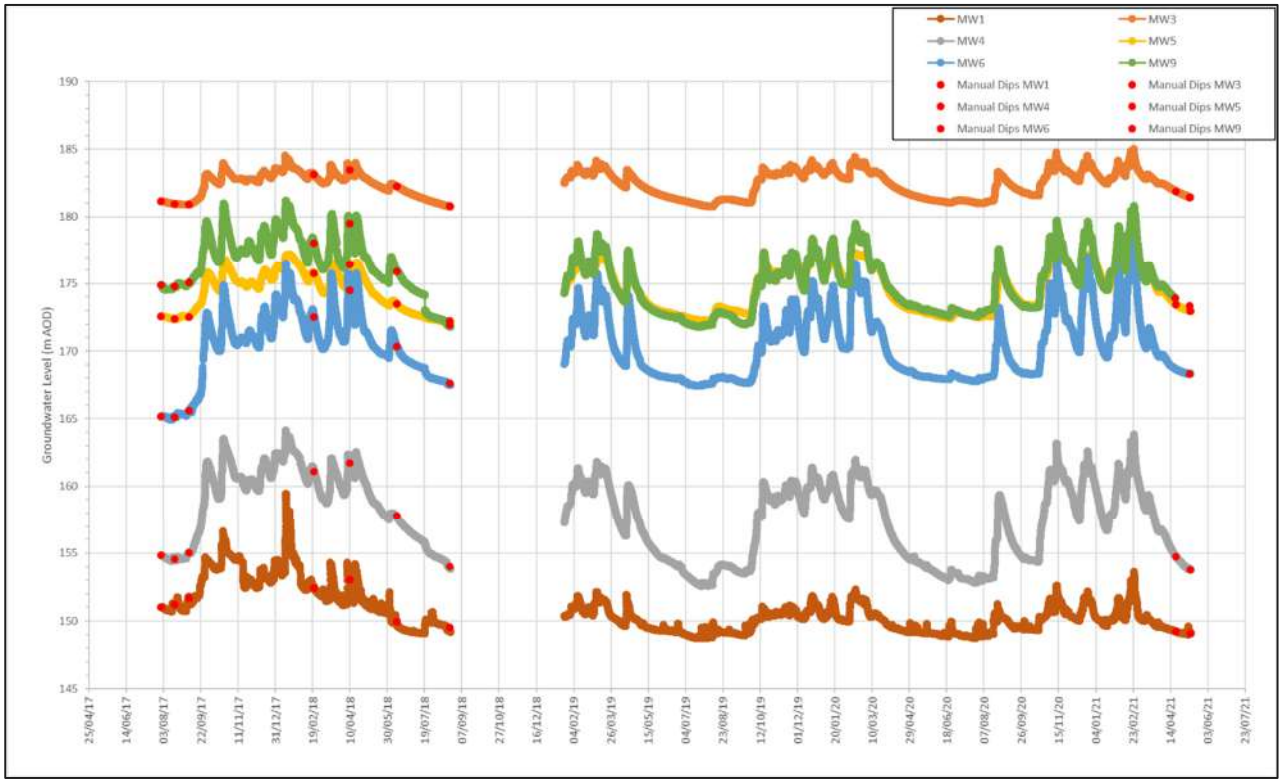
7.174 The response of groundwater levels in the monitoring wells suggests a consistent pattern of recharge, indicating an even, widespread recharge through the till cover across the area.

7.175 In 2021, the Derelict House Well and Old Office Well had no loggers, and the Site Well was non-operational.

Table 7-15:
Summary of groundwater levels 22/01/19-10/05/21

	MW1	MW3	MW4	MW5	MW6	MW9
Maximum (m AOD)	153.64	185.02	163.85	177.56	178.27	180.82
Minimum (m AOD)	148.72	180.74	152.58	172.27	167.43	171.78
Average (m AOD)	150.01	182.44	157.05	174.67	170.39	174.93
Range (m)	4.92	4.27	11.27	5.28	10.83	9.04
* 0.46 m above ground level, 0 m below top of casing i.e., groundwater was at the top of the casing, potentially overflowing						

Diagram 7-2:
Groundwater levels at Bweeng Quarry from April 2017 - July 2021



Groundwater levels 2021-2024

7.176 The groundwater level loggers were reset in May 2021 and began recording groundwater levels. Groundwater level data was last downloaded in September 2024 by Breedon Ireland, see Diagram 7-3 below.

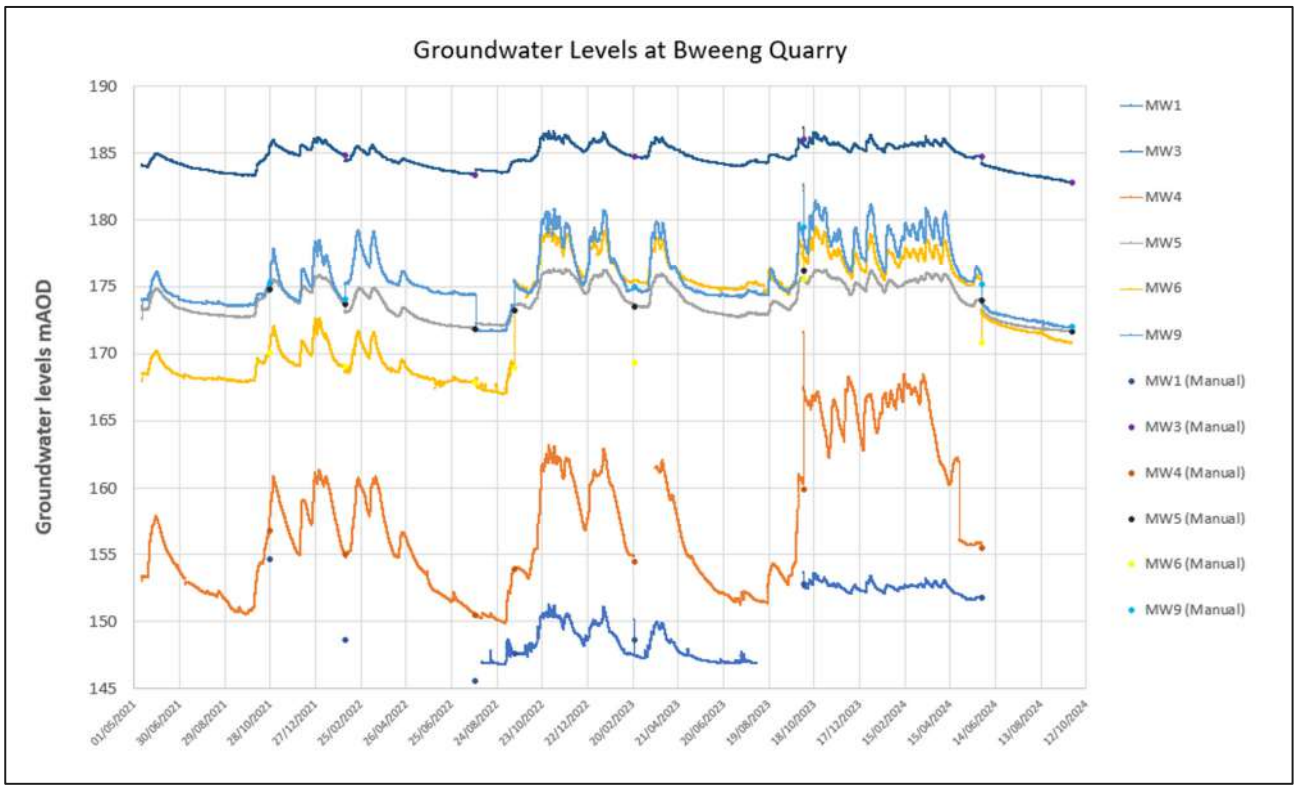
7.177 The groundwater level data record for MW1 and MW4 is intermittent, see Diagram 7-3, and therefore only summary data for MW3, M5, MW6 and MW9 are provided in Table 7-16 below.

7.178 Continuous monitoring from May 2021 to October 2023 revealed varied seasonal fluctuations. MW3 and MW5 displayed a 4-5 meter range, while MW4, MW6, and MW9 showed a range of 10-13 m. These differences are related to the diverse characteristics of the bedrock aquifer.

Table 7-16:
Summary of groundwater levels May 2021 - September 2024

	MW3	MW5	MW6	MW9
Maximum (m AOD)	186.60	176.23	179.53	181.44
Minimum (m AOD)	182.80	171.59	166.97	171.59
Average (m AOD)	184.75	173.85	172.72	175.61
Maximum - Minimum Range (m)	3.79	4.64	12.56	9.85

Diagram 7-3:
Groundwater levels at Bweeng Quarry from May 2021 - September 2024



Manual (TMS) Groundwater levels 2021-2024

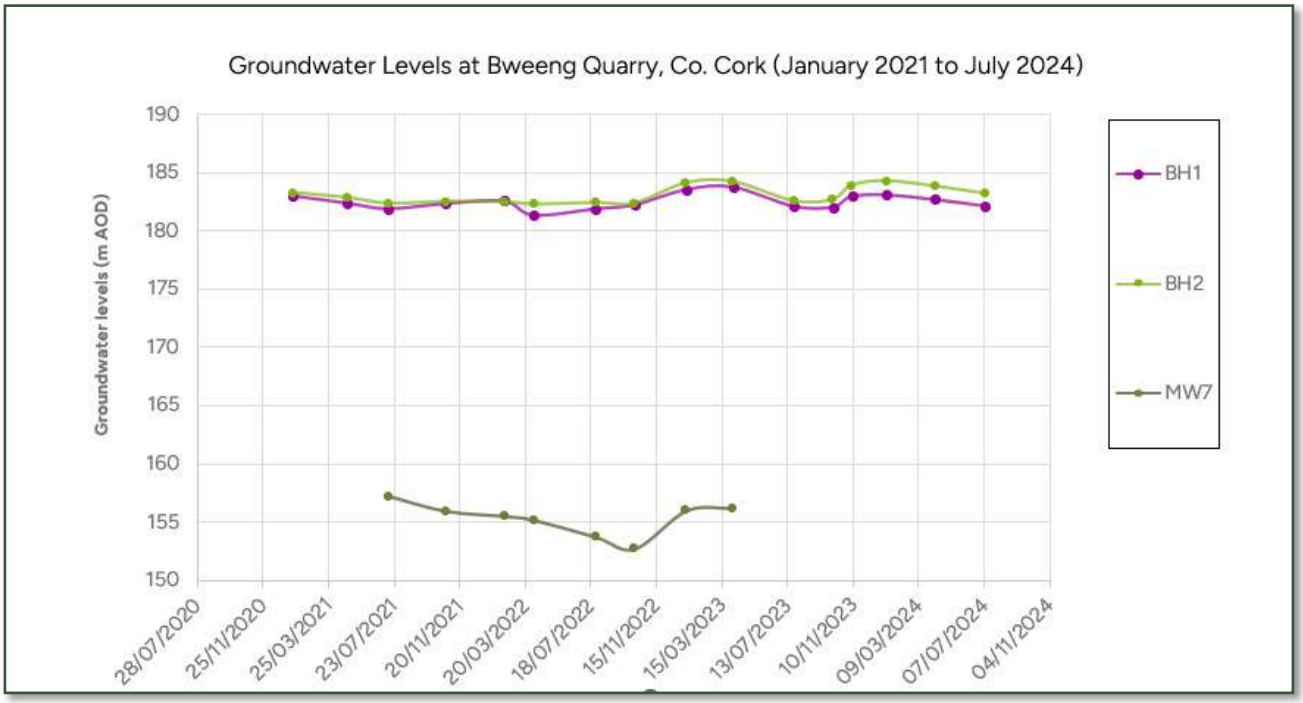
7.179 TMS have been monitoring the groundwater quality at quarry on a quarterly basis since 2021 at BH1, BH2 and MW7 and they have also recorded groundwater levels at these locations by way of manual measurement prior to sampling for groundwater quality, see Table 7-17 and Diagram 7-4. The monitoring results are presented in Appendix 7-I.

7.180 No groundwater monitoring level results are available for MW7 since 4th April 2023 due to access issues to the well head.

Table 7-17:
Summary table of manual groundwater levels at groundwater quality monitoring wells (2021-2024, TMS)

	BH1	BH2	MW7
Maximum (m AOD)	183.34	183.63	157.22
Minimum (m AOD)	180.90	181.62	152.70
Average (m AOD)	182.06	182.43	155.29
Range (m)	2.44	2.01	4.52

Diagram 7-4
Manual groundwater levels at groundwater quality monitoring wells (2021-2024, TMS)



7.181 BH1 and BH2 display a similar pattern of groundwater level fluctuations with average groundwater levels of 182.06 mAOD at BH1 and 182.43 mAOD at BH2. The available data for MW7 deeper groundwater levels with an average level of 155.29 mAOD.

Groundwater Zone of Contribution to Quarry Void

7.182 TMS generated regional and local groundwater flow direction illustrations, available in Appendix 7-F. Additionally, TMS delineated the upgradient catchment, specifically the Zone of Contribution (ZOC) for groundwater inflow to the quarry, also detailed in Appendix 7-F.

7.183 In this area, groundwater flow remains shallow and typically aligns with the topographic slope. Before quarry operations, the original water table slanted toward the north-northeast across the quarry site. Dewatering activities below the water table in the quarry impact groundwater levels near the quarry, causing drawdown. The effect is visible as a limited 'zone of influence,' around the quarry extraction area observed from near-surface groundwater levels in monitoring wells situated west, southeast, and north of the quarry void.

7.184 Analysis of the hydrogeological data from groundwater level monitoring indicate the zone of influence around the quarry extraction area extends approximately 70-100 m to the southeast, around 100 m to the west, and approximately 150 m to the north. The groundwater zone of influence represents the area within which, groundwater levels are expected to be influenced by dewatering activities at the proposed development. Groundwater beyond this identified zone of influence follows the direction of the local topographic gradient and displays natural groundwater level patterns.

7.185 Based on the available data on the Existing ZOC, a projected ZOC around the quarry void and proposed extension area is shown on Figure 7-2 in relation to the proposed quarry

extension footprint. The available data indicates a relatively limited ZOC for groundwater around the proposed quarry development.

7.186 There are two identified wells within the zone of influence, both of which are owned by Breedon Ireland, and are used as groundwater monitoring wells only. As there are no public water supplies (boreholes) within the zone of influence, no drawdown or impacts to any water supply wells will occur as a result of the proposed development.

Groundwater Quality

7.187 In compliance with the quarry planning permission (Ref. QR073) routine groundwater monitoring is undertaken at the site on a quarterly basis from 4 no. groundwater monitoring wells located at the site. These results are submitted to Cork Co. Council on a quarterly basis. The groundwater quality results for Q2 2021 to Q3 2024 are included in Appendix 7-H.

7.188 Additional groundwater quality sampling events have been undertaken intermittently in support of various studies submitted with planning or licence applications since approximately 2017. Both the routine groundwater sampling results, and the results of the additional studies are discussed below.

7.189 TMS conducted routine groundwater sampling at the site from August 2015 to April 2018, initially biannually and later quarterly from January 2017. The collected groundwater samples were from available wells, including two off-site supply wells (BH1 and BH2) and two on-site supply wells (BH3 and BH4). Notably, BH1 corresponds to the 'Old Office Well,' BH2 to the 'Derelict House Well,' BH3 was an older supply well that's no longer in existence, and BH4 is the 'Site Well.'

7.190 Starting in 2017, additional wells (MW2, MW3, MW4, and MW7) were included in the groundwater quality monitoring. By 2020, the monitoring encompassed data from BH1, BH2, MW2, and MW7.

7.191 Results from the wells situated outside the existing quarry are indicative of the background groundwater quality.

7.192 Background groundwater quality typically exhibits low conductivity, low pH, and low alkalinity, typical of non-calcareous rocks with short water residence times. Occasional exceedance of assessment criteria was noted for total ammonia, orthophosphate, and chloride. These parameters often signal sources such as fertilizers and organic waste. Chloride concentrations in background groundwater average approximately 19.9 mg/l.

7.193 Land-use within the upgradient catchment (ZOC) is mainly agricultural (grazing), with a farmyard and two domestic dwellings (septic tank/percolation areas). These represent possible sources for the occasionally elevated total ammonia, orthophosphate, and chloride in groundwater upgradient of the quarry.

7.194 Historically, consistent low pH levels were observed in the background wells until 2023, during which neither the background nor the site well exhibited acidity in samples. Besides intermittent instances of exceeding acceptable levels for total ammonia, chloride, orthophosphate, and total petroleum hydrocarbons, the background wells only reported one occurrence of exceeding acceptable levels for sulphate, observed in Q3 2020.

7.195 The most recent quality results align with past monitoring, indicating no significant deviations. Groundwater quality from the two on-site supply wells shows a chemical pattern akin to the background, signifying no impact on the surrounding groundwater quality.

7.196 SLR collected samples on the 10th and 11th May 2021 from boreholes MW03, MW04, MW05, MW07, and MW09 to test water quality. A Waterra pump and tubing were used to

pump water from depth in the borehole and ensure that recent surface water inflow was not collected. Each borehole was purged until pH, conductivity, and temperature readings stabilised (any two successive readings were within 10% of each other). Refer to Appendix 7-G for a copy of the field record sheets.

7.197 The water quality test results are screened against the threshold limits set out in the EU Environmental Objectives (Groundwater) Regulations (SI No 366 of 2016) and the EU Drinking Water Regulations (SI No 122 of 2014). EPA Interim Guideline Values (IGV) are used if there are no other criteria available to screen against.

7.198 Inorganics and metals results are presented in a summary table in **Table 7-18** below, TPHs are not included because they were all reported below detection limit. The results are briefly summarised as follows:

- pH: MW03 is slightly outside the Drinking Water Regulations range of 6.5-9.5 pH units with a concentration of 6.39 pH units;
- Orthophosphate as PO4: MW04 and MW09 exceed the EPA IGVs of 0.03 mg/l with a maximum concentration of 0.068 mg/l at MW09. All other boreholes are below detection limit of 0.05 mg/l however, it should be noted that the detection limit is above the EPA IGVs;
- Iron (filtered, dissolved): MW03 and MW05 exceed the Drinking Water Regulations of 0.2 mg/l with a maximum concentration of 15.1 mg/l at MW03;
- Manganese (filtered, dissolved): MW03 and MW05 exceed the Drinking Water Regulations of 50 mg/l with a maximum concentration of 197 mg/l at MW03;
- Potassium (filtered, dissolved): MW04 and MW05 exceed the EPA IGVs of 5 mg/l with a maximum concentration of 10.4 mg/l at MW05; and
- All TPHs were reported below detection limit.

7.199 Ammonia and chloride, which had been previously reported as being occasionally elevated during the August 2015 to April 2018 monitoring rounds, were not reported at concentrations above the assessment criteria.

Table 7-18:
Groundwater quality results 10th and 11th May 2021

Parameters	Units	MW03	MW04	MW05	MW07	MW09
Inorganics						
Ammoniacal Nitrogen as N	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2
Ammoniacal Nitrogen as NH3	mg/l	<0.2	<0.2	<0.2	<0.2	<0.2
Ammoniacal Nitrogen as NH4	mg/l	<0.3	<0.3	<0.3	<0.3	<0.3
Chloride	mg/l	10	20.6	22.9	17	10.7
Conductivity @ 20 deg.C	mS/cm	0.117	0.387	0.305	0.305	0.174
Cyanide, Free	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05
Cyanide, Total	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05
Nitrate as NO3	mg/l	2.13	18.7	14.2	22.4	16.1
Nitrite as NO2	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05

Parameters	Units	MW03	MW04	MW05	MW07	MW09
Oxygen, dissolved	mg/l	<0.3	4.71	<0.3	6.35	5.89
pH	pH Units	6.39	6.81	6.58	6.83	6.55
Phosphate (Ortho as P)	mg/l	<0.02	<0.02	<0.02	<0.02	0.0222
Phosphate (Ortho as PO4)	mg/l	<0.05	0.052	<0.05	<0.05	0.068
Sulphate	mg/l	<2	12.7	12.2	14.1	6.5
Total Oxidised Nitrogen as N	mg/l	0.485	4.23	3.21	5.07	3.63
Metals (filtered, dissolved)						
Aluminium (diss.filt)	µg/l	<10	<10	<10	20.7	<10
Antimony (diss.filt)	µg/l	<1	<1	<1	<1	<1
Arsenic (diss.filt)	µg/l	<0.5	<0.5	<0.5	<0.5	<0.5
Barium (diss.filt)	µg/l	0.914	63.4	24	3.95	4.94
Boron (diss.filt)	µg/l	<10	<10	<10	<10	<10
Cadmium (diss.filt)	µg/l	<0.08	<0.08	<0.08	<0.08	<0.08
Calcium (Dis.Filt)	mg/l	7.51	55.1	33.8	41	17.6
Chromium (diss.filt)	µg/l	<1	<1	<1	<1	<1
Copper (diss.filt)	µg/l	<0.3	3.02	0.308	1.55	1.94
Iron (Dis.Filt)	mg/l	15.1	0.0282	6.39	0.0241	<0.019
Lead (diss.filt)	µg/l	<0.2	<0.2	<0.2	<0.2	<0.2
Magnesium (Dis.Filt)	mg/l	3.49	8.67	7.86	7.73	5
Manganese (diss.filt)	µg/l	197	3.89	82.4	5.74	<3
Mercury (diss.filt)	µg/l	<0.01	<0.01	<0.01	<0.01	<0.01
Nickel (diss.filt)	µg/l	2.9	1.2	5.07	1.37	0.701
Potassium (Dis.Filt)	mg/l	0.716	8.03	10.4	0.955	0.968
Selenium (diss.filt)	µg/l	<1	<1	<1	<1	<1
Sodium (Dis.Filt)	mg/l	10.3	10.9	11.8	12.4	7.61
Zinc (diss.filt)	µg/l	1.46	1.98	1.6	1.94	4.54

Site Water Balance

7.200 The water balance calculations have been undertaken for the site, see Appendix 7-A. The calculations indicate a very low contribution from groundwater to the quarry sump due to the low permeability and compact nature of the bedrock typical of High PSV quarries. This is represented by the GSI published groundwater recharge cap of 200 mm/yr.

Estimated Groundwater Drawdown

7.201 Recorded groundwater levels in the vicinity of the proposed extension area are of the order of 175 mAOD elevation.

7.202 The current quarry void sump is at c. 135 mAOD, which is equivalent to a groundwater drawdown in the greenfield extension area of c. 40 m.

7.203 Given a proposed final permitted quarry floor elevation of 110 mAOD in a southern greenfield extension, which is equivalent to the current permitted level of the existing quarry then the estimated groundwater drawdown would be of the order of c. 65 mAOD.

Groundwater Inflows

7.204 With the proposed extension and deepening of the existing quarry void, any groundwater encountered must be pumped out to maintain dry working conditions in the quarry void. The volume of potential groundwater ingress into the extraction has been calculated based on the hydraulic properties of the bedrock; the inflow calculations are done using empirical formulae and also by applying the concept of recharge; the calculations are presented in Appendix 7-A and are summarised here.

Empirical Calculation

7.205 Based on empirical formulae, the estimated groundwater ingress for the proposed quarry extension and existing quarry void to its maximum permitted depth of 110 m AOD are:

- Groundwater ingress Q of 67 m^3/d after one month; and
- Groundwater ingress Q of 47 m^3/d after six months.

7.206 This is the maximum estimated groundwater inflow for dewatering as it is estimated for the maximum proposed quarry footprint and depth. Therefore, they are considered to be conservative estimates of groundwater inflow based on the final extraction phase at the site.

Recharge Concept Estimate

7.207 Based on the recharge estimate as set out in Appendix 7-A, the estimated groundwater ingress for the proposed quarry extension and existing quarry void to its maximum permitted depth of 110 m AOD are:

- Groundwater ingress Q of 193.7 m^3/d.

7.208 The recharge concept groundwater inflow estimate takes into account the uniqueness of Irish hydrogeological features in estimating an inflow rate, see Appendix 7-A. This alternative calculation can provide a more conservative determination for a site where the rate or volume of water to be removed from the quarry can be conceptualised as equivalent to the rate of groundwater flow through the site that will be intercepted by excavation below static groundwater level.

Water Balance Inputs

7.209 The design inputs for the design site water balance are set out in Appendix 7-A, and are summarised here in Table 7-19.

Table 7-19:
Water Balance Design Inputs

Quarry Feature	Design Input
Current quarry void area	77,400 m^2
Maximum proposed quarry void area	114,400 m^2
Current quarry void floor level	135 m AOD
Maximum proposed quarry void floor level	110 m AOD

Site Water Balance - Surface Runoff and Shallow Subsurface Flow

7.210 A site water balance has been undertaken for surface runoff plus shallow subsurface flow at the site and is presented in Table 4 of Appendix 7-A.

7.211 The water generated from the maximum extent of the quarry void from surface runoff plus shallow subsurface flow is estimated to be c. 2.7 l/s while the water generated from the remainder of the site is estimated to be c. 4.1 l/s. Therefore, the total site figure for water generated is estimated to be c. 6.8 l/s; this water will be managed and treated on site before it is discharged to the receiving waters.

Estimated Total Dewatering Volumes

7.212 The estimated total dewatering volumes at the site are set out in Appendix 7-A.

7.213 The surface runoff plus shallow subsurface flow to be managed over the final extraction area is estimated to be c. 234 m^3/d, see Table 4 Appendix 7-A. It has been assumed that this is a volume that will always require management at the site.

7.214 The groundwater inflows were estimated using empirical formulae and a recharge concept for the maximum quarry void extent. The estimated combined surface runoff plus shallow subsurface flow and groundwater inflow volumes are summarised in Table 7-20 below.

Table 7-20:
Estimated Total Dewatering Volumes

Method of Estimation	Dewatering Volume - Average Daily
Empirical Formulae	234 m^3/d + 47 m^3/d = **281 m^3/d (3.25 l/s)**
Recharge Concept	234 m^3/d + 193.7 m^3/d = **427.7 m^3/d (5.95 l/s)**

7.215 Based on the two estimates of groundwater ingress to the site, it is therefore estimated that the total water volume from the quarry void which will need to me pumped out in order to facilitate groundwater drawdown and allow for dry working conditions in the quarry void will be between c. 280 m^3/d and 430 m^3/d.

7.216 The average rainfall runoff and shallow subsurface flow across the remainder of the site, i.e. from the 17.6 ha. area at the site outside of the maximum quarry void area, has been estimated to be c. 354 m^3/d, see Table 4 of Appendix 7-A.

7.217 Based on the above calculations the maximum estimated average daily discharge from the site will be c. 782 m^3/d (427.7 m^3/d + 354 m^3/d), see Appendix 7-A.

7.218 The maximum estimated average daily discharge is considered to be representative of sump dewatering rates at the maximum quarry void extent and depth, so it is a conservative value at year 20 of the planned quarry lifetime.

Quarry Void Pumping Volumes

7.219 The volume of water pumped up from the quarry void is monitored on a continual basis by way of a battery-operated electromagnetic flowmeter (SITRANS FM MAG 8000). The flow monitoring location is shown in Figure 7-9.

7.220 The recorded flows from the quarry void from January 2021 to September 2024 are shown in Diagram 7-5, and summary flow details are in Table 7-21.

Diagram 7-5:
Total Daily Pump Volumes from Quarry Void (2021 to 2024)

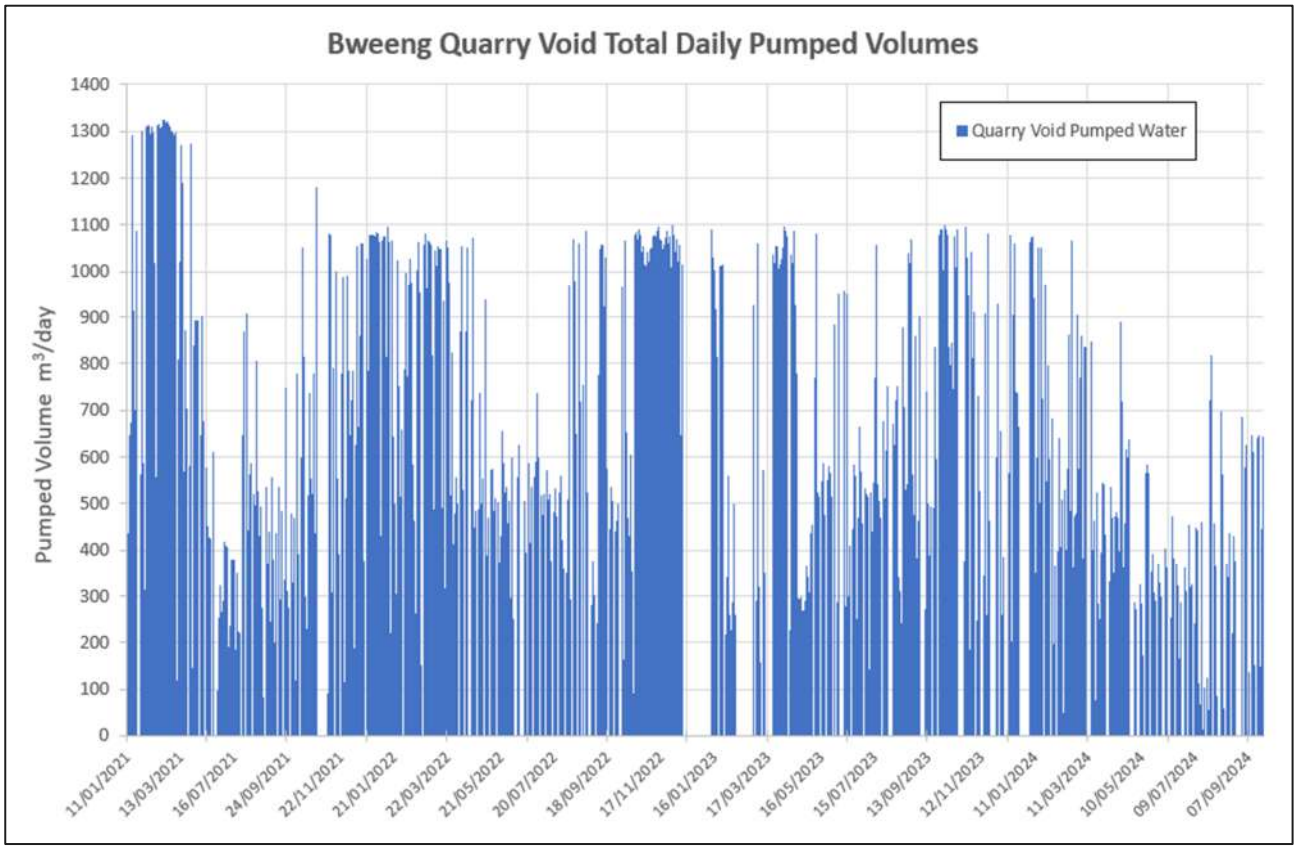


Table 7-21:
Quarry Void Pumped Water -Summary Flow Details

	Average Daily Flow	Maximum Daily Flow
2021	557 m^3/day	1,325 m^3/day
2022	538 m^3/day	1,100 m^3/day
2023	419 m^3/day	1,099 m^3/day
2024 *	301 m^3/day	1,076 m^3/day
* 2024 data to 27/09/2024		

7.221 The average daily pumped water for 2021 and 2022 from the quarry void was c. 550 m^3/day while it was slightly lower for 2023 at c. 420 m^3/day. The maximum pumped discharge from the void was c. 1,100 m^3/day except for 2021 when it was 1,325 m^3/day.

7.222 The maximum daily discharge volume for the whole site is 1,100 m^3/day. The daily volumes that are pumped are recorded prior to the water use in washing aggregates, dust suppression and readymix production, so as the pumped water volumes shown above are at or just above the license limit, the actual volume of water being discharged through the licenced discharge point would be less than the values shown in Table 7-21 and in compliance with the discharge limit of 1,100 m^3/day.

Proposed Water Management System

7.223 With the proposed extension area there will be a requirement to attenuate and treat groundwater inflows and surface water from the quarry void as well as storm water runoff from the site.

7.224 Specifications relating to the volume of waters arising are presented for specific components, as follows:

- Water will be collected, accommodated and managed on the quarry floor in a sump and will then be pumped up to the site processing area;
- Storm water attenuation will be provided for on the quarry floor and also at processing area quarry; and
- Settlement lagoons will be provided to treat all waters arising at the site.

7.225 The quarry void sump will be designed to act as an attenuation lagoon and before it is pumped up to the processing area for treatment. As best practice, the sump on the quarry floor must be large enough to attenuate the volume of water associated with a 1 in 100-year storm event. If required, the quarry floor has the capacity to attenuate water above that generated by the 1:100-year storm event. Rainfall runoff calculations for the site are presented in Appendix 7-A and are summarised here.

Quarry Void Water Balance

Storm Runoff

7.226 Based on the maximum proposed quarry void extent of 11.44 ha. The 1:100-year 24 hr. storm event with a 20% uplift for climate change will generate c. 16,700 m^3 of runoff, see Table 7 in Appendix 7-A.

7.227 A quarry floor area of c. 8,500 m^2 will provide for the attenuation of c. 17,000 m^3 assuming a depth of 2 m for attenuated waters. The current quarry floor area is c. 20,000 m^2 so is sufficient to provide for the estimated required future attenuation volumes.

Greenfield Runoff Rates

7.228 The pre-development greenfield runoff rate (Q_{BAR}) is estimated for the final quarry void area of 11.44 ha. in Appendix 7-A. The estimated QBAR from the final quarry area is c. 91 l/s which is c. 7,862 m^3/day.

7.229 The discharge of surface water is limited to the pre development greenfield runoff rate to mitigate against downstream flooding in the receiving waters.

Attenuation Volume

7.230 The storm runoff should be accommodated and attenuated on the quarry floor and then to treat the discharge by way of a settlement lagoon(s) at the overflow rate appropriate to the settlement of solids and the licenced discharge rate.

7.231 The required attenuation storage in the quarry void is calculated when outflow is limited to Q_{BAR}. The quarry floor must be capable of storing the balance of the stormwater during the design 1:100-yr rainfall event, see Appendix 7-A.

7.232 The attenuation storage requirements on the quarry floor, when the outflow is restricted to Q_{BAR}, are shown in Table 9 of Appendix 7-A. based on a discharge rate of 5,897 m^3/day the balance of 9,135 m^3 is required to be attenuated on the quarry floor to be subsequently discharged. A minimum quarry floor areas with available volume for the attenuation of 9,135 m^3 shall be maintained.

IFI & Cork Co. Council Consultations - Silt Control Improvements

7.233 Following a series of constructive and helpful site meetings and consultations with IFI & Cork Co. Council, as described at the start of this chapter under Consultations. Significant improvements to the site silt & water management regime were undertaken by Breedon. These improvements are shown on Figure 7-10 and described below.

7.234 Clean water from the quarry sump is now directed (via storage tanks at the wash plant) to the final settlement pond, SP5, reducing pressure on the overall settlement pond system and allowing additional resonance time to treat trade waters.

7.235 Previously, the clean water from the quarry sump was pumped up and mixed with wash water from the wash plant before being directed to the first settlement lagoon (Settlement Lagoon SP1, see Figure 7-7), a regime which greatly increasing the volume of dirty water requiring treatment in the settlement lagoons.

7.236 Protection bunding around all settlement ponds has been improved to ensure that all water is channelled and enters each settlement pond at its starting point, and not at various entry points as was previously the case.

7.237 Significant strengthening of the bund between the public road and the settlement pond system on the eastern boundary of the site has been undertaken. This will ensure that, during periods of wet weather, fugitive silt emissions through the bund, onto the public road does not occur.

7.238 Comprehensive improvements to the swale settlement ponds have taken place, with the provision of armour rock to line the internal surfaces of the pond walls, and the creation of

new internal baffles to slow down through flow of water through the settlement pond system, increasing residence time and improving the effectiveness of the treatment system.

7.239 Improvements to the road verges between the quarry entrance and the Reamanagh stream have been completed. These improvements comprise the scraping back of the verge edge and the installation of stone lined collection drains, to capture rainfall and attenuate it along the road verge. These collection drains will enable additional settlement of fines picked up in the rainfall, prior to entry to the Reamanagh Stream. The road verge improvements will also allow the mechanical road sweeper to clean the full width of the paved road surface.

7.240 Containment bunds around stockpiles of fine aggregates has been provided. This will reduce the likelihood of rainfall and overland flow picking up fine material from the stockpiles and adding to the overall quantity of water that requires treatment at site.

7.241 Containment bunding around individual paved and unpaved areas at the site has been installed. This will help to keep clean overland flow separate from silt laden overland flow and reduce the pressure on the site settlement pond system.

7.242 A mechanical road sweeper was previously retained and utilised on an as-needs basis for cleaning internal paved roads, and the external public road. Following consultation with IFI & Cork Co. Council, use of the road sweeper has been increased to a minimum of twice per week, and then additionally as required. A road sweeping log has been compiled and is available for inspection at the site offices.

7.243 A replacement wheelwash was installed in Spring 2024 at the site. Following consultation with IFI and Cork Co. Council, a maintenance and inspection programme for this wheelwash has been compiled, this is included in the site Environmental management system and is available for inspection at the site offices.

7.244 A pre-fabricated steel walkway has been installed at the licenced discharge point ensuring safe and permanent access to SW1 is maintained.

Future Improvements to Settlement Pond System

7.245 In addition, to further enhance the treatment capabilities of the pond system it is proposed, as part of the planning application, to refurbish and redesign the water settlement lagoons, see Figure 7-8.

7.246 The proposed settlement lagoon requirements at the site, including the proposed extension area, are set out in Appendix 7-A.

7.247 In order to ensure effective treatment of water for suspended solids, it is proposed to increase the lagoon area to 988 m^2 and with a pond depth of c. 1 m the residency time of waters will be 2.3 days for waters in SP5, see Appendix 7-A.

Process Area Runoff Attenuation and Treatment

7.248 The remaining component of water that requires management and treatment is rainfall-runoff from the process areas at the site. At present, rainfall-runoff flows across the site's ground surface from the gate, the Wash Plant's adjacent stockpile areas, car park and office buildings towards the northeast corner of the site which is a low point for the processing area. Here these waters flow through black PVC pipes into SP7 from which they are pumped up towards SP10, see Figure 7-7.

7.249 Measures are set out in Appendix 7-A to improve the process area water management in terms of runoff and treatment, it is proposed to split the processing area in terms of direct

runoff drainage from the processing area south of the site entrance and from the processing area north of the site entrance, see Appendix 7-A.

7.250 The discharge rate from both areas will be limited to the greenfield runoff rate of 22 l/s for the southern area and 13 l/s for the norther area, see Appendix 7-A, to ensure that there will not be an increased risk of flooding in the receiving waters.

7.251 The proposed water management and treatment design for the processing areas is shown in Figure 7-8 and in Appendix 7-A.

7.252 The proposed upgrades to the existing water management system at the site are set out in Appendix 7-A and are summarised here. The proposed upgrades to the site water management system are:

- **Settlement lagoon train for wash water** - separate settlement pond lines are provided for the clean water from the quarry void and combined water from the wash plant and runoff from processing areas. This measure keeps site clean and dirty water separate for treatment;
- **Primary settlement lagoon for wash plant** - it is proposed to construct a new pond to the immediate south of the washing plant (see SP12 on Figure 7-8). Whilst some settlement of heavier solids will occur here its primary role is to attenuate dirty water flows from the plant. The outlet from the new pond (SP12) will flow into the existing settlement pond line starting at SP1, see Figure 7-8;
- **Refurbish & redesign existing settlement lagoons** - the existing settlement lagoons from SP1 will be refurbished, redesigned and widened, with the removal of fine silt material which has built up over time. The details of the lagoon refurbishment and redesign including pond attenuation capacity and treatment for suspended solids is set out in Appendix 7-A;
- **Stockpile runoff** - larger stockpiles will be surrounded with small interceptor drains containing intermittent check dams. This will assist with entrapment of sediment at source and prevent transport of sediment in runoff from the stockpiles;
- **Haul routes** - haul routes will be top dressed to prevent rutting, which increases wear on the roads. The edges of many haulage routes within the site are defined by berms containing fine sediment, which can become mobilised during high intensity rainfall. Edge berms will be replaced with large boulders, as is practical;
- **Dust suppression** - sprinklers will be activated using sensors in order to reduce the hydraulic load requiring treatment. Water used in dust suppression will be recycled from settlement lagoon SP12;
- **Wheel wash** - Water used in the wheelwash will be recycled in a closed loop system;
- **Readymix truck washout** - truck washout will continue to be undertaken on the hardstanding slab next to the concrete truck washout tank, with all washout water going to the tank;
- **Concrete batching plant hard stand area** - edge treatment will be placed around hardstanding area to ensure that all runoff generated on the concrete hardstanding area is directed to the tanks;
- **Concrete batching plant water treatment** - the treated washout waters and yard runoff in the settlement tank and yard runoff will be recirculated and used for washout. An emergency storm overflow from the settlement tank will be provided and this will overflow to settlement lagoon SP1;

- **Process area interceptor drain** - a new interceptor drain will be installed to split the processing area in terms of drainage, into a northern half and a southern half, and will direct runoff to Settlement Lagoon SP1; and
- **Hydrocarbons** - Pollution control protocols are in place for re-fuelling operations; drip trays are used and hydrocarbon spill kits are available at the site if required. All chemicals, oils and grease used at the site are stored in dedicated containers on bund trays. The site manager will conduct an audit of hydrocarbon storage and refuelling areas on a monthly basis; the results from the audit will be sent to Breedon's National Environmental Manager for sign off.

IFI Consultation Response

7.253 A detailed response has been prepared in relation to the IFI consultation undertaken and it is set out in Appendix 7-A, and the key points are summarised here.

7.254 The key issues raised by the IFI in relation to the proposed development were around the discharge of polluting matter such as silt and fuel oils from the site, the quality of the receiving waters and the protection of riparian zones and the floodplain of the receiving waters.

7.255 The following mitigation measures will be implemented at the site to address the issues raised by the IFI:

- No material will be placed within 10 m of watercourses or open drains adjacent to the site;
- No material will be placed on floodplain areas, where they exist;
- Sprinklers used for dust suppression will use sensors to activate them. This measure will reduce the runoff and sediment load on the water treatment system;
- Measures will be implemented to reduce the sediment load in runoff from entering the water treatment system;
- Clean water from the quarry void and wash water from the aggregate wash plant will be kept separate to reduce the volume of dirty water which requires treatment;
- A new settlement lagoon will be created for the clean water from the quarry sump. This measure keeps the site clean and dirty water separate and improves the treatment of the dirty waters from the wash plant;
- A new Settlement Lagoon (SP12) will be constructed for the dirty water for the wash plant, this provides for primary settlement for wash waters and will regulate flow and load to the existing lagoons for additional treatment;
- The existing settlement lagoons at the site will be refurbished and redesigned to provide additional attenuation capacity for storm water runoff at the site and ensuring settlement treatment for fines;
- A new drain is proposed to divide the processing area and divert runoff to Settlement lagoon SP1. This measure will ensure that the northeastern settlement lagoons (SP6 - SP10) are not overloaded in terms of storm runoff;
- No fuels will be stored near aquatic zones;

7.256 In terms of the ecological importance of the Reamanagh Stream and the impact of the site activities on the stream a baseline aquatic survey of the water environment was undertaken by Triturus Environmental Ltd. A copy of the report is included with this application. The

baseline report found no deterioration in aquatic species in the Reamanagh Stream downstream of the site discharge compared to control sites upstream of the discharge point.

7.257 The surface water management system at the site will be upgraded to provide capacity for the effective treatment of suspended silds in the water and also provide for the attenuation of waters which will include an uplift for predicted climate change of +20%.

Water Framework Directive

7.258 The EU Water Framework Directive1 (WFD) became EU law in December 2000 and provides for a single European framework to assess water quality (Ecological status) and allows for the comparison of results across Europe. The WFD covers rivers, lakes, estuaries or transitional waters, coastal waters as well as groundwaters.

7.259 Surface waters are classified into five quality classes (Ecological status) under the WFD; High, Good, Moderate, Poor and Bad Ecological status. Groundwater is classified into just two quality classes, Good and Poor Ecological status. High Ecological status is when the water is unpolluted, while at the opposite end of the classification Bad Ecological status is when the water is highly polluted.

7.260 The WFD required baseline water quality in all waterbodies to be established for biological, chemical and hydromorphology quality. These three quality variables are combined to give the overall Ecological status classification of the waterbody; good or high ecological status and good chemical status for surface waters and good chemical and quantitative status for groundwaters.

The two principal objectives of the WFD are to:

- that all water bodies must reach at least 'Good' overall status by 2027, at the latest. For surface waters, good overall status is a combination of good ecological status (or potential) and good chemical status; and
- that the status of each water body, including all the quality elements which make up the overall status, must not deteriorate relative to the baseline reported in the relevant RBMP.

7.261 The WFD identifies where actions are required to achieve Good Ecological status or maintain waterbodies which are already Good or High Ecological status. Waterbodies can be restored Good and High Ecological status by using targeted actions and measures to reduce the impact of human activities on them.

7.262 For heavily modified or artificial water bodies, which are incapable of achieving Good Ecological status without impairing an existing specified water use, the environmental objective is to achieve good ecological potential.

7.263 The WFD requires that management plans are prepared on a river basin basis and specifies a structured method for developing these plans.

River Basin Management Plans

7.264 The River Basin Management Plans (RBMP) provide a single system of water management based on the natural delineation of river catchments and is the method by which the aims of the WFD are achieved.

7.265 For each river basin district in Ireland a RBMP plan needs to be established and updated every six years, to provide the context for the co-ordination requirements of the WFD key aims which are to:

- provide for protection to all waters, surface waters and groundwater;

[1] Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy.

- achieving Good Ecological status for all waters by 2027;
- establish water management measures based on river basin catchment areas;
- establish a combined approach of emission limit values and quality standards for waters;
- involving citizens more closely in the WFD and RMBMP; and
- streamlining and aligning national legislation.

7.266 The RBMP provides a detailed account of how the objectives set for each river basin in terms of ecological status, quantitative status, chemical status and protected area objectives are to be reached within the timescale of the plan. The plans include the results of the catchment analysis including the river basin's characteristics, a review of the impact of human activity on the status of waters in the basin, estimation of the effect of existing legislation and the remaining gap to meeting these objectives; and establish a set of measures designed to meet the objectives.

River Basin Management Plan for Ireland 2022-2027

7.267 The current Third-Cycle RMBP report for Ireland[2] states that while substantial progress has been made in the management of water services and how we work together to protect, restore and improve water quality with the improvement in some areas and aspects of water quality, many waterbodies are still subject to mounting environmental pressures and overall water quality is in decline primarily due to nutrient pollution.

7.268 The RMBP states that due to the overall decline in water quality stronger measures are now required which will improve overall water quality; the sustainable management of water resources is important to address and adapt to the impacts of climate change, with many of the required measures having co-benefits for climate mitigation and biodiversity. Protecting and restoring water quality in Ireland will most of all need measures to address:

- the loss of agricultural nutrients to water;
- continue to improve waste water treatment; and
- to re-establish natural free-flowing conditions in more rivers.

7.269 The plan states that Ireland's water resources and services face challenges on a number of fronts including a continued need for investment in infrastructure and an ever increasing demand for water services due to urbanisation, population and economic growth. These challenges are set against a backdrop of widespread, rapid, and intensifying climate change.

The River Lyre and the WFD Third-Cycle

7.270 The Lyre has received a classification of Moderate Ecological status for the period spanning the Second-Cycle of the WFD (2016-2021). This classification is based on both its physio-chemical and biological quality.

7.271 The Lyre River does not fall within the category of a drinking water protected river as defined by the Water Framework Directive (WFD).

7.272 The WFD Third-Cycle Draft Blackwater (Munster) Catchment Report (February 2022) states that Lyre River is under review for risk, therefore, significant pressures are not identified in

[2] Water Action Plan, A River Basin Management Plan for Ireland, 2022-2027, Government of Ireland

the Third Cycle report. From Second-Cycle assessment (2020), the Lyre River was assigned as 'At risk'.

7.273 In summary, based on the Water Framework Directive information presented here it is considered that River Lyre is at risk of achieving Good Ecological Status by 2027.

Glenville Groundwater Body and the WFD Third-Cycle

7.274 The Glenville GWB has attained a classification of good status with regards to Groundwater Quality under the WFD for the period 2016 - 2021 and is assessed as not being at risk of failing to achieve its objectives by the year 2027.

7.275 It is considered that the proposed extension of the existing quarry continued operation of the site will not result in the Glenville GWB from continuing to maintain its Good Status under the WFD.

Protected Areas

7.276 One protected area is identified within the study area. The Special Area of Conservation: Blackwater River (Cork/Waterford) SAC (Code: 002170) is located approximately 2 km northeast and downgradient from Bweeng site, at its closest point. No other protected areas encountered within the study area.

7.277 None of the rivers in proximity to the site are drinking water protected rivers under the Water Framework Directive (WFD), see WFD section in this chapter above.

7.278 The entirety of every Water Framework Directive (WFD) Groundwater body has been designated as Drinking Water Protected Areas. This designation is based on the possibility of meeting the criteria for water abstraction for human consumption, as defined in Article 7 of the WFD. These Drinking Water Protected Areas encompass the complete extent of each WFD groundwater body.

Sensitive Receptors

7.279 Arising from the foregoing baseline study, the following sensitive receptors have been identified in the receiving environment around Bweeng area:

- Locally important bedrock aquifer;
- Reamanagh Stream, adjacent to quarry;
- Private groundwater abstractions, and;
- Group water scheme abstraction.

7.280 For identified receptor, the significance and sensitivity of the receptor is assessed in **Table 7-22** below and a rating (High/Medium/Low/Negligible) applied, based on the methodology outlined in existing guidance and reproduced in **Appendix 7-I**.

Table 7-22:
Existing Environment – Importance and Sensitivity of Identified Receptors

No.	Existing Environment	Importance	Sensitivity	Existing Significance / Sensitivity Rating (H/M/L/N)
1	Underlying locally important bedrock aquifer	The bedrock aquifer is classified by the GSI as being a locally important aquifer which is moderately productive in local zones.	The bedrock aquifer can be used for water supply. Reduction in groundwater volumes and quality.	**Medium - Attribute has a medium quality or value on a local scale**
2	Reamanagh Stream	The Reamanagh Stream is classified by WFD as "moderate status" and at risk of deteriorating.	Reduction in surface water quality, increase in surface water volume.	**Medium - High Attribute has a medium quality or value on a local scale**
3	Private water supplies	Domestic well supplies in locally important bedrock aquifer which is moderately productive in local zones.	Reduction in groundwater volumes and quality.	**Medium - Attribute has a medium quality or value on a local scale**
4	Group water scheme abstraction	Supply to c 10 – 12 homes	Reduction in groundwater volumes and quality.	**Medium - Attribute has a medium quality or value on a local scale**

Baseline Summary

7.281 The current quarry floor sump level is c. 135 m AOD and the final permitted depth of the existing quarry is c. 110 m AOD.

7.282 The nearest surface watercourse to the site is the Reamanagh Stream which rises in the lands immediately to the north of the quarry, according to EPA database. The stream flows north along the northern site boundary.

7.283 Groundwater and surface water within the quarry void collect in a sump located on the quarry floor. Discharge, following treatment, is to the Reamanagh Stream in compliance with the current, valid discharge licence for the quarry Ref. WP(W)03/19.

7.284 The bedrock geology at the existing quarry and proposed extension is mudstone, sandstone, and volcanics and is classified as a locally important aquifer. The overall geological structure involves folding and faulting, with an easterly plunging syncline housing volcaniclastic deposits. In the uppermost bedrock layer, there's a weathered zone with variable thickness, characterized by soft, brownish-altered rock.

7.285 A resource assessment undertaken by SLR Consulting in 2019 focused on the agricultural lands south of Bweeng Quarry and included the drilling of three strategically drilled core holes. The geological findings identified volcaniclastic sequences were thickest in the east

and north, gradually thinning westward and southward. The weathering profile varied from east to west, with deeper weathering penetration in the western boreholes, revealing buff moderately strong sandstone up to 20 m.

7.286 Groundwater flow in the bedrock aquifer is predominantly shallow, in the upper weathered/fractured zone, with little or no flow deeper down in the bedrock apart from the odd deeper fracture which may/may not be interconnected with the fracture network.

7.287 Recharge to the bedrock aquifer is limited by the low permeability of the rock, with significant interflow expected within the overburden or at the top of bedrock (rejected recharge). Very few groundwater inflows are observed within the quarry.

7.288 Based on pumping volumes from the quarry measured in 2017, it is estimated that the discharge from the quarry void including will increase from c. 11 l/s to c. 17.8 l/s when the quarry void is at its maximum lateral extent.

7.289 Groundwater flow in the area is shallow and expected to follow the topographic slope. Groundwater in the area flows in a north north-easterly direction. With the development of the existing quarry extraction area and associated groundwater drawdown, a narrow zone of influence has developed which is expected due to the low permeability of the rock.

7.290 A number of private groundwater abstractions have been identified in the vicinity of the quarry and are used for agricultural and domestic supplies. A group water scheme borehole is located 672 m to the east of the quarry which serves c. 10-12 local houses. These abstractions are all located outside the hydrogeological zone of influence of the quarry which is shown in Figure 7-2, and extends a maximum of c. 150 m from the quarry void.

Impact Assessment

Evaluation Methodology

7.291 The potential direct and indirect impacts to surface water and groundwater associated with the proposed development at the site are discussed below.

7.292 The methodology applied here is a qualitative risk assessment methodology in which the nature of the potential impacts are described in terms of the character, magnitude, duration, probability and consequence of the impact, see Appendix 7-I.

7.293 The potential impact is then screened against the sensitivity of the receiving environment to establish the overall significance of the potential impact (without mitigation). Appropriate mitigation measures for the potential impacts identified are discussed, and the identified potential impacts reassessed assuming the identified mitigation measures in place.

Construction Stage Impacts (No Mitigation)

7.294 In the context of the proposed development, the construction stage in this case is taken to be the realignment of the section of local road and the preparation of the lateral extension area for the extraction of the rock material.

7.295 The existing site offices and welfare facilities will be used during the construction stage.

7.296 Stripping of soils and subsoils at application area, by using earth moving machinery is taken to be site preparation. The topsoil and overburden material will be used in the construction of screening berms associated with the road realignment and for restoration of worked out parts of the existing quarry.

7.297 The potential direct and indirect impacts to surface waters and groundwater are discussed below.

Direct Impacts

7.298 During the removal and storage of soils and subsoils at the proposed extension area, there is a risk of groundwater pollution from the following potential sources:

- accidental spillage of fuels and lubricants by construction plant during removal and storage of soils and subsoils, with the potential for contaminated run-off entering groundwater; and
- increase in suspended solids and potential for run-off with suspended solids entering groundwater.

7.299 The significance of the identified potential impacts is assessed in Table 7-23 below. No direct impacts on surface water are anticipated from the construction stage from the quarry lateral extension. Storm surface water runoff in the quarry extension will percolate to ground during the construction stage.

Indirect Impacts

7.300 No indirect impacts associated with the construction stage of the proposed development have been identified.

Operation Stage Impacts (No Mitigation)

7.301 The operation stage is taken to comprise lateral extension of the existing permitted quarry area and continuation of extraction within the existing quarry void to a quarry floor level of 110 m AOD.

7.302 During the operation stage, the risk of groundwater pollution described above during the construction phase will continue to apply, as listed:

- accidental spillage of fuels and lubricants by construction plant during removal and storage of soils and subsoils, with the potential for contaminated run-off entering groundwater; and
- increase in suspended solids and potential for run-off with suspended solids entering groundwater.

Direct Impacts

7.303 In addition, the following potential impacts, relating specifically to the proposed lateral extension of the quarry over the course of the operation stage, could also arise in the absence of any mitigation:

- An extension of the dewatering of the existing quarry will be required, with the lowering of the groundwater level to 110 m AOD extended from the existing quarry to the proposed extension. The extension of the lowered groundwater level could impact on the local domestic groundwater supply wells and group water abstraction scheme;
- The extension of the dewatering will result in an increase in the volume of groundwater pumped from the sump on the quarry floor to the discharge point for dewatering purposes and to maintain dry conditions in the proposed extension of the quarry void. Discharge of water with a high silt content or accidental spills and leaks could impact on the surface water quality at the Reamanagh Stream; and
- During periods of low flow, this discharge may augment flow in the Reamanagh Stream.

7.304 The significance of the identified potential impacts is assessed in **Table 7-23** below.

Indirect Impacts

7.305 No indirect impacts associated with the operational stage of the proposed development have been identified.

Post - Operational Stage Impacts (No Mitigation)

7.306 After the extraction is permanently ceased, the quarry area will be restored to natural habitat.

7.307 As an integral part of the final site restoration and closure, all machinery, equipment, as well as any fuels and oils that could pose a threat to the surrounding environment, will be removed from the site once extraction is permanently ceased.

7.308 Soils and subsoils that were stripped from the application site will be used in the restoration process.

7.309 There are no anticipated direct or indirect impacts from the post operational stage.

Direct Impacts

7.310 There will be no direct impacts on the surface water or groundwater during the site closure and restoration works.

Indirect Impacts

7.311 No indirect impacts anticipated on surface water or groundwater during the during the site closure and restoration works.

Rating of Identified Potential Impacts

7.312 The potential impacts outlined above during the construction and operational stages have been described in terms of the character, magnitude, duration, probability and consequence, and each impact is rated in terms of High (H), Medium (M), Low (L) and Negligible (N) based on the magnitude, extent, duration and consequence of the identified effects.

7.313 The description of the effects and rating for each identified impact is shown in Table 7-23 below.

7.314 The significance of impacts is based on the significance and sensitivity of the existing environment (Table 7-22), and the description of identified potential impacts with likely significant effects outlined in **Table 7-23** below. The significance of Impact is determined from the Classification of the Significance of Impacts in **Appendix 7-J.**

Table 7-23:
Description of the Effects and Rating for each Identified Impact

No.	Identified Potential Impact	Magnitude of Impact (with Description) (No Mitigation)	Significance of Impact (No Mitigation)
Construction Stage - Direct - Groundwater			
1	Impact on groundwater quality in bedrock aquifer from accidental fuel leakage/ spillage	Low - Potential to affect groundwater quality in underlying locally important aquifer through vertical migration. Impact to groundwater is unlikely due to short term nature of works. Any leakage / spillage would be accidental only and of limited volume.	**Slight**
2	Impact on groundwater quality in bedrock aquifer from increased suspended solids	Low - Potential to affect groundwater quality in underlying aquifer through vertical migration. Impact to groundwater is unlikely due to short term nature of works.	**Slight**
3	Impact on groundwater quality in water supplies from accidental fuel leakage/ spillage	Low - Potential to affect groundwater quality in private and group water supplies through vertical migration followed by lateral migration. Impact is unlikely due to short term nature of works. Any leakage / spillage would be accidental only and of limited volume.	**Slight**
4	Impact on groundwater quality in water supplies from increased suspended solids	Negligible - Potential to affect groundwater quality in private and group water supplies in underlying aquifer through vertical migration followed by lateral migration. Impact to groundwater is highly unlikely due to short term nature.	**Not Significant**
Operation Stage - Direct - Groundwater			
5	Impact on groundwater quality in bedrock aquifer from accidental fuel leakage/ spillage	Low - Medium - Potential to affect groundwater quality in underlying locally important aquifer through vertical migration. Any leakage / spillage would be accidental only and of limited volume.	**Slight - Moderate**

No.	Identified Potential Impact	Magnitude of Impact (with Description) (No Mitigation)	Significance of Impact (No Mitigation)
6	Impact on groundwater quality in bedrock aquifer from increased suspended solids	Low - Medium - Potential to affect groundwater quality in underlying aquifer through vertical migration of suspended solids.	**Slight - Moderate**
7	Impact on groundwater quality in water supplies from accidental fuel leakage/ spillage	Low - Medium - Potential to affect groundwater quality in group and private water supplies through vertical migration followed by lateral migration. Any leakage / spillage would be accidental only and of limited volume.	**Slight - Moderate**
8	Impact on groundwater quality in water supplies from increased suspended solids	Low - Potential to affect groundwater quality in underlying aquifer through vertical migration followed by lateral migration. Impact to groundwater is highly unlikely due to short term nature.	**Slight**
9	Impact of lowered groundwater levels on the group and private water supplies	Low - Groundwater level monitoring in the wider area indicates that water levels have not been significantly lowered by the current quarry void dewatering. The zone of influence is less than 150 metres from the edge of the quarry extraction area, and there are no private water supplies within the zone of influence.	**Slight**
Operational Stage - Direct - Surface Water			
10	Impact of discharge quality on surface water	Low - Medium - The extension of the dewatering will result in an increase in water discharge. Discharge of water with a high silt content or accidental spills and leaks could impact on the surface water quality at the Reamanagh Stream.	**Slight - Moderate**
11	Impact of discharge quantity on surface water	Negligible - Low - There will be an increase in discharge associated with the proposed extension of the quarry. This increase can be accommodated within the existing quarry water management system.	**Slight**

7.315 Table 7-23 indicates that if no mitigation measures are applied for the proposed development the significance of the potential impacts ranges from Not Significant to Slight-Moderate.

Do-Nothing Scenario

7.316 If the proposed application is not permitted, the existing quarry operations will continue and agricultural land use within the extension area will continue, with no change to the existing surface water or groundwater environment.

Interactions

7.317 The proposed development has the potential to impact water quality, and this also has implications for human health, biodiversity (habitats and species) and material assets (aquifers) which are addressed in the respective Chapters of this EIAR.

Mitigation Measures

7.318 In order to mitigate against the risk of pollution to groundwater and surface water occurring during the proposed development at Bweeng Quarry, the following existing water management and environmental management and control measures will continue to be implemented at the site which are listed under Water Management and Groundwater Protection below.

Water Management

7.319 The surface water management and protection requirements set out in the existing discharge licence (ref. no. WP(W)03/19) will continue to be implemented at the quarry. The discharge water quality from the quarry is monitored by Breedon Ireland on a regular basis in compliance with the discharge licence. The discharge quality will continue to be monitored on a quarterly basis.

7.320 There is an existing site environmental management plan – ISO 14001: 2015, which includes Water Management Procedures. The key points of the Water Management Procedures DP008 are summarised below:

- All water usage at the site shall be monitored and recorded. Any significant changes in water usage shall be investigated and the findings documented.
- The discharge point shall be visually inspected daily unless otherwise specified in any regulatory requirement.
- Where any visual pollution is detected in the discharge, a sample shall be taken immediately and tested. Water with high suspended solids shall be prevented from entering watercourses and surface water drains by proper onsite management.
- Effective controls to prevent contamination of groundwater resources and an effective monitoring programme to monitor groundwater quality and supply shall be put in place, including:
    - Minimise water demand;
    - No uncontrolled discharge of drainage from the site occurs at any time; and
    - Storage of wastes, fuels and hazardous materials shall be in designated bunded storage areas.

- In instances when an actual or suspected uncontrolled release of pollutants occurs to a watercourse or groundwater, emergency response procedures DP004 shall be implemented.
- If a non-compliance with an Objective or Target is noted, an immediate review will be undertaken to identify the cause.

Groundwater Protection Measures

7.321 Crushing / screening / washing plant is refuelled in-situ using refuelling vehicles from the fuel supplier on an as-needs basis. Quarry vehicles are refuelled on a hard stand refuelling area, outside of the quarry void area.

7.322 Spill kits are maintained on site in case of accidental leak/spillage and staff are trained in the use of same.

7.323 Vehicle maintenance is carried out in the garage in the west of the site; various oil products (hydraulic oil, engine oil, axle oil) are stored on spill pallets in this garage.

7.324 Breedon Ireland environmental team undertake quarterly environmental audits at the site to ensure that compliance with all planning consents, licences and site environmental management system, which is accredited to ISO 14001 standard, is both maintained and enhanced.

Assessment of Impacts with Mitigation Measures in Place

7.325 With the above mitigation measures in place at the proposed extension area, a reduction in the assessed significance of impacts will result:

Operation Stage - Direct:

- Reduction of the potential impact on groundwater quality on the aquifer and water supplies (impacts no. 5-7) from **'slight-moderate'** to **'slight'**;
- Reduction of potential impact on groundwater levels on water supplies from dewatering the quarry (impact no. 9) from **'slight-moderate'** to **'slight'**; and
- Reduction of the potential impact on surface water quality from discharge quality (impact no. 10) from **'slight-moderate'** to **'slight'**.

7.326 The significance of all other potential impacts identified will be reduced to **"not significant"** or lower.

7.327 It is considered that with the prescribed mitigation measures in place at the site, and with a revised Discharge Licence in place for the site, once planning permission has been granted, then the proposed development will not prevent the Good Status objective of the Lyre River being attained under the WFD.

Residual Impact Assessment

7.328 Examination of the identified potential impacts on the receiving environment show that with the mitigation measures in place, there are no significant residual impacts with respect to groundwater and surface water during the construction / operational / post operational stages of the quarry development. Following mitigation through implementation of the mitigation and management measures set out above, the significance of all potential impacts identified will be reduced to "slight" or lower.

Monitoring

7.329 Existing monitoring measures being implemented will continue in order to monitor any potential impact arising from the proposed development on groundwater or surface water.

7.330 Following completion of the final restoration there will be no requirement for any active long-term surface water or groundwater management at the site.

Surface Water Monitoring

7.331 Surface water and treated discharge water will continue to be monitored on a quarterly basis in accordance with the requirements set out in the discharge licence WP(W)03/19 discharge licence.

7.332 Additional Q-Value monitoring points at SW4 and SW5, Figure 7.8 will be undertaken in addition to the Q-Value monitoring currently being undertaken in compliance with Discharge Licence No. WP(W)03/19.

Groundwater Monitoring

7.333 Groundwater levels will continue to be monitored in line with the current monitoring programme.

7.334 Groundwater quality will be monitored at five on-site boreholes (MW03, MW04, MW05, MW07 and MW09) on a biannual basis. The groundwater samples will be tested for the following parameters:

- pH, dissolved oxygen, conductivity;
- chloride, sulphate;
- Ammoniacal Nitrogen as NH3, Ammoniacal Nitrogen as NH4 and Total Oxidised Nitrogen as N;
- Nitrite as NO2, Nitrate as NO3;
- Phosphate (Ortho as P), Phosphate (Ortho as PO4);
- Metals - aluminium, antimony, arsenic, barium, boron, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, sodium, zinc; and
- Hydrocarbons: TPH and BTEX.

Figures

Figure 7-1:
Water Features Map

Figure 7-2:
Bedrock Aquifer Map

Figure 7-3:
Groundwater Body Map

Figure 7-4:
Groundwater Vulnerability Map

Figure 7-5:
Surface Water Catchments Map

Figure 7-6:
Existing Quarry Surface Water Management Overall Conceptual Layout

Figure 7-7:
Existing Quarry Surface Water Management Detail Layout

Figure 7-8:
Proposed Quarry Surface Water Management

Figure 7-9:
Surface Water and Groundwater Monitoring Locations

Figure 7-10:
Water Management Improvement Measures at Bweeng

Notes:

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2. Extract from EPA rivers

Legend:

- BREEDON LAND INTEREST (c.28.8 Ha)
- APPLICATION AREA (c.28.8 Ha)
- EPA RIVERS
- EXTENSION AREA (c. 3.7 Ha)

Rev	Amendments	Date	By	Chk	Auth

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Project: BWEENG QUARRY MALLOW, CO. CORK

Figure Title: WATER FEATURES

Scale		SLR Project No.
1:25,000	@ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
NB	NB	PG	PG
Date: 12/23	Date: 09/24	Date: 12/23	Date: 10/24

Figure Number: **FIGURE 7.1** Rev. **1**

Scale 1:25,000

0 500 1000 1500 2000 2500m

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Ballybanartla
Tobergal Br
Barrinclay
Reamanagh
Carrigcleena More
Carrigcleena Beg
Kilquane
Standing Stone
Fulacht Fia
Ahaneboy
Stream
River
Way
170
180
190
175
164
233
186
ZONE OF INFLUENCE
500 m from Extraction Area
1.
2.
3.
4.
5.
6.
7.
8.

0 200 400 600 800 1000m

Scale 1:10,000

N

Notes:

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2. Extract from Ordnance Survey Discovery Series Map No. 80
3. Extract from GSI Groundwater Data Mapping © GSI

Legend:

- BREEDON LAND INTEREST (c.28.8 Ha)
- BREEDON APPLICATION AREA (c. 28.8 Ha)
- WELLS IDENTIFIED IN LOCAL SURVEY, WITHIN cca. 500 m FROM QUARRY VOID
- LOCALLY IMPORTANT BEDROCK AQUIFER (LI)
- ESTIMATED GROUNDWATER DRAW DOWN ZONE OF INFLUENCE
- PROPOSED QUARRY EXTRACTION WITH BENCHES
- EXTENSION AREA (c. 3.7 Ha)
- 500m ZONE FROM PROPOSED EXTRACTION AREA

Rev	Amendments	Date	By	Chk	Auth

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Figure Title: BEDROCK AQUIFER MAP

Scale	SLR Project No.
1:10000 @ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
NB	NB	PG	PG
Date: 12/23	Date: 12/23	Date: 12/23	Date: 09/24

Figure Number: **FIGURE 7.2** Rev. **0**

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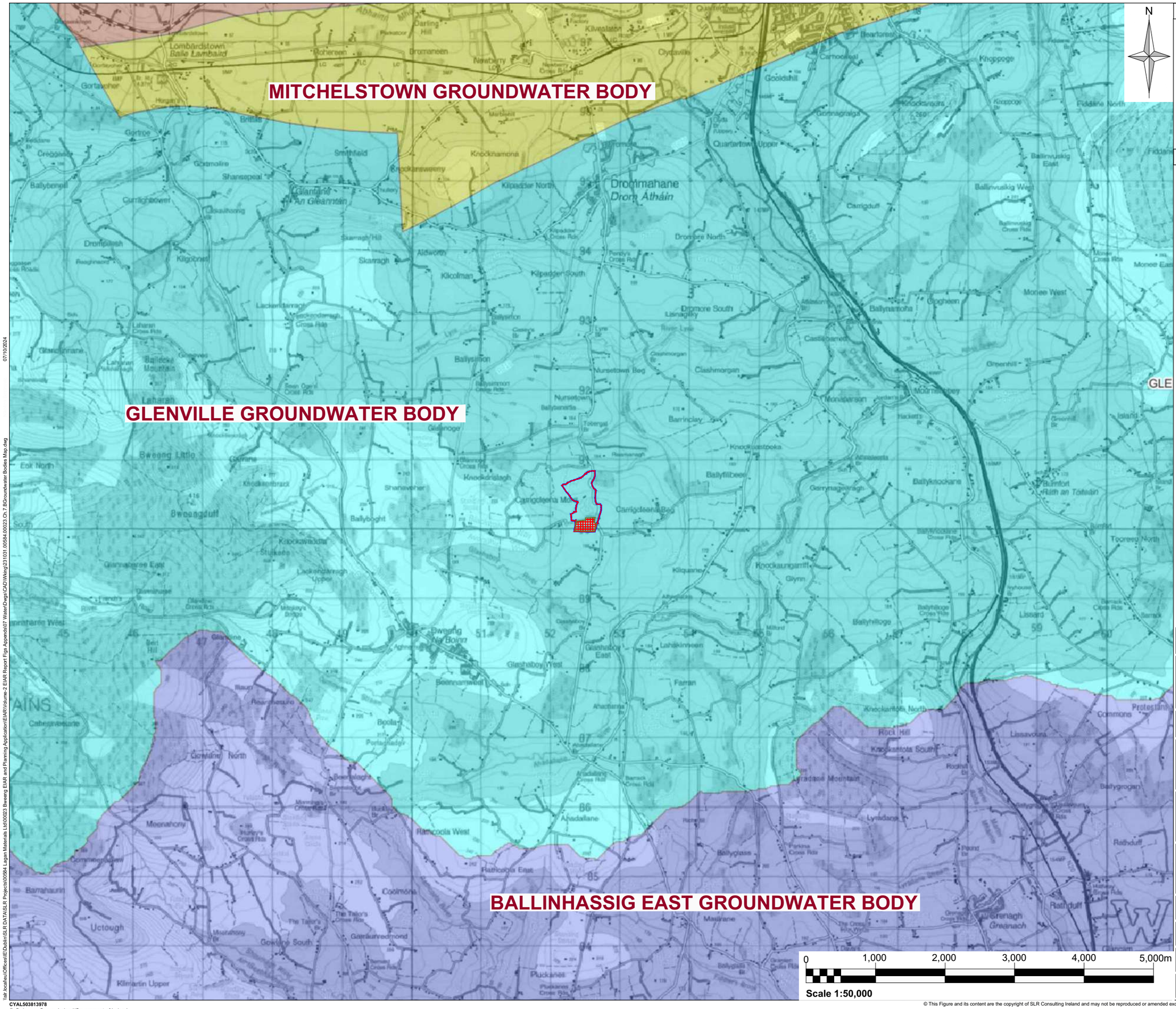
MITCHELSTOWN GROUNDWATER BODY
GLENVILLE GROUNDWATER BODY
BALLINHASSIG EAST GROUNDWATER BODY
Droominahane
Drom Áthán
Lombardstown
Baile Lambaird
Gortaclohar
Gortroe
Smithfield
Knockhamona
Shanrepeal
Ballybeneil
Curraghbower
Dromdaleish
Kilgobnet
Aldworth
Skanragh
Kilcolman
Kilpadder South
Kilpadder North
Dromore North
Dromore South
Lisnagaby
Ballynamona
Castlemore
Clashmorgan
Nursetown Beg
Nursetown
Ballyannon
Barrinclay
Monaparson
Mourneabbey
Monee West
Bweeng Little
Bweengduff
Ballybought
Knockanbrack
Knockanaddra
Lackendarragh
Lackendarragh Upper
Glantane
An Gleanntán
Bweeng
An Bhoirr
Glashaboy East
Glashaboy West
Farran
Ballyfilbeen
Carrigcleena Mor
Carrigcleena Beg
Knockaunglass
Kilquane
Glynn
Ballyknockane
Ballyhilloge
Lissard
Tooreen North
Ballinvuskig East
Ballinvuskig West
Carrigduff
Knocknaroon
Knocknagragh
Goldshill
Carnoolard
Khoppoge
Fiddane North
Monee East
Ogshean
Greenhill
Island
Gortnamona
Ballyglass
Ballyglass Cross Rds
Ahadallane
Rathcoola West
Rathcoola East
Coolmona
Gowlane North
Gowlane South
Meenahony
Commeenduff
Barnahauin
Uctough
Kilmartin Upper
Pluckanes
Pluckanes Cross Rds
Massane
Knocknastooka South
Knocknastooka North
Rock Hill
Lyradane Mountain
Lyradane
Lissavoura
Commons
Ballygrogan
Rathduff
Greenagh
Greanach
Protestant
Ballyhoura Mountains
Ballyhoura Mountains Way
Eok North
Eok South
Gortnamolire
Brittas
Ballyhoura Cross Rds
Ballyhoura Mountains Cross Rds
Ballyhoura Mountains Way
Ballyhoura Mountains Way Cross Rds
Ballyhoura Mountains Way Cross Rds
Ballyhoura Mountains Way Cross Rds

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3. Extract from GSI Groundwater Vulnerability Data Mapping © GSI

Legend:

- BREEDON LAND INTEREST (c.28.8 Ha)
- APPLICATION AREA
- EXTENSION AREA (c. 3.7 Ha)

GROUNDWATER VULNERABILITY CLASSIFICATION:

- ROCK AT OR NEAR SURFACE
- EXTREME
- HIGH
- MODERATE
- LOW

Rev	Amendments	Date	By	Chk	Auth

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Figure Title: GROUNDWATER VULNERABILITY MAP

Scale	SLR Project No.
1:25000 @ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
NB	NB	PG	PG
Date: 12/23	Date: 12/23	Date: 12/23	Date: 10/24

Figure Number: **FIGURE 7.4** Rev. **1**

0 500 1000 1500 2000 2500m

Scale 1:25,000

07/10/2024

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SUBCATCHMENT 18_7

SUBCATCHMENT 18_23

SUBCATCHMENT 19_5

N

0 1,000 2,000 3,000 4,000 5,000m

Scale 1:50,000

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2. Extract from Ordnance Survey Discovery Series Map No. 80
3. Extract from EPA Water Catchments Data Mapping © EPA

Legend:

- BREEDON LAND INTEREST (c.28.8 Ha)
- APPLICATION AREA (c.28.8 Ha)
- SUBCATCHMENT BOUNDARY
- SURFACE WATER BODIES
- BLACKWATER CHATCHMENT (18)
- LEE CHATCHMENT (19)
- EXTENSION AREA (c. 3.7 Ha)

Rev	Amendments	Date	By	Chk	Auth

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Project: BWEENG QUARRY MALLOW, CO. CORK

Figure Title: SURFACE WATER CATCHMENTS MAP

Scale		SLR Project No.
1:50,000	@ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
NB	NB	PG	PG
Date: 12/23	Date: 12/23	Date: 12/23	Date: 10/24

Figure Number: **FIGURE 7.5** Rev.: **1**

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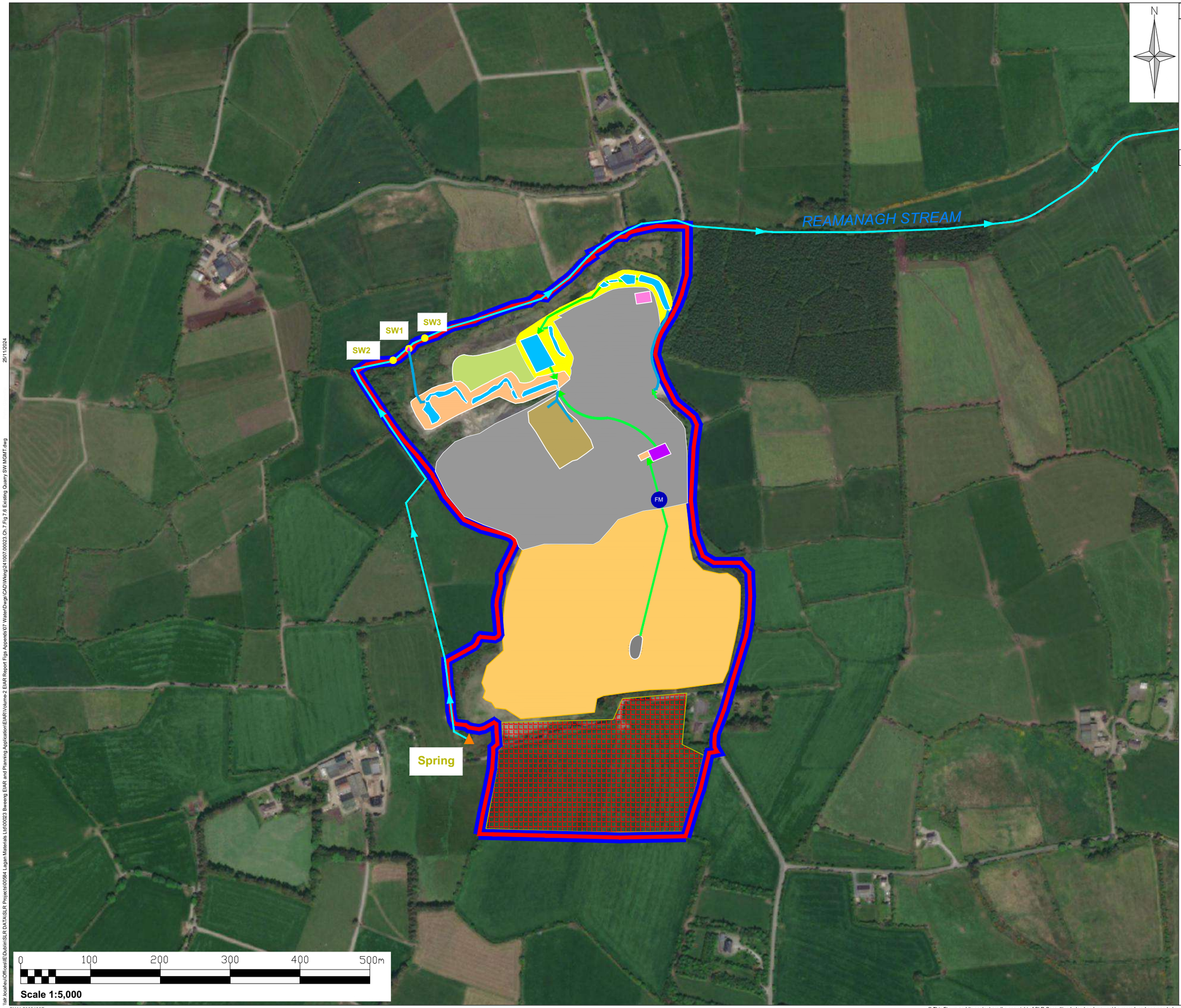

Notes:

1. Extract from Aerial map

Legend:

- BREEDON LAND INTEREST (c.28.8 Ha)
- APPLICATION AREA (c.28.8 Ha)
- OPEN CHANNELS
- PIPEWORK
- REAMANAGH STREAM
- SW SAMPLING POINTS
- FLOW METER
- DISCHARGE POINT
- CURRENT QUARRY VOID
- PROCESSING AREA
- CONCRETE BATCHING PLANT AREA
- EASTERN SETTLEMENT POND AREA
- WESTERN SETTLEMENT POND AREA
- WILLOW PLANTATION
- SCREENING AREA
- WASHING PLANT
- WATER STORAGE TANKS
- SETTLEMENT PONDS
- QUARRY SUMP
- EXTENSION AREA (c. 3.7 Ha)
- SPRING

Rev	Amendments	Date	By	Chk	Auth

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Figure Title
EXISTING QUARRY SURFACE WATER MANAGEMENT OVERALL CONCEPTUAL LAYOUT

Scale	SLR Project No.
1:5000 @ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
NB	NB	PG	PG
Date	Date	Date	Date
09/24	12/23	12/23	09/24

Figure Number
FIGURE 7.6

Rev.
1

25/11/2024

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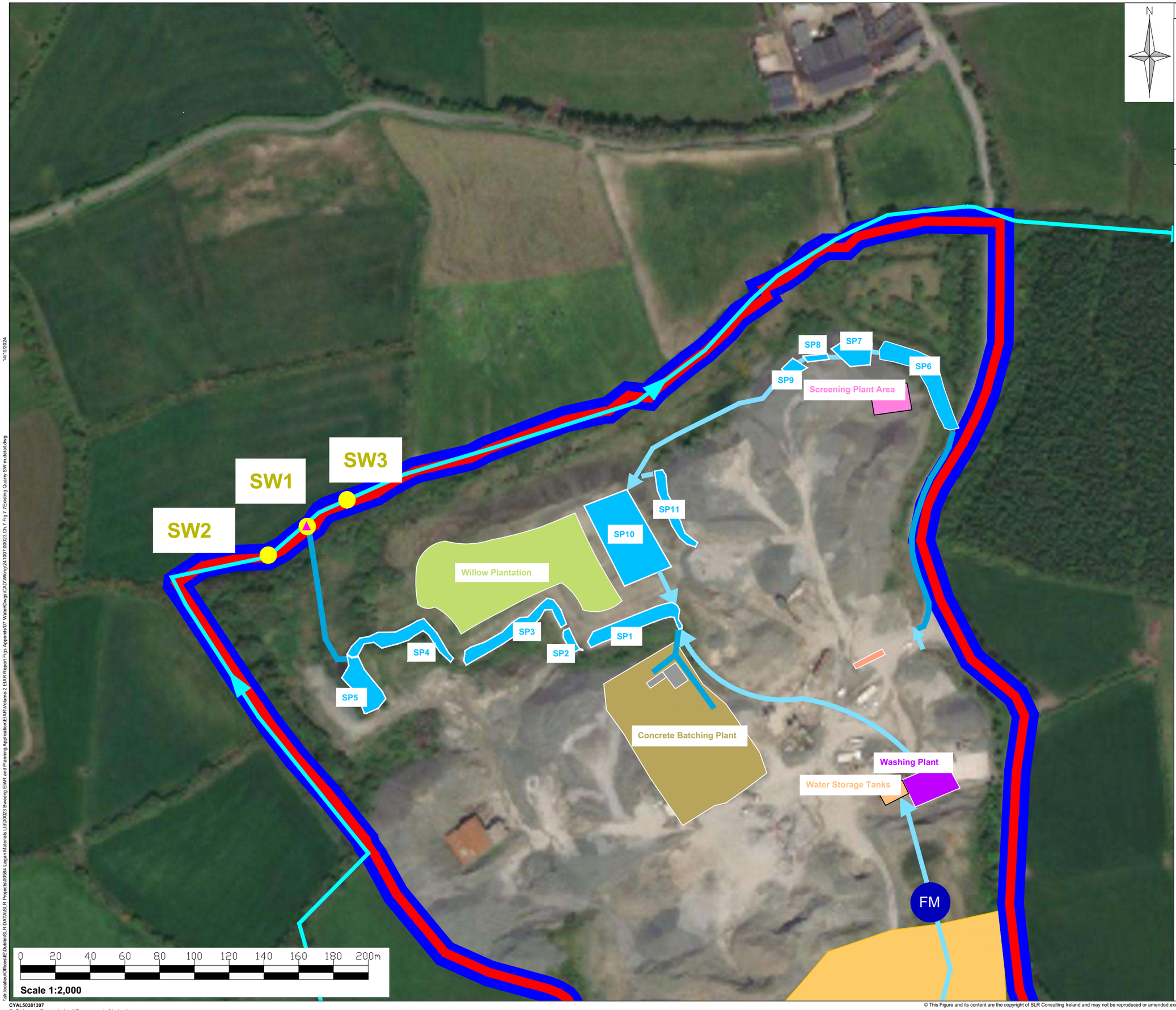

Notes:

1. Extract from Aerial map

Legend:

- BREEDON LAND INTEREST (c.28.8 Ha)
- APPLICATION AREA (c.28.8 Ha)
- OPEN CHANNELS
- PIPEWORK
- REAMANAGH STREAM
- SW SAMPLING POINTS
- FLOW METER
- DISCHARGE POINT
- CONCRETE BATCHING PLANT SETTLEMENT TANKS
- CONCRETE BATCHING PLANT AREA
- WILLOW PLANTATION
- SCREENING AREA
- WASHING PLANT
- WATER STORAGE TANKS
- SETTLEMENT PONDS
- WHEELWASH

Rev	Amendments	Date	By	Chk	Auth

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Figure Title
EXISTING QUARRY SURFACE WATER MANAGEMENT DETAIL LAYOUT

Scale		SLR Project No.
1:2,000	@ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
NB	NB	PG	PG
Date	Date	Date	Date
09/24	12/23	12/23	09/24

Figure Number **FIGURE 7.7** Rev. **1**

14/10/2024

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2. Extract from Aerial map

Legend:

- BREEDON LAND INTEREST (c.28.8 Ha)
- APPLICATION AREA (c.28.8 Ha)
- OPEN CHANNELS
- UPGRADED FLOW DIRECTION ARROWS
- NEW RUNOFF INTERCEPTOR DRAIN
- RUNOFF FLOW DIRECTION
- REAMANAGH STREAM
- SW SAMPLING POINTS
- DISCHARGE POINT
- CONCRETE BATCHING PLANT AREA
- CONCRETE BATCHING PLANT SETTLEMENT TANKS
- WILLOW PLANTATION
- SCREENING AREA
- WASHING PLANT
- WATER STORAGE TANKS
- UPGRADED SETTLEMENT PONDS
- WHEELWASH
- NORTHERN RUNOFF AREA
- SOUTHERN RUNOFF AREA

Rev	Amendments	Date	By	Chk	Auth

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Figure Title: PROPOSED QUARRY SURFACE WATER MANAGEMENT

Scale		SLR Project No.
1:1,250	@ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
NB	NB	PG	PG
Date 09/24	Date 12/23	Date 12/23	Date 09/24

Figure Number: **FIGURE 7.8** Rev. **1**

0 25 50 75 100 125m

Scale 1:1,250

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N

REAMANAGH STREAM

SW1
SW2
SW3
SW4
SW5

QUARRY ENTRANCE

MW8
SITE WELL
MW7
FM
MW2
MW1
MW5
MW4
MW6
DERELICT HOUSE WELL
MW9
OLD OFFICE WELL
19-BWG-03
EXTENSION AREA
19-BWG-01
19-BWG-02
MW3

0 100 200 300 400 500m

Scale 1:5,000

Notes:

1. Extract from Aerial map

Legend:

- BREEDON LAND INTEREST (c.28.8 Ha)
- APPLICATION AREA (c.28.8 Ha)
- SURFACE WATER MONITORING POINTS
- DISCHARGE POINT
- GEOLOGICAL SURVEY BOREHOLES IN EXTENSION AREA
- GROUNDWATER WELLS
- FLOW METER
- EXTENSION AREA (c. 3.7 Ha)

Rev	Amendments	Date	By	Chk	Auth

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Project: BWEENG QUARRY MALLOW, CO. CORK

Figure Title: SURFACE WATER AND GROUNDWATER MONITORING LOCATIONS

Scale		SLR Project No.
1:5000	@ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
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Date: 09/24	Date: 09/24	Date: 09/24	Date: 09/24

Figure Number: **FIGURE 7.9** Rev.: **1**

09/10/2024

C:\Users\nbozhinovic\OneDrive - SLR Consulting Limited\Desktop\241008.00023.Ch.7 Fig. 7.9 SW and GW Monitoring Locations.dwg

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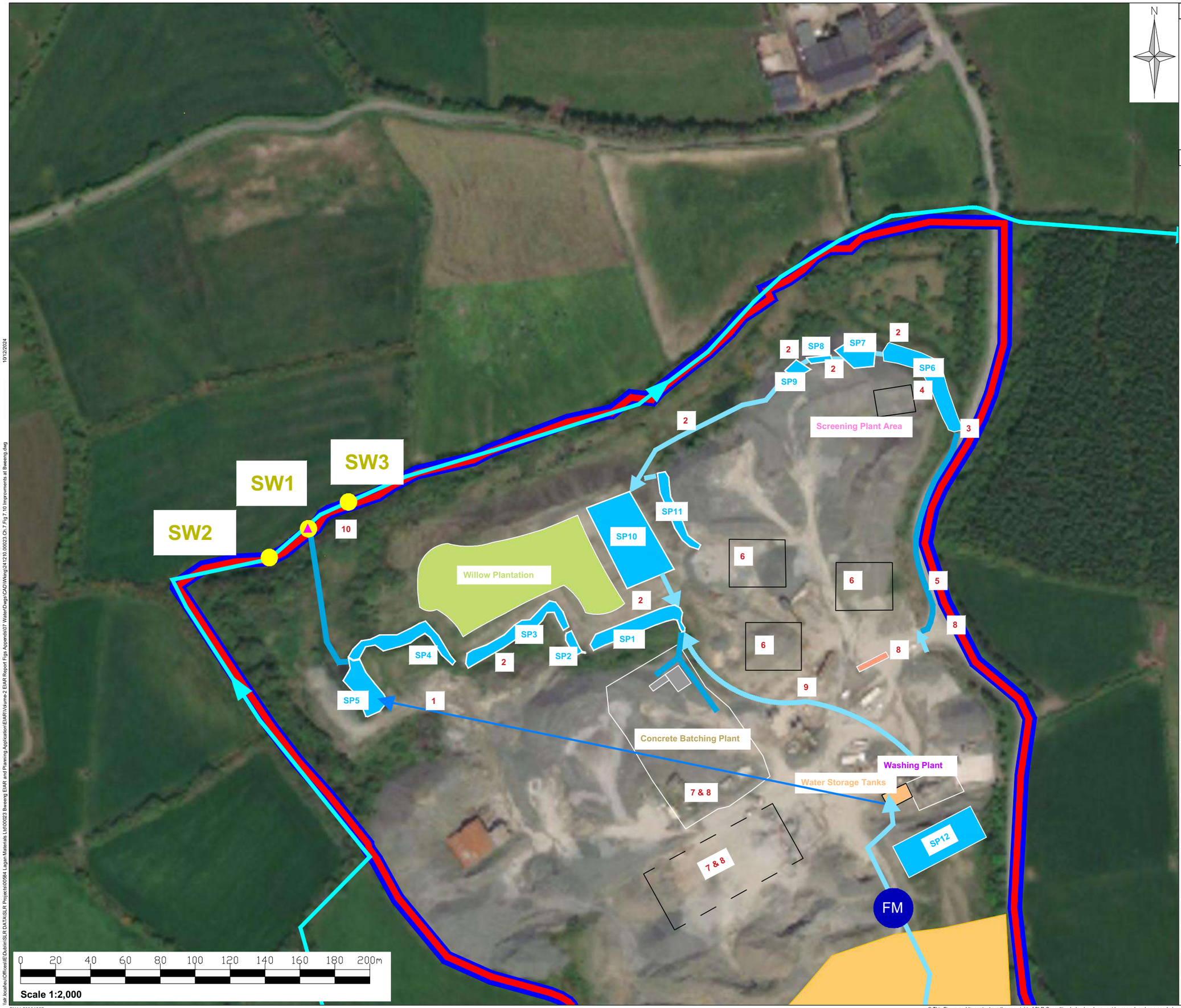

Notes:

1. Extract from Aerial map

Legend:

1 - Clean water from quarry sump now directed to final settlement pond SP5.
2 - Protection bunding around all settlement ponds has been improved.
3 - Significant strengthening of the bund between the public road and the settlement pond system on the eastern boundary of the site has been undertaken.
4 - Improvements to the swale settlement ponds have been completed, with the installation of armour rock to line the internal surfaces of the pond walls, and the creation of new internal baffles.
5 - Improvements to the road verges between the quarry entrance and the Reamanagh stream. These improvements comprise the scraping back of the verge edge and the installation of stone lined collection drains, to capture rainfall and attenuate it along the road verge.
6 - Containment bunds around stockpiles of fine aggregates.
7 - Containment bunding around individual paved and unpaved areas.
8 - A mechanical road sweeper was previously retained and utilised on an as-needs basis for cleaning internal paved roads, and the external public road.The frequency of mechanical road sweeping for the public road and internal paved roads has been increased and a log of sweeping is being maintained.
9 - A new wheelwash which replaced an older one was installed in Spring 2024 at the site. Following consultation with IFI and Cork County Council, a maintenance and inspection programme for this wheelwash - has been implemented.
10 - A pre-fabricated steel walkway has been installed at the licenced discharge point ensuring safe and permanent access is maintained.

Rev	Amendments	Date	By	Chk	Auth

SLR

www.slrconsulting.com

Client: BREEDON IRELAND

Project: BWEENG QUARRY MALLOW, CO. CORK

Figure Title: WATER MANAGEMENT IMPROVEMENT MEASURES AT BWEENG QUARRY - DETAIL LAYOUT

Scale	SLR Project No.
1:2,000 @ A3	00584.00023.00001

Designed	Drawn	Checked	Authorised
NB	NB	PG	PG
Date 12/24	Date 12/24	Date 12/24	Date 09/24

Figure Number: **FIGURE 7.10** Rev. **1**

10/12/2024

\\dir.local\eu\Office\IE\Dublin\SLR DATA\SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application\EIAR\Volume-2 EIAR Report Figs Appends\07 Water\Dwgs\CAD\Wking\241210.00023.Ch.7.Fig.7.10 Improvements at Bweeng.dwg

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Appendices

Appendix 7-A:
Bweeng Quarry Water Management Audit and Future Design Proposals Report, Hydro-G and Envirologic Ltd., 2024

Hydro-G

&

ENVIROLOGIC

HYDROGEOLOGICAL · HYDROLOGICAL CONSULTING

BREEDON IRELAND BWEENG QUARRY

WATER MANAGEMENT

AND

DESIGN ENHANCEMENT REPORT

CLIENT:	Breedon Ireland
SITE LOCATION:	Carrigcleena More, Bweeng, Co. Cork
PREPARED BY:	Pamela Bartley PhD (Hydrogeology), Bartley Hydrogeology Ltd., T/A Hydro-G
	Colin O'Reilly PhD (Hydrology), Envirologic Ltd.
DATE:	19th November 2024
REFERENCE:	2024_CORPB_Bweeng
CONTACT:	Pamela Bartley, Hydro-G, 50 Henry St., Galway H91 FA4X
	087 807 2744

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1 INTRODUCTION

1.1 BACKGROUND

This document has been prepared for Breedon Materials Ltd. (trading as Breedon Ireland) in respect of Bweeng Quarry, Co. Cork, by Dr. Pamela Bartley (Hydro-G) and Dr. Colin O'Reilly (Envirologic).

1.2 EVIDENCE OF COMPETENCY

Dr. Pamela Bartley (Hydro-G) and Dr. Colin O'Reilly (Envirologic) completed this work together. Multiple site visits, an audit of how water moves through the site and how it is managed, GPS surveying and discussions with the site led to the designed Water Management System enhancements now presented in this report.

Pamela Bartley (Hydro-G) is a water focussed civil engineer with almost 30 years field based experience in hydrogeology: borehole drilling, groundwater monitoring and resource evaluation. Dr Colin O'Reilly (Envirologic) has over 20 years of professional experience as a hydrological engineer: evaluating and managing surface water runoff, modelling flooding and all associated Hydrogeological components. Both Colin O'Reilly and Pamela Bartley's practical experience is complimented by their PhDs, which were followed by postdoctoral academic research at field based at research centres. They have very practical footings in instrumentation and evaluation of resultant data. Both Pamela and Colin members of the Irish Branch of the International Association of Hydrogeologists (IAH) and both have served on its committees at various stages as well as 3 years each as conference secretaries.

Dr. Pamela Bartley's primary qualification is a Diploma in Water and Wastewater Technology from Sligo RTC. She then completed her primary degree in Civil Engineering at Queens University, Belfast, followed by an M.Sc. in Environmental Engineering and then a field-based, Hydrogeologically focussed, Ph.D. within the School of Civil Engineering at Trinity College, Dublin. She completed academic research at postdoctoral level and lectured at 3rd level institutions but left to work in consultancy in 2005. Her key work areas are groundwater development from large scale water supply boreholes, hydrogeological assessment of quarries and successful receipt of discharge permits for quarry discharges to groundwater and surface waters. Hydro-G is the registered trading name of Pamela Bartley's company Bartley Hydro-Geology Ltd and the company holds employer's and public liability insurances and professional indemnity insurance of €2million for each and every claim in each period. Pamela is qualified and IOSH certified to act as PSDP (Project Supervisor Design Phase) & PSCS (Project Supervisor Construction Stage) as defined by the Construction Regulations, is a registered Irish Water Supplier (no. 1855) and is HSQE approved within Irish Water.

Envirologic is an environmental consulting practice established by Dr. Colin O'Reilly in 2010 and based in north Dublin. Colin's doctorate degree was awarded by the Centre for Water Resources Research, School of Architecture, Landscape and Civil Engineering, University College Dublin. Envirologic has key competencies in Hydrogeology (groundwater) and hydrology (surface water). Expertise is delivered to a varied customer base in both private and public sectors. The practice offers a wide range of solutions to meet client specific needs and to satisfy environmental and planning legislation. Envirologic has insurance cover for professional indemnity and public liability. Sample quarry projects completed by Envirologic can be viewed at

http://www.envirologic.ie/projects#/industrial/. Envirologic has also successfully developed complex flood risk assessments and solutions for projects such as the Tullamore Medical Centre. Mitigation measures included a development-free zone between the main building and the Tullamore River, and specifications for widening of the river channel adjacent to the site. Envirologic operates either as sole consultancy on a project, but more typically as part of a collaboration or consortium. The company has formed strong collaborations with several leading environmental consultancies, planning firms, consulting engineers, architectural practices and frequently Hydro-G for quarry sites.

Hydro-G has delivered successful planning and discharge licence applications for regionally important quarries in SAC environments: Bennettsbridge Limestone, Churchill Stone Letterkenny, McGraths Quarries, Harringtons Quarries, Mortimers Quarry, Esker Readymix and MC Group. As a result of work in evaluating planning appeals, Pamela has become specialist in planning evaluations in the context of enacted Irish Regulation and EU Directives concerning the water environment such as the Groundwater Regulations (S.I. No. 9 of 2010), Surface Water Regulations (S.I. No. 272 of 2009), Water Framework and Habitats' Directives. She has been an invited guest speaker at An Board Pleanála, The Irish Concrete Federation, The Health Service Executive, Environmental Health Officers National Conference, The Irish Planning Institute's National Conference, The International Association of Hydrogeologist's National Conference (Irish Branch) and has delivered hydrogeological lectures to the public during Science Week.

1.3 WORK OBJECTIVES

The objectives of this report are to:

1. Audit, document and describe the existing site Water Management systems in operation.
2. Present design justification for the required additions and upgrades that will enable better Water Management and support expansion of the site, should the Planning Authority be minded to Grant Permission for the continued use and extension to the quarry.

1.4 INLAND FISHERIES IRELAND (IFI)

Inland Fisheries Ireland (IFI) opened their 12th March 2024 observations on future development at the site stating that whilst they are not in principle opposed to the proposed development, there have been historical issues at the site regarding water and more detail regarding expansion of the water management systems seemed worthy in light of conservation objective site connectivity and biodiversity of water dependent species.

With respect to potential impacts on aquatic life downstream of the site's licenced discharge, potential for effects to downstream conservation objective sites and water dependent species, in the summer of 2024 Breedon engaged directly an expert in this area: **Mr. Ross Macklin of Triturus Environmental Ltd.** The findings of the field works completed are reported in a separate report entitled 'Aquatic & fisheries baseline report for the continued operation of a quarry development at Bweeng, Co. Cork' (August 2024).

With respect to internal Water Management, Breedon Ireland engaged independent water and quarry specialists, **Hydro-G and Envirologic, to audit and evaluate water movement throughout the site with the aims of presenting mathematically justified design proposals that would enhance water management and provide extra capacity for future water treatment.** Dr. Pamela Bartley, Hydro-G, and Dr. Colin O'Reilly, Envirologic, completed multiple site walkovers and meetings with the site manager and site personnel in addition to auditing, surveying and documenting all water flows, existing water management procedures and infrastructure and the procedure for managing silt and solids carried with water as it moved around the site through managed and unmanaged flows. Site data were then used and inputs to industry standard formulae for the purposes of specifying dimensions required to determine the volumes of both rainfall runoff and groundwater ingress at various sub sections of the site, to size systems to ensure settlement of solids (Stokes Law), to quantify attenuation volumes required for Extreme Rainfall Events (+20% Climate Change factor) and to propose future water management systems to ensure protection of the adjacent stream. Throughout the process, draft solutions were workshopped with Breedon Ireland management to ensure that the proposals could be effectively implemented.

All works completed by Hydro-G and Envirologic and Triturus Environmental Ltd., address the items presented by the IFI in their submission of 12th March 2024, which they presented as follows:

- *"The discharge of silt-laden waters to fisheries streams due to insufficient silt control measures can clog salmonid (salmon and trout) spawning beds and can also precipitate further riverbank erosion downstream. Inevitably this can lead to loss or degradation of valuable habitat. IFI requests that the riparian zones along watercourses should be maintained and that no material should be deposited within 10m of watercourses or open drains adjacent to the site. IFI is also of the view that no material should be deposited on floodplain areas, where they exist, as this may result in significant alteration of hydrological processes. "It is important to incorporate best practice and strategies to minimise discharges of silt/suspended solids to waters. Silt traps if appropriate should be constructed at locations that will intercept run-off from the site".*
- *"Fuel oils, etc. should be stored on a sheltered dry elevated site well removed from aquatic zones. It is our view that refuelling of vehicles should take place in a designated area well away from aquatic zones and fuel oils must not, under any circumstances, discharge into an aquatic zone."*
- *"While IFI is aware of the significance of the SAC Munster Blackwater SAC as is correctly referenced within the application documents, the repeated statement that the SAC is over 2 km from the site may serve to undermine the significance of the receiving Reamanagh Stream which bounds the quarry. Small tributary streams provide crucial niche habitat for macroinvertebrate communities and most significantly from a fisheries perspective, spawning and nursery habitat for fish including salmonid and lamprey species. Where deleterious discharges occur, the negative impacts are immediate and then cumulative within the catchment as a whole, via habitat degradation and reduced spawning recruitment in relevant fish populations."*
- *"IFI notes from the application documents a number of references to the Discharge Licence currently held by the quarry and specifically to the sampling points SW1, SW2 & SW3 which relate to ongoing environmental monitoring of both the quarry discharge and the receiving surface water as conditions of said licence. "The sampling point (SW1) for the discharge appears to be located within the quarry itself and not the discharge point and therefore may not accurately reflect the quality of the final discharge".*
- *"Monitoring results suggest that there is no negative impact on the receiving aquatic habitat arising from quarry discharges, however IFI is concerned that the location of the sampling points, as marked on enclosed maps are upstream*

of a significant interface of the quarry boundary (approximately 300 m of channel) and the watercourse and therefore not likely to indicate any issues arising in this section of channel. A recent site inspection of the receiving stream shows significant settlement of fine silt and sand material in the channel immediately downstream of SW3 (SW3 appears to be the downstream limit of monitoring) and similar settled silt in the channel at points toward and immediately downstream of the stream crossing the public road where there are other surface water discharges along the quarry boundary. This deposited fine material may be indicative of locally elevated levels of suspended solids settling out within the channel, which were not observed in the channel further upstream within the monitored section. Monitoring in this downstream section may prove more indicative of any impacts arising from the quarry as a whole, including any unmarked, intermittent or accidental discharges."

- *"While IFI is aware that significant improvements have been made to water treatment within the quarry by the current operator, unsatisfactory discharges have been observed arising from same with warnings issued in the past, and a prosecution under fisheries and local government legislation completed in relation to a deleterious discharge at the site in 2021. It is significant that previous IFI observations of unsatisfactory discharges have been made at locations downstream of the surface water and macroinvertebrate sampling points noted within the application."*
- *"IFI notes that the applicant predicts a significant increase in the volume of water which will be generated, treated and discharged from the extended quarry, but does not detail augmentation of existing on-site treatment capacity for same. Given its own previous observations, as above, and in recognition of the increased intensity of rainfall events experienced in recent years IFI is concerned that existing treatment capacity may be insufficient to serve the larger quarry area, particularly during periods of high precipitation."*

At the end of this Water Management Audit & Future Design Proposal's document, each of the IFI points are answered with reference to the detail now presented.

2 THE QUARRY

2.1 LAYOUT

The Bweeng Quarry site can be considered as having several internal sub-sections with specific activities occurring in each, as follows:

1. **Active quarrying area in the south of the site.** Blasted & crushed bedrock is loaded onto quarry dumper trucks and transported from the quarry floor to the central part of the site *via* the western haul route.
2. **Processing area in the central part of the site which includes washing, stockpiling and a wheelwash.** The central area of the quarry site is used for stockpiling of crushed rock and stone taken up from the quarry floor, screened material, and washed material ready for sale. Due to the natural variability of material processed on site the nature and number of the stockpiles varies.
3. **Readymix concrete plant** in the north-western part of the site.
4. **Water Management (Settlement Ponds**) **& Willow Plantation** in the northern portion of the site.

5. **An occasional mobile screening unit in the northeastern part of the site.** As part of the permitted aggregate processing activities onsite, mobile screening units are utilised on a campaign basis, typically for a period of four months, twice a year. The mobile units are maintained on hardstanding while they are in operation. There are dedicated settlement ponds in the northeastern portion of the site adjacent to the screening activities.

2.2 SECTION 4 DISCHARGE LICENCE

The management of all waters arising at Bweeng Quarry are regulated by a Section 4 Discharge Licence (WP(W)03.19), which was issued by Cork County Council on 10th February 2020. The Licence Conditions are therefore in compliance with the Surface Water Regulations (2009, as amended), the Groundwater Regulations (2010, as amended) and, *de facto*, the Water Framework Directive. WP(W)03/19 specifies that the ***'daily discharge of treated water shall not exceed 1,100 m^3/d'*** and other Conditions of note, numbered as they appear in the Licence, include as follows:

1.7 *The existing settlement lagoons and the wetland system shall be refurbished and maintained to provide appropriate capacity to reduce flow to allow settlement. Preferential flowpaths and overflows from any cells/lagoon shall be avoided.*

1.9 Any sample taken at SW01 shall be assumed to be representative of the discharge until the contrary can be shown. Emission Limit Values (ELVs) are as follows:

- *pH = 6.0 – 9.0*
- *BOD = 10 mg/l*
- *Suspended Solids = 35 mg/l*
- *Total Nitrogen = 15 mg/l*
- *Total Mineral Oil = 5 mg/l*
- *Total Heavy Metals = 1 mg/l*
- *Chromium VI = 0.15 mg/l.*

Reference is made in this report to the discharge licence application compiled by SLR, for Breedon, in 2019 and the accompanying cover letter which provides a synopsis of site water management on the site at that time.

2.3 PERMISSIONS

The site operates with numerous component permissions under Cork County Council Planning references spanning from the previous owner's time in 2006 to the current 2019. More details on current consents are presented in the accompanying EIAR for the site.

Breedon Ireland are applying for new consent for expansion of the Bweeng Quarry site to Cork County Council. The Description of Development is as follows:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration).
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c. 3.7 hectares.
- Construction of a new settlement pond (1,000m^2) and upgrade of the existing surface water management and settlement pond system at site.
- Realignment of a section of the existing local road to the South of the proposed extension area.
- Overburden storage.
- Operation landscaping including perimeter screening berms around the proposed extension area.
- Restoration of the quarry to natural habitat after-uses.
- All related ancillary site works within an overall application area of c. 28.8 hectares and all for a period of 20 years and a further 2 years to complete final restoration of the site.

A previous application for extension in January 2024 was withdrawn in March 2024 following requests for more detail and consideration from Inland Fisheries Ireland, specifically relating to Water Management systems and the outside water environment and the potential impact on species it supports. The detail of the IFI submission is presented in Section 1.3 above.

3 ENVIRONMENTAL SETTING

More details are presented in the Land, Soils & Geology and the Water chapters of accompanying EIAR. Summary information is presented here.

3.1 TOPOGRAPHICAL SETTING

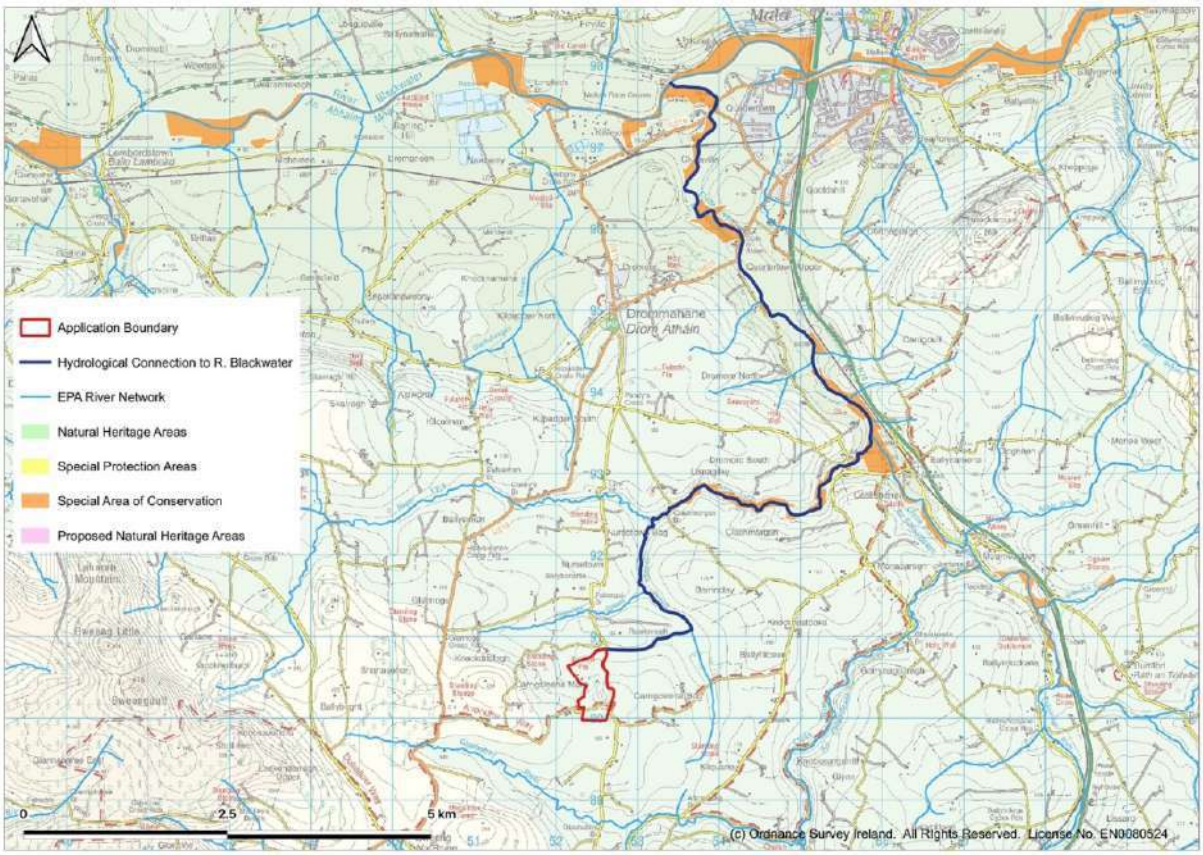
The site lies on the eastern side of the Boggerah Mountains, a modest upland area in north County Cork. The highest point in this range is Musheramore (644 mOD), 20 km west of the site. The site itself lies on the north-facing slope of a minor east-trending ridge (233 mOD) which extend from the nearest hilltop, this being Bweengduff 5.5 km to the west. The OS 1:50,000 Discovery Map contours indicate that site elevations are in the range 150 – 190 mOD (see Figure 1).

3.2 CONSERVATION OBJECTIVE WATERS CONNECTIVITY

Several of the first order streams in the area are part of the Blackwater River SAC (Site code 002170). The site position of the quarry is therefore in hydrological connectivity with the Blackwater SAC(002170). Overall, the River Blackwater is described as being of considerable conservation significance for the occurrence of good examples of habitats and populations of plant and animal species that are listed on Annexes I and II of the E.U. Habitats

Directive respectively. Readers are referred to the detail presented by Mr. Ross Macklin in the report entitled 'Aquatic & fisheries baseline report for the continued operation of a quarry development at Bweeng, Co. Cork (Triturus Environmental Ltd., August 2024) and specifically Figure 2.1 of that report for SAC connectivity.

Figure 1 - Topographical Site Setting



3.3 DESK STUDY: SOILS & GEOLOGY

3.3.1 Soils & Subsoils

Geological Survey of Ireland (GSI) maps show that soils in the locality are predominantly shallow and well-drained with an acidic hydrochemical signature. Quaternary deposits are mapped by the GSI as a till derived from Devonian Sandstones.

3.3.2 Bedrock Geology

The primary rock type mapped by the GSI for the site is Devonian Old Red Sandstone and siltstone of the Ballytrasna Formation. A tuff belonging to the Carrigcleenamore Volcanics Unit is mapped as an outcrop in the southern half of the current site.

3.3.3 County Geological Site

Bweeng Quarry is a County Geological Site (Hennessy et al., 2023). Key points to note from the County Geological Site Report are as follows:

- *The sandstone and siltstone are high-PSV rocks and are mainly produced for high-specification road surfaces.*
- *The southern end of the quarry footprint is coincident with the mapped outcrop area of the Carrigcleena Volcanic unit. Bedded tuffs of this unit are visible in the south wall of the quarry, above the ORS rocks. These were previously quarried and, when mixed with ORS, improved the PSV of the quarry product. Above the southeastern corner of the quarry the main outcrop of the Carrigcleena Volcanic unit is preserved.*

3.4 DESK STUDY: HYDROLOGY

3.4.1 Local & Regional Hydrology

Topography through the site falls in a northerly direction from c. 190 mOD at the current southern site boundary into a minor valley which coincides with the northern site boundary and has a low point elevation of just below 160 mOD.

This valley is drained by a first order channel known as the Reamanagh Stream which flows along the northern boundary of the site in an easterly direction for 1 km before joining the Shinagh Stream (EPA Ref.: South Kilpadder Stream). The Shinagh outfalls to the Blackwater River 13 km downstream (and north) of the site.

EPA Envision provides hydrological information for the site's associated rivers, as follows:

- Reamanagh Stream (EPA code: 18R34), South Kildapper River (EPA code: 18S62) and Lyre River (EPA code: 18L02)
- LYRE_020 [EU_CD IE_SW_18L021100] SUB BASIN
- Blackwater[Munster]_SC_080 [Sub catchment ID 18_23].
- Hydrometric area 18 (Blackwater (Munster).

The Reamanagh stream starts on the ground as a spring emergence prior to its commencement mapping on the EPA Envision and OSI Discovery Map Series as the Lyre_020. There is anecdotal reporting of a spring on the northern boundary close to the mapped commencement of the Lyre_020 on Envision mapping. In addition, the historic OS 6" maps show that there is a 'Rising' stream to the immediate south western corner of the site and this is the actual start of the surface water system. The historic OS 6" map is shown with Hydro-G 'highlight' annotations for the OS mapped springs as Figure 2.

In the summer of 2024, Dr. Pamela Bartley, Hydro-G, walked this eastern boundary from the road north of the OS mapped 'Rising' and along the eastern boundary and the stream as it traversed the Discharge location and on to the Bridge under the road at the far northeastern corner of the quarry. The hydrochemical survey included

rudimentary flow rate measurements and collection of hydrochemical samples at four locations, including the Discharge itself, for analysis at an accredited laboratory. Sample locations are also shown on Figure 2 and results, including commentary are presented in Table 1 after the Figure.

Figure 2 – Historic OS 6" mapping showing "Rises" of Surface Water System & Hydro-G 4Sample Locations (1, 2, 3, & 4).

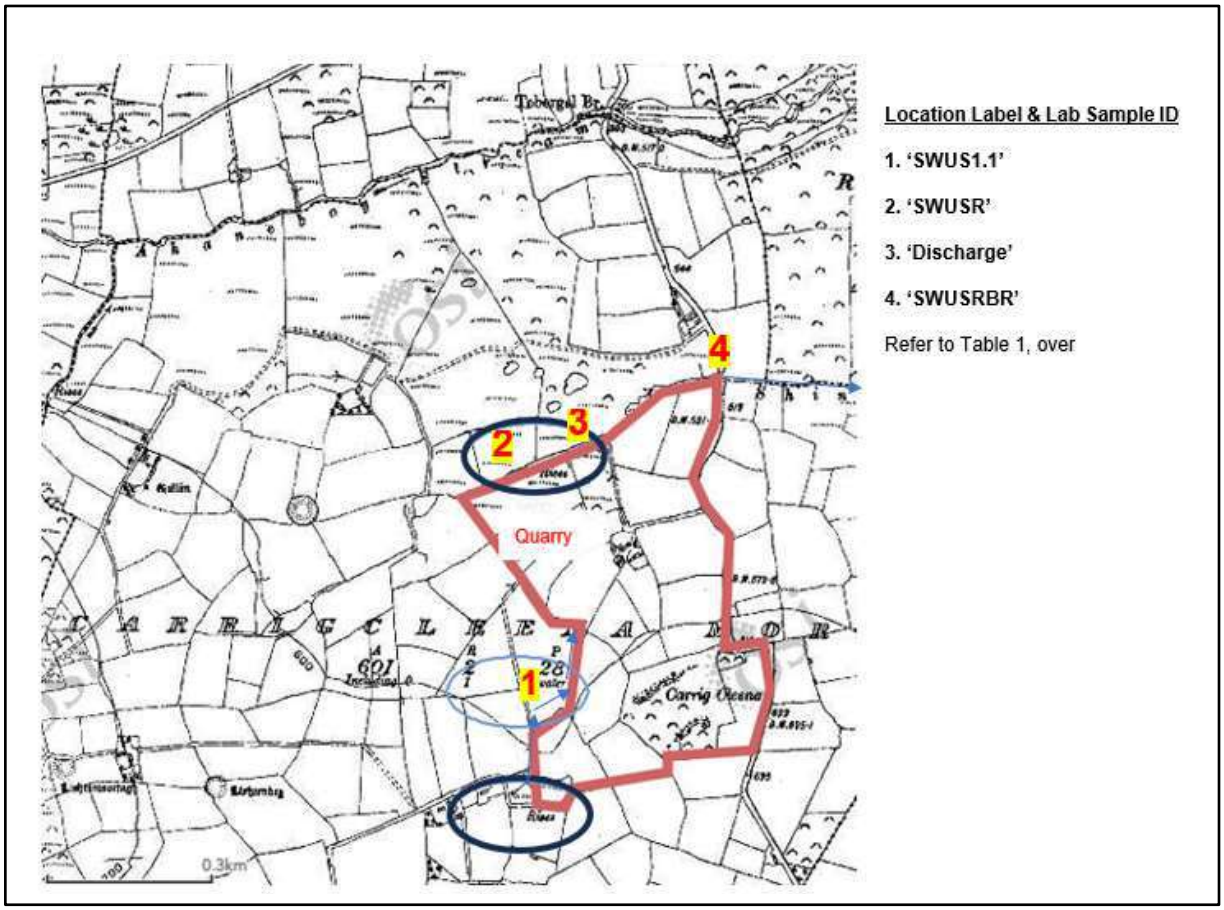


Table 1 - Water Quality Results July 2024 Hydro-G (Green Highlighting indicates those parameters specified in the Discharge Licence)

Sampling Location ITM Grid Reference		552,306; 590,354	552,256; 590752	552,294; 590755	552570; 590903	
Sampling Location Description		Surface Water on eastern boundary, north of 'Rising'.	Surface Water Upstream Routine (TMS Routine Sampling ID = SW2)	DISCHARGE (TMS Routine Sampling ID = SW1)	Surface Water downstream AT BRIDGE before ROAD (Triturus Location A3)	**Hydro-G Comments [note SW = Surface Water]**
Sample Location Lab Identifier		**SWUS1.1**	**SWUSR**	**Discharge**	**SWUSRBR**	
Figure 2 (Report) Location Label		**1**	**2**	**3**	**4**	
Test	**Units**	**Results - Samples 3/7/24 (BHP 290455 . 1)**				
pH	-	7.12	7.20	**7.71**	7.21	**pH neutral and Discharge is Compliant with Section 4 Licence**
Conductivity (25°C)	µS/cm	232	248	246	217	**Conductivity similar upstream and Downstream**
Total Ammonia (as N)	mg/L	<0.05	<0.05	0.065	<0.05	**Surface Water is < LOD and SW Reg Compliant for Upstream and Downstream. Discharge Licence does not specify Ammonia ELV**
Chloride (as Cl^-)	mg/L	20	17	15	18	**Chloride is lower in Discharge than SW and no significant change arises in SW**
Total Hardness (as CaCO?)	mg/L	72	87	91	71	**Discharge is only slightly higher than SW and causes no change**
Nitrate (as NO?)	mg/L	22	15	**12**	19	**Discharge has lower NO3 than receiving water**
Nitrite (as NO?)	mg/L	<0.05	<0.05	**<0.05**	<0.05	**<LOD Nitrites in all samples**
OrthoPhosphate (as P)	mg/L	0.050	0.024	**<0.01**	0.037	**Discharge has <LOD MRP-P. SW is elevated in upstream and Bridge samples (reflects Agriculture)**
Total Nitrogen (as N)	mg/L	4.2	3.6	**2.40**	2.9	**Discharge has the lowest Total Nitrogen value and is Compliant with Section 4 Licence ELV**
Total Suspended Solids	mg/L	<10	<10	**<10**	<10	**Discharge has < 1/3 of the permitted SS content and is Compliant with Section 4 Licence. SW Similarly < LOD SS.**
Mineral Oils (>C??-C??)	mg/L	<0.01	<0.01	**<0.01**	<0.01	**<LOD Mineral Oils and Petroleum Hydrocarbs, as is SW. Compliant with Section 4 ELV.**
Total Petroleum Hydrocarbons (>C?-C??)	mg/L	<0.01	<0.01	**<0.01**	<0.01	
Aluminium (Total as Al)	mg/L	0.064	0.11	**0.15**	0.067	**not specified in SW Regs, nor salmonid Regs, nor Fish Life Directive nor Section 4 Licence. Low concentrations in any case in SW and Discharge. Slight elevation in discharge likely to be geologic in nature. In any case, dar upstream and Bridge downstream are same.**
Chromium VI	mg/L	<0.003	<0.003	**<0.003**	<0.003	**<LOD Chromium VI and Section 4 Licence Compliant.**
Barium (Total as Ba)	mg/L	0.026	0.035	**0.029**	0.020	**Heavy Metals Compliant with Section 4 Licence and majority < LOD**
Cadmium (Total as Cd)	mg/L	<0.005	<0.005	**<0.005**	<0.005	
Chromium (Total as Cr)	mg/L	<0.005	<0.005	**<0.005**	<0.005	
Copper (Total as Cu)	mg/L	<0.025	<0.025	**<0.025**	<0.025	
Lead (Total as Pb)	mg/L	<0.025	<0.025	**<0.025**	<0.025	
Nickel (Total as Ni)	mg/L	0.021	0.022	**0.023**	0.014	
Mercury (Total as Hg)	mg/L	<0.00025	<0.00025	**<0.00025**	<0.00025	
Zinc (Total as Zn)	mg/L	<0.025	<0.025	<0.025	<0.025	
Potassium (Dissolved as K)	mg/L	<5	<5	<5	<5	**same concentrations for SW and Discharge**
Sodium (Total as Na)	mg/L	13	12	12	12	

4 CURRENT SITE WATER MANAGEMENT SYSTEMS

4.1 OVERVIEW

Hydro-G were tasked with reviewing the existing surface water management systems in place at the site and recommending measures that can improve the efficiency of the current surface water management system.

The overall current water management system is presented on a high level conceptual basis in Figure 3.

Each of the components shown in Figure 3 are labelled specifically in Figure 4 and are described in more detail in the following sections.

Figure 3 – Schematic of the Quarry Water Management System

Figure 4 – Components of the Quarry Water Management System

4.2 QUARRY SUMP

The working quarry void is a topographically excavated bedrock that is accessed *via* a haulage ramp on its western side. It has an area of approximately 77,400 m^2. The southern end of the current void is defined by a local road (this local road is to be rerouted to facilitate a future proposed extension).

With respect to the bedrock extraction area, the floor sump is the ultimate collector of all rainfall-runoff generated and any waters arising from interflow through the exposed rock faces. It is in the floor sump that waters are attenuated and preliminary settlement of water occurs prior to its pumping for use, further treatment and ultimate discharge in compliance with the site's Section 4 Licence.

Excavation in the rock void has progressed to a current elevation of c. 135 mOD, with this area referred to as the quarry floor (20,500 m^2). The sump's water level estimation was estimated as being c. 126 mOD, based on a nearest safely accessed ground elevation, on the day of Envirologic's Trimble satellite system topographic surveying in July 2024.

The sump has a footprint of approximately 30 m by 10 m (c. 300 m^2) and an estimated depth of 5 m (Plate 1). These dimensions give the floor sump an approximate volume of 1,500 m^3.

Plate 1: Active Quarry Sump

Commonly at quarry sites, the phased planning of extraction is facilitated by intermittently relocating the sump on the quarry floor as extraction advances, and commonly as extraction advances the sump area and volume increases. The expanding footprint of the site's floor sump results in an improvement the efficacy of primary settlement in the sump, thereby reducing the sediment load being pumped to subsequent water management system component settlement ponds. While the quarry floor sump will change and evolve with the excavation plan it is convention that a minimum water depth of 1m is maintained to effect appropriate primary settlement.

As well as the sump's volumetric capacity, quarry floors have the capacity to attenuate extreme storm events over the entire floor area. Seasonal rainfall patterns dictate the changing shape of a sump at any time.

Water collected in the current quarry sump consists of all rainfall-runoff generated within the active excavation area (77,400 m^2; 7.74 ha). As rainfall-runoff on topographically upgradient agricultural lands is captured in perimeter field drains and routed towards the Reamanagh Stream, it is reasonable and defensible to design on the basis that there is no contribution of rainfall-runoff from topographically upgradient agricultural lands. Similarly, the eastern boundary road deals with its own runoff and there is no contribution from this side of the quarry.

In general terms the water collected in the sump is relatively clean because the only potential source of contaminant is suspended solids from trafficked areas involved in the movement of rock.

From the quarry floor's sump, water is pumped to the central part of the site where there are Water Storage Tanks adjacent to the Wash Plant that situated to the south of the site entrance.

4.3 WATER STORAGE TANKS

Sump water is initially pumped to top up to two cylindrical water storage tanks next to the washing plant (Plate 2). The water storage capacity for the northern and southern water storage tanks are c. 34 m^3 and c. 163 m^3, respectively. Relatively clean sump water stored in these tanks is used to wash High PSV stone at the adjacent washing plant.

Plate 2: Water Storage Tanks

Excess sump water outfalls from the rising main into the slipway under the washing plant and the tank underneath is called the dirty water holding tank, which is designed to collect dirty water from the conveyor belts of the washing plant.

4.4 WASHING PLANT

High PSV aggregates undergoes washing prior to use in road and other infrastructure projects. In addition, the washing process generates an extract by product that provides sand for use in the readymix batching process.

The washing plant is located immediately adjacent and east of the water storage tanks. Stockpiled material that has been screened previously is tipped into the washing plant using a loading shovel.

Washing of resource material generates silt-laden water (referred to henceforth as dirty water) which is ejected from the washing plant into the underlying subsurface dirty water holding tank, where it mixes with water pumped up from the sump (Plate 3). This mixing increases the hydraulic load of dirty water requiring treatment.

Plate 3: Washing Plant immediately Adjacent to the cylindrical tanks (Plate 2) that receive the Sump Water.

With respect to the detail of Plate 3, note the water from washing plant overspilling centrally into the holding tank and the clean sump water from the pumped rising main entering holding tank in the foreground.

The washing plant's holding tank has an overflow mechanism at an elevation of 171.1 mOD. Water is then transferred by underground pipeline in a northerly direction and outfalls from a PVC pipe to a corner of Settlement Pond 1 (SP1), which is in the first settlement pond in the system (refer to Figure 4). That PVC pipe has access manholes at locations, as follows:

(i) the rear of the canteen, and

(ii) southwest of the site office.

4.5 CONCRETE BATCHING PLANT WATER MANAGEMENT

A concrete batching plant was commissioned in 2021, as approved under Pl. Ref. 19/5902. The permission included for a closed-loop settlement system.

The batching plant is accompanied by a hardstanding area of approximately 2,000 m^2. Yard runoff and truck washout water enters the Concrete Truck Washout Tank, as shown in Plate 4. This bath type structure has an angled base which allows for the easy removal of heavy sediment using a loading shovel. Dimensions are 11.7 m (L) by 8 m (W).

The Concrete Truck Washout Tank overflows at 168.43 mOD into a three-chamber settlement tank, covered in a steel grate (see Plate 4). Each of the three chambers has a footprint of 4.5 m x 4.5 m and an effective depth of 1 m. It is intended that clarified water is recycled for concrete production, with excess water routed to Settlement Pond 1 (SP1).

Plate 3: Concrete Truck Washout Tank

Plate 4: Concrete Batching Plant Settlement Tank

4.6 SETTLEMENT LAGOONS

With reference to Figure 4, the current Settlement Pond sequences are summarised, as follows:

- Primary Sequence = SP1 to SP5 [referred to as the Western system]
- Secondary Sequence = SP6 to SP10 [referred to as the Eastern system]

The current Settlement Pond component dimensions, as determined following Hydro-G's and Envirologic's Summer 2024 Water Management Audit & Trimble Surveying, are presented in Table 2 with reference to Figure 4.

Table 2: On-site settlement pond details as determined by Envirologic and Hydro-G (refer to Figure 4)

Ref.	Location	Current Inflow	Area	Average Depth	Approximate Volume, m^3
SP1	Northwestern part of the Quarry	Dirty Water from Wash Plant Clean Sump Water; Dirty Water from Batching Plant & Surface Water Runoff from roads and carpark.	400 m^2	1.0 m	400
SP2			65 m^2		65
SP3			460 m^2		460
SP4			430 m^2		430
SP5			390 m^2		390
SP6	Northeastern part of the Quarry	Surface-runoff from northeastern part of the site, the gate and haul roads	730 m^2	0.5 m	365
SP7			260 m^2		130
SP8			65 m^2		32.5
SP9			70 m^2		35
SP10	Elevated pond next to willow plantation	Received Pumped outflow from SP7 (part of the SP6 – SP10 sequence)	1,450 m^2		725
SP11	Silt-drying chamber	Runoff from perimeter lands around SP10 & Silt Clearouts	340 m^2		170
Totals (existing)			4,660 m^2		3,202.5 m^3

Each Settlement Pond Sequence operates as follows:

- Settlement Pond 1 (SP1) receives sump waters and dirty water from the Wash Plant. SP1 also receives runoff from the concrete batching plant area and flow from SP10, which is essentially treated water from the Secondary (eastern) settlement lagoon sequence. There is a single inlet to SP1, at its eastern end (Plate 6). Water level in SP1 was surveyed as 163.2 mOD.
- Waters are progressively clarified as they flow through SP1, SP2, SP3, SP4 and SP5 (the western system). These ponds are connected by pipes installed in perimeter berms or simple overflow weirs.

- Water from SP5 may be used intermittently to provide water to the screening plant. Waters at the northern end of SP4 and SP5 merge and leave the site at the monitoring point SW1.
- The secondary pond sequence, SP6 to SP20, is in the northeastern part of the site and they were created more recently to accommodate all waters arising in an area occasionally used for secondary processing and screening of product. Breedon refer to these ponds as 'The Swales', colloquially. These ponds receive runoff from all of the paved surfaces extending to a distance of 240 m from these ponds.
- Water currently enters at either end of the secondary Settlement Pond sequence SP6 – SP10.
- At the southeastern end, waters enter SP6 from the grated gully across the site entrance from the road. SP6 is a long narrow pond that outfalls to SP7, which contains a pumping chamber moving waters up to SP10. SP6 and SP7 also receive yard runoff directly via 200 mm PVC pipes installed at the base of a berm that defines the northern perimeter of the screening area (note black pipe in Plate 8). Waters flowing through these pipes do not undergo any treatment in SP6 to SP9.
- SP8 and SP9 are smaller ponds which receive some yard runoff and runoff from the perimeter track around the raised settlement pond, SP10.
- SP10 is a large, settlement pond (Plate 9) positioned on raised ground next to a willow plantation. The outlet from SP10 is at its southern end and flows by gravity into SP1. SP10 requires regular dredging. Dredged material is placed in SP11 to the east for drying. Dried silt material is deposited up on raised ground to the south of the quarry void, withing the quarry boundary.
- SP10 discharges to SP1, which is the start of the SP1 – SP5 sequence. Discharge from the SP1 – SP5 Settlement Pond system is to the Reamanagh Stream.
- The discharge point cannot be clearly observed. Whilst it has a sign demarking its location, there is uneven ground and a small embankment between the discharge point and the river. This will be remedied. Details are presented later.

Plate 5: Primary Sequence System – First Settlement Pond SP1 (view from downstream/western end)

Plate 6: Primary Sequence System – Final Settlement Pond SP5 (view of northern end)

Plate 7: Secondary Sequence System -Settlement Pond SP7 (view looking west)

Plate 8: Settlement Pond SP10 (view from south to north)

5 DRIVERS OF WATERS GENERATED IN QUARRY VOID

One of the primary concerns of IFI related to the potential increase in water generated in the active quarrying area if it were granted permission to expand from its current footprint of 7.74 ha (77,400 m^2) with an extension under consideration of 3.7 ha, which would result in a total future proposed quarrying area of 11.44 ha (114,400 m^2). IFI noted that the increase in quarry footprint was not accompanied by a corresponding increase in treatment capacity.

The drivers on waters arising at a quarry are rainfall, and how it is reduced by evapotranspiration to become Effective Rainfall, and also the balance of what is finally available as runoff following infiltration of Effective Rainfall into the bedrock. There are also groundwater inflows arising at all sites. However, at this high PSV quarry site it is likely that rainfall is the dominant input of the water balance. Meteorological data are now presented in order to enable Design Specifications for future water management systems at the site. In addition to meteorological data, information for bedrock acceptance rates are provided in this section.

5.1 QUARRY AREAS GENERATING WATERS TO BE MANAGED

The surveyed areas which are used in this assessment of volumes of water arising and requiring Water Management Systems are, as follows:

- Existing site area = c. 22 ha & proposed future total site area = 28.8 ha
- Existing quarry void = 77,400 m^2 = 7.74 ha [Floor of current void = 20,500 m^2 = 2.05 ha]
- Proposed future extension to current void = 37,000 m^2 = 3.70 ha
- TOTAL FUTURE PROPOSED active quarrying area upon completion = 114,400 m^2 = 11.44 ha

5.2 METEOROLOGY & GROUNDWATER RECHARGE POTENTIAL

In order to justify capacity of the design, preliminary, general, and unrefined surface water runoff calculations for the current void (7.74 ha) along with the proposed extension (3.7 ha) have been performed availing of Met Éireann rainfall and evapotranspiration data, along with GSI recharge coefficients.

5.2.1 Annual Average Rainfall (AAR)

Monthly gridded rainfall data was sourced from Met Éireann (Walsh, 2012) and is presented in Table 3. It is shown that the Met Éireann reported **Annual Average Rainfall is 1,442 mm/yr.**

Table 3: Long-term (1991 - 2020) mean monthly rainfall data (mm) (Met Éireann)

J	F	M	A	M	J	J	A	S	O	N	D	Annual
168	123	108	100	88	86	89	99	105	149	158	169	1,442

5.2.2 Evapotranspiration (AE & PE)

The most relevant Met Eireann Synoptic Station is Moorepark at c.31 km to the east and at the station, average annual Potential Evapotranspiration (PE) is reported to be 511 mm/yr (2021-2023).

Actual evapotranspiration (AE) is estimated by multiplying PE by a 0.95 factor, to allow for the reduction in evapotranspiration during periods when a soil moisture deficit is present (Water Framework Directive Working Group GW5, 2004).

Actual evapotranspiration is therefore 485 mm/yr [0.95 PE * 511 mm/yr Met Éireann PE].

5.2.3 Effective Rainfall (ER)

The Effective Rainfall (ER) for the site, using Met Éireann AAR data, is determined as follows:

ER = AAR – AE = 1,442 mm/yr – 485 mm/yr = 957 mm/yr = 0.957 m/yr

For comparative purposes, the GSI maps (https://dcenr.maps.arcgis.com/) show Effective Rainfall to be 898 mm/yr, which is only 59 mm/yr lower than the 957 mm/yr calculated with Met Éireann data.

5.3 GROUNDWATER RECHARGE COEFFICIENTS

The lithological profile at the site is described in the accompanying EIAR for the site, as follows:

- Soils (where present) = Kilrush Series, a typical surface water gley. Poorly to moderately drained.
- Subsoils (where present) = Sandstone Devonian till, moderate permeability
- Bedrock = Ballytrasna Formation (Upper Devonian) = purple mudstone and sandstone, with a volcanic rock unit occurring within the Ballytrasna (known as the Carrigcleenamore Volcanics).

The GSI assign a Groundwater Recharge Coefficient of 85% to the bare rock quarry surfaces. When this recharge coefficient is applied to the GSI ER of 898 mm/yr the resultant potential recharge rate to the bedrock aquifer is 763 mm/yr. **However, the GSI has assigned a recharge 'cap' of 200 mm/yr to the bedrock type at the quarry.**

The GSI assigns a Groundwater Recharge Coefficient across the greenfield area as 60%. When this recharge coefficient is applied to ER of 898 mm/yr, the **resultant potential recharge rate to bedrock groundwater in this upgradient greenfield area is 538.8 mm/yr.**

5.4 BEDROCK PERMEABILITY

The geological resource being extracted is high PSV stone. By its nature this tends to be low permeability bedrock.

Packer tests carried out during coring returned higher hydraulic conductivity (permeability) values for the upper 20-25 m of bedrock (median value 0.23 m/d; 2.6 x 10^{-6} m/s), but much lower values for the bedrock below this (median value 0.005 m/d; 5.8 x 10^{-8} m/s) which would be expected. The packer test results indicate that the upper

weathered/fractured zone of bedrock has a low permeability; bedrock below this upper zone has a permeability order of magnitude lower than the upper zone. Therefore, most groundwater flow in bedrock occurs in the upper weathered zone, as expected, with little or no flow deeper in bedrock apart from the odd deeper fracture which may/may not be interconnected with the fracture network. The water balance calculations presented here can justify a very low contribution from groundwater to the sump because of the compact nature of the bedrock, typical in high PSV quarries. This is represented by the GSI published recharge cap of 200 mm/yr.

5.5 GROUNDWATER LEVELS

Historic data for the site (May 2021 – October 2023) was employed in the evaluations presented herein.

- MW1 = 148.20 mOD
- MW3 = 184.75 mOD
- MW4 = 155.29 mOD
- MW5 = 173.82 mOD
- MW6 = 170.46 mOD
- MW9 = 175.34 mOD

MW5 and MW9 adjoin the proposed extension area and can be used to inform drawdown calculations.

5.6 DRAWDOWN

Groundwater levels surrounding the extension area are of the order of 175 mOD elevation.

The current sump is at 135 mOD, which is equivalent to an expected drawdown from the greenfield extension area of 40 m.

A final floor elevation of 110 mOD in a southern greenfield extension area is proposed. This level is equivalent to the current permitted level of the existing floor.

The future total drawdown for the final proposed extraction would be 65 m (175 mOD – 110 mOD). **This is a Design Parameter for the determination of groundwater ingress through the walls of any future excavations, should they be permitted.**

6 DESIGN INPUTS: VOLUMES OF WATER ARISING

Calculations are now presented to mathematically justify specifications proposed for both enhancement and expansion of the Water Management systems at the Bweeng site.

The volumes of waters generated in the quarry void arise under the following conditions.

(a) **Rainfall-runoff** inputs to the **current** quarry void with a footprint of 77,400 m^2.

(b) **Rainfall-runoff** inputs to the **final proposed** quarry void with a final footprint of 114,400 m^2.

(c) *Groundwater inflows* to the **current** quarry void with a footprint of 77,400 m^2 and a floor of 135 mOD.

(d) *Groundwater inflows* to the **final proposed** quarry void with a footprint of 114,400 m^2 and a floor of 110 mOD.

Specifications relating to the volume of waters arising are presented for specific components, as follows:

(i) to be collected, accommodated, managed and pumped forward from the **quarry's floor sump** under ordinary conditions of rainfall runoff and groundwater ingress,

(ii) the attenuation requirements to store extreme rainfall events at floor level and at the higher elevation processing and storage areas of the quarry,

(iii) and the calculated settlement lagoon areas that will be required to settle particles that will travel with all waters arising at the site.

6.1 FLOOR LEVEL WATERS ARISING

6.1.1 Rainfall-Runoff Inputs

Rainfall landing within the areas where bedrock has been extracted generates runoff. The extraction area within a typical quarry such as Bweeng comprises a topographically enclosed space where rainfall-runoff is diverted towards the lowest part of the excavation, referred to as the **quarry's floor sump**.

It is natural for some local groundwater to seep through exposed bedrock walls in all working quarries. This too will be collected in the quarry's floor sump. However, the in-situ bedrock at Bweeng quarry is tight and competent with very low bedrock permeability values. Groundwater inflows through the walls is low. The volumes of groundwater are calculable and presented in the following section.

The agricultural fields adjoining the western (upgradient) quarry boundary contain open drains which collect rainfall-runoff and divert it towards the Reamanagh Stream. Therefore, rainfall resulting in overland flow from these fields need not be considered in the calculations for the site. All areas outside the planning application area will be undisturbed, and in terms of rainfall-recharge patterns, will maintain their current greenfield runoff rates.

The water balance derived from rainfall landing on the existing extraction area (c. 7.74 ha) and proposed extension (c. 3.7 ha) are presented as Table 4. The 'Remainder of Site' values of Table 4 are derived by subtracting from the total application, *i.e.,* 28.8 ha less 11.44 ha, resulting in 17.36 ha.

Table 4: Site Water Balance – Rainfall Inputs and Associated Shallow Subsurface Flow in High PSV Environment.

Parameter	Unit	Current Extraction Area	Proposed Extraction Area	TOTAL FINAL Extraction Area	Remainder of Site
Extraction Area	ha	7.74	3.70	11.44	17.36
Area	m^2	77,400	37,000	114,400	173,600
Effective rainfall	m/yr	0.898	0.898	0.898	0.898
Rainfall volume	m^3/yr	69,505	33,226	102,731	155,893
Rainfall volume	m^3/d	190	91	281	427
Recharge coefficient	%	0.85	0.85	0.85	0.85
Recharge reaching bedrock head	m^3/yr	59,079	28,242	87,322	132,509
Surface runoff (recharge rejected at surface)	m^3/yr	10,426	4,984	15,410	23,384
Surface runoff (recharge rejected at surface)	m^3/d	29	14	42	64
Recharge cap	m/yr	0.2	0.2	0.2	0.2
Recharge to bedrock aquifer	m^3/yr	11,816	5,648	17,464	26,502
Recharge to bedrock aquifer	m^3/d	32	15	48	73
Shallow subsurface flow (recharge rejected at bedrock head)	m^3/yr	47,264	22,594	69,857	106,007
Shallow subsurface flow (recharge rejected at bedrock head)	m^3/d	129	62	191	290
Surface runoff plus shallow subsurface flow	m^3/yr	57,689	27,578	85,267	129,391
	m^3/d	158	76	234	354
	l/s	1.83	0.87	2.70	4.10

With reference to the calculations presented in the Water Balance (Table 4) important details are as follows:

- Rainfall-runoff over exposed bedrock and 'interflow' waters in the upper broken bedrock surfaces across the total proposed extracted area, as evaluated in this application, will enter the sump from which they will be pumped to the Wash Plant area for use in preparation of aggregate product. The balance of unused water, that is not used, will be sent to Settlement Pond 5 (SP5). From SP5, discharge is by Section 4 Licence to the Reamanagh Stream. Scenarios have been presented for the current and proposed extraction areas, and the final extraction area when these are combined. The future final extraction area is calculated to accrue a daily average of 234 m^3/d rainfall runoff to the sump, which is a fraction of the site's 1,100 m^3/d permitted total ELV of the Section 4 Licence.

- The value of **234 m^3/d** is rainfall and shallow subsurface flow and. Groundwater inflow through the rock will be added to this. For the record, 234 m^3/d is 2.7 l/s.
- The increase arising from the proposed extension of the floor is 76 m^3/d (0.87 l/s), increasing from the current calculated excavated bedrock's rainfall runoff rate of 158 m^3/d (1.83 l/s) to a future total of 234 m^3/yr (2.7 l/s).
- In addition to the increased footprint, the proposed development also involves deepening of the current extraction area to the permitted depth of 110 mOD. Under that scenario, any groundwater encountered must be pumped out to maintain a dry working environment. The volume of potential groundwater ingress into the extraction is calculated using the hydraulic properties of the bedrock. These calculations are presented in the following section.

The Table 4 preliminary water balance is a 'first run' desk-based exercise and it is acknowledged that the approach has certain limitations, such as: daily averages of annual rainfall and national scale mapping of groundwater recharge caps, as specified by the GSI. Acknowledgement of calculation limitations facilitates the development of more robust conceptual models and water management plans. For example, the calculations do not take into account the water captured for storage and recycled through site activities, nor does it account for the water used to make Readymix. However, the omission of these water usages throughout the site results in a more conservative calculation leading to a safer design process.

6.1.2 Groundwater Inflows Inputs

Groundwater seepage into all excavations of bedrock can be conceptualised as radial flow towards a pumping well. Where the surrounding bedrock has low permeability and low hydraulic conductivity, inflow rates and water management can be managed using a sump on the quarry floor. The aquifer testing completed by SLR in the accompanying EIAR suggests low permeability and potentially low groundwater volumes requiring water management in the future at this site.

Projected dewatering rates are estimated for the proposed development using recommended formulae and site-specific data collected from drilling investigations.

The methodology to determine the potential quantity of groundwater requiring management at the site in the future is now presented in calculation steps, as follows:

A. Estimate the potential volume of groundwater inflows to the sump using **empirical formulae.**

B. Alternatively, evaluate volumes that might occur by **applying the concept of recharge**.

6.1.3 A. Empirically Calculated

When the floor of an open quarry is excavated, there is potential for water to enter the quarry. There are commonly two components to the inflow as follows:

i. diffuse inflow widely distributed through the general rock mass, and

ii. focused flow where permeable fractures intersect the exposed quarry faces.

Using these theoretical principles, the analytical solution put forward by Marinelli & Niccoli (2000) is derived from the Dupuit-Forcheimer approximation to estimate radial groundwater inflows to open rock quarries (Table). Their solution incorporates a time-dependent factor.

$$\mathbf{Q(t) = (4\ \pi\ K\ b\ s_w) / (2.3\ log\ (2.25\ K\ b\ t / r_p^2\ S))}$$

Where,

Q(t) = Groundwater ingress at time (t)

K = hydraulic conductivity = 5.8 x 10^{-8} m/s = 0.005 m/d

b = thickness of the bedrock horizon = 175 – 110 = 65 m

S_w = design drawdown = 175 – 110 = 65 m

r_p = equivalent radius of the quarried area (7.74 ha for current and 11.44 ha for final future) = (157 m and 191 m)

S = specific storage = 1 x 10^{-5} m^{-1} (industry value for high PSV rock)

t = time since 'instantaneous' placement of the open pit

Table 5: Groundwater inflows using Marinelli & Niccoli (2000)

Variable	Unit	Scenario	Scenario
Scenario Number		1	2
Scenario description		Current void & current permission elevation	Completion of current permission and proposed extension in depth and laterally
Excavated footprint	Ha	7.74	11.44
Excavated footprint	m^2	77,400	114,400
Effective radius	m	157	191
K	m/s	5.8 x 10^{-8}	5.8 x 10^{-8}
K	m/d	0.005	0.005
Thickness of bedrock horizon, b	M	40	65
H	mOD	175	175
h_w	mOD	135	110
Design Drawdown, S_w	M	40	65
Storage	m^{-1}	1 x 10^{-5}	1 x 10^{-5}
Dewatering Rate after 1 month	m^3/d	26	67
Dewatering Rate after 6 months	m^3/d	18	47

As presented in Table 5 as Scenario 1, the application of the Marinelli & Niccoli (2000) solution equation suggests **current** groundwater inflow rates are as follows:

- Groundwater ingress Q = 26 m^3/d after one month from the time that the site was brought to 135 mOD.
- Groundwater ingress Q = 18 m^3/d after six months from the time that the site was brought to 135 mOD.

As presented in Table 5 as Scenario 2, the application of the Marinelli & Niccoli (2000) solution equation suggests groundwater inflow rates **upon completion of the permitted works and the proposed development works** as follows:

- Groundwater ingress Q = 67 m^3/d after one month from the time that the site is brought to 110 mOD.
- Groundwater ingress Q = **47 m^3/d after six months** from the time that the site is brought to 110 mOD.

Again, these calculated final groundwater inflow values are small in relation to the permitted ELV of 1,100 m^3/d. Even on a cumulative basis, the calculated volumes of rainfall runoff and groundwater ingress remain significantly below the permitted ELV.

6.1.4 B. Groundwater Inflows as Recharge Concept

On a practical basis, it is sometimes postulated that the empirically derived radial approach may not be entirely appropriate to the uniqueness of Irish hydrogeological features. An alternative calculation can provide a more conservative determination for a site and so this is also applied when Hydro-G and Envirologic are developing design proposals. The rate or volume of water to be removed from the quarry can be conceptualised as equivalent to the rate of groundwater flow through the site that will be intercepted by excavation below static groundwater level.

Based on the GSI and WFD Working Group GW5's accepted recharge rate of 60% on upgradient greenfield lands, the predicted groundwater recharge to the excavated bedrock at Bweeng from the upgradient groundwater catchment, current void, proposed future total void and entire site are presented as Table 6.

Table 6: Groundwater Ingress as a Recharge Concept

Variable	Unit	Area Upgradient of Site	Current Void	Void Upon Completion	Total Groundwater at Completion
Area	ha	23.94	7.74	11.44	
Area	m^2	239,490	77,400	114,400	
Effective Rainfall (GSI)	mm	898	898	898	
Recharge coefficient	%	60%	85%	85%	
Recharge rate	m/yr	539	763	763	
Recharge cap	m/yr	0.2	0.2	0.2	
Capped Recharge rate	mm/yr	200	200	200	
Recharge rate	m/yr	0.2	0.2	0.2	
Groundwater Arising	m^3/yr	47,898	15,480	22,880	70,778
Groundwater Arising	m^3/d	131	42.4	62.7	**193.7**

Groundwater arising is calculated to be **193.7 m^3/d** if the entire propsoed void area were completed to 11.44 ha. The increase from the current permitetd void to the expansion area is from 42.4 m^3/d to 62.7 m^3/d upon completion.

6.2 CALCULATED FUTURE TOTAL DEWATERING VOLUMES

Based on preceding calculations relating to rainfall runoff and associated shallow subsurface interflow, the amount of rainfall runoff to be managed over the final **extraction area** proposed is equal to 234 m^3/d (refer to Table 4). It can be assumed that this is a volume that will always require management. In addition to the rainfall runoff component, two distinct methods for estimating groundwater inflows to the site as extraction nears completion were applied in the preceding sections. The results of which are summarised as follows:

1. Based on an empirical formula, which utilises permeability and final drawdown, the potential long-term average daily amount of water to be managed from the quarried void is as follows:

   Surface runoff and recharge rejected at bedrock head within final quarried area = **234 m^3/d**

   to be added to

   Groundwater inflow based on drawdown and bedrock hydraulic conductivity = **47 m^3/d**

   Presents a Total Waters Arising = 281 m^3/d = 3.25 l/s

Or

2. Based on rainfall and recharge coefficients:

   Surface runoff and recharge rejected at bedrock head within final quarried area = 234 m^3/d

   to be added to

   Recharge to upgradient groundwater catchment plus recharge direct to final quarry void = 193.7 m^3/d

   Presents a Total Waters Arising = 427.7 m^3/d = 4.95 l/s

It is therefore concluded that the future TOTAL volume of water requiring removal from the sump will be in the range of c. 280 -430 m^3/d, assuming grant of permission to create an excavated area of 11.44 ha. The low values reflect the density of the rock and the fact that beneath the current footprint being quarried, there is little groundwater in a bedrock with very low hydraulic conductivity. Given the average measured TOTAL SITE discharge rate is currently **520 m^3/d**, the future values for sump waters are likely to be **at the lower end of the calculated range**.

These values are intended to be representative of sump dewatering rates that are only likely to be realised close to completion of rock extraction operations in the far future. Interim discharge rates will be linked to the phasing scheme. The phased development will initially involve the development of the upper quarry benches *i.e.* dry working. Pending planning being granted for proposed works development of a 20-year life of a quarry.

Average rainfall-runoff and shallow subsurface flow across the remainder of the site (not bedrock excavations) has been estimated as approximately 354 m^3/d (Table 4). When that value is added to the total groundwater arising rate calculated, the likely future total daily discharge rates are estimated to be result in a MAXIMUM 782 m^3/d (427.7 + 354), on average.

As stated previously, the maximum permitted discharge of the Section 4 Discharge Licence is 1,100 m^3/day (WP(W)03.19). Therefore, the current Section 4 Discharge Licence (WP(W)03.19) will remain fit for purpose to service the additional development proposed. On days when there is no rainfall runoff, the values will be substantially lower than those permitted.

7 DESIGN ATTENUATION OF EXTREME EVENT WATERS ARISING

The sump acts as an attenuation lagoon and is used to store water before sending it for treatment. For best practice design, the attenuation sump on the quarry floor must be large enough to store the volume of water associated with a 1 in 100-year storm event with further capacity in the quarry void to store multiple times the volume of water generated during a 1:100 storm event. This will be allowed to flood should it be required. An assessment is required to ensure the lowest part of the quarry void is capable of temporarily storing stormwater that drains to it during intense rainfall events. Calculations are now presented.

7.1 EXTREME RAINFALL EVENTS

The only stormwater that enters the sump is direct rainfall from the floor. There are no upgradient areas that drain to the sump.

Using the Met Eireann Depth Duration Return Period data table for extreme rainfall at the site, calculations presented in Table 7 for the 1 in 100-year rainfall event.

Table 7: Potential rainfall-runoff inflows to the quarry sump during extreme rainfall events

Considered Catchment Area (ha)	Considered Catchment Area (m^2)	Rate	1 in 1 year	1 in 10 year	1 in 50 year	1 in 100 year
Final Void = 11.44 ha	114,400	**24-hour event**				
		Met Eireann (mm)	10.2	79.3	107.4	121.9
		as (m)	0.0102	0.0793	0.1074	0.1219
		Rainfall-runoff to sump, m^3/d	1,167	9,072	12,287	13,945
		m^3 required with +20% climate change	1,400	10,886	14,744	16,734
		6-hour event				
		Met Eireann (mm)	5.7	44.4	60.2	64.3
		as (m)	0.0057	0.0444	0.0602	0.0643
		Rainfall-runoff to sump, m^3/d	652	5,079	6,887	7,356
		m^3 required with +20% climate change	782	6,095	8,264	8,827

Results presented as Table 7 demonstrate that the extreme 1 in 100-year event's contribution to the final void over a 24-hour period is **16,734 m^3. This includes a climate change growth factor of 20%.**

Therefore, to store the Q_{100} rainfall event, with the additional 20% climate change factor, the following indicative sump dimensions, or variations, could provide the 16,734 m^3 storage:

- Radius = 52 m, for a depth = 2 m (vol. = 16,990 m^3; area = 8,495 m^2), or
- Radius = 43 m, for a depth = 3 m (vol. = 17,426 m^3; area = 5,809 m^2) or
- Radius = 33 m, for a depth = 5 m (vol. = 17,106 m^3; area = 3,421 m^2).

The current quarry floor has a footprint of 20,500 m^2. The current quarry floor area exceeds the requirements above. There is adequate area available on the working floor of every quarry site for the attenuation of stormwaters. It is best practice that stormwater accommodation is provided on the floor of the working area. The required calculated area can be provided in any variation in dimensions and configuration. The only requirement is that the required volume is achieved because it is an attenuation, not treatment, function requirement.

7.2 BEDROCK RUNOFF Q_{BAR}

The bedrock to be quarried has a low permeability, so it can be reasonably assumed that during extreme storm events the contribution of groundwater seepages is low relative to the overall contribution from precipitation as runoff. It is always necessary to attenuate stormwater, generated on any site, such that it leaves the site at a rate less than or equal to greenfield runoff rates. This is an important feature of any quarry in that it provides large attenuation capacity storage, which will provide significant protection from flooding to downgradient receptors. An allowance needs to be made to allow a certain amount of precipitation to leave the site at a controlled rate.

Pre-development greenfield runoff rate is given by:

$$QBAR_{rural} = 0.00108\ (AREA)^{0.89} \times (SAAR)^{1.17} \times (SOIL)^{2.17}$$

where,

$QBAR_{rural}$ = mean annual flood flow from a rural catchment (m^3/s)

AREA = permitted quarry upon completion (km^2) = 114,400 m^2 = 0.1144 km^2

SAAR = standard annual average rainfall depth (mm) = 1,442 mm

SOIL = soil index, a composite index determined from soil survey maps that accompany the Flood Studies Update = 0.4, representing SOIL 3, applicable to moderately permeable subsoil

It is recommended that flood risk assessment based on the methodology in Volume 2 of the Greater Dublin Strategic Drainage Strategy (2005) is not applied to an area of less than 50 hectares. It suggests that the runoff from smaller areas is then linearly interpreted. A theoretical catchment area of 0.5 km^2 (50 ha) is used for initial calculations. The $QBAR_{rural}$ rate applicable to the theoretical catchment area of 0.5 km^2 is:

$$Q_{BARrural} = 0.00108\ (0.5)0.89 \times (1,442)1.17 \times (0.4)2.17$$

$Q_{BARrural}$ = 0.396 m^3/s (396 l/s) for a notional 50 ha catchment

The linear interpolation of Q_{BAR} from the notional simulation catchment of size of 50 ha to the final sump area (11.44 ha) is shown in Table 8.

Table 8: Linear interpolation of QBAR for on-site hardstanding

Item	Fraction area, ha	units	Q_{BAR}	Q_{75}	Q_{100}
50 ha as per IH124 methodology	50	m^3/s	0.396	0.741	0.777
		l/s	396	741	777
Final Quarry Void	11.44	m^3/s	0.091	0.170	0.178
		l/s	91	170	178

The limiting discharge rates for the 75 - and 100-year return period storm events are presented in Table 8 using growth factors of 1.87 and 1.96, respectively, in accordance with relevant TII guidance (TII, 2015). The Climate Change growth factor is accounted for in the sump attenuation calculations and not the allowable Greenfield Runoff Rate. It would be counterproductive to apply a growth factor to the allowable greenfield runoff rate.

The applicant does not intend to vary the discharge rate in response to the return period greenfield runoff rate. The discharge rate will instead be fixed. The maximum potential pumping rate from the sump to the settlement lagoons must be limited to a rate less than pre-development greenfield runoff rates during extreme rainfall events for the final quarried area (**0.09 m^3/s = 91 l/s = c. 7,800 m^3/d**). This rate is significantly higher than the permitted ELV that is specified in the Section 4 Licence, and it is therefore insured that the quarry discharge will not increase flood risk to downgradient receptors.

7.3 ATTENUATION STORAGE DESIGNED

In its most restrictive approach, attenuation storage is calculated when outflow is limited to Q_{BAR}. The quarry floor must be capable of storing the balance of the stormwater during intense rainfall events. Table 9 presents the return period rainfall depths for a range of durations, as provided by the OPW FSU online portal. Design rainfall rates were obtained from the OPW FSU facility. A 20% increase in design rainfall depths was adopted to account for climate change.

In line with standard practice, discharge surface water should be limited to the pre-quarrying greenfield runoff rate to mitigate against downstream flooding. The attenuation storage requirements when the outflow is restricted to Q_{BAR}, are shown in Table 9.

Table 9: Design rainfall rates and attenuation storage using outflow of 22 l/s

Duration, D, hrs	FSU Rates for Rainfall (mm)	Rainfall x 1.2 Growth Factor (mm)	Final Void Area (m^2)	Calculated IN (m^3)	Calculated OUT (m^3)	Required Attenuation Volume [IN-OUT] (m^3)
0.25	17.4	20.9	114,400	2,389	82	2307
0.5	23.4	28.1	114,400	3,212	164	3049
1	31.6	37.9	114,400	4,338	328	4010
2	42.5	51.0	114,400	5,834	655	5179
4	57.3	68.8	114,400	7,866	1,310	6556
6	68.2	81.8	114,400	9,362	1,966	7397
12	91.9	110.3	114,400	12,616	3,931	8685
18	109.5	131.4	114,400	**15,032**	5,897	**9135**
24	121.9	146.3	114,400	16,734	7,862	8872
48	139.5	167.4	114,400	19,151	15,725	3426

Information presented in Table 9 shows that the MAXIMUM volume of stormwater generated in the final quarry void during a 1 in 100-year event is associated with the **18 hour duration storm (I = 15,032 m^3)***. Restricting the outflow to greenfield runoff rate, Q_{BAR}, results in a permissible outflow of **O = 5,897 m^3**. The balance, i.e., (I-O) = 9,135 m^3, must be withheld via attenuation, and released at greenfield runoff rate or less. As quarrying progresses, a quarry floor with a minimum available volume of 9,135 m^3 shall be maintained. A quarry floor volume in excess of that has already been shown to be available in earlier calculations. The floor can attenuate all design extreme rainfall events.

It is best practice to accommodate and attenuate the extreme storm on the floor and treat in the final settlement lagoons at the overflow rate appropriate to the settlement of solids and the licenced discharge rate. This will be how storms are managed at the site.

*Note: For the Meteorological Data for Storm Depth and Durations for this site, the maximum values are associated with the 18 hour storm. At other sites, for different meteorological data, the maximum values could be generated by the 24 hour storm. However, here at Bweeng, the maximum is associated with the characteristics of the 18 hour storm.

8 PROPOSAL - DESIGN TREATMENT OF SUMP WATERS – SP5

Waters collecting in the quarry void are currently mixed with dirty water from the washing plant and pumped to SP1. This practice is greatly increasing the volume of dirty water requiring treatment. For future enhancement of settlement of the dirty waters it is proposed that the balance of sump waters, not used in washing or product, will be pumped directly to SP5.

This lagoon must be appropriately sized to ensure removal of fine bedrock particles by settlement. The settlement lagoon SP5 shall have a minimum size capable of treating the average daily flow being pumped from the sump, this being 430 m^3/d.

8.1 SETTLEMENT DESIGN OVERFLOW RATE

Designs are now presented to demonstrate the size of settlement lagoons required to remove all particles of than the fine SILT size that is prevalent at the site (0.004 mm in diameter) and greater, which is significantly smaller than the size of most rock fragments. This presents a very conservative design because the floor is not the source of SILT at the site: the washing and processing areas create the SILT load. Notwithstanding that, designing for SILT settlement ensures adequate settlement for the coarser grits and small rock fragments arising from blasting on the floor.

On a design basis, the overflow rate through the settlement lagoon should be equal to the settling velocity of the smallest particle the lagoon is designed to remove. The method for determining the size required for the settlement lagoons is based on Stoke's Law. The following equation is used to calculate the settlement velocity of particles:

$$V_s = g \,.\, (\rho_s - \rho_w)\, d^2 / 18\mu_w$$

Where:

g = acceleration due to gravity is 9.81 m/s^2

ρ_s = density of the particle requiring settlement = 2.0 g/cm^3 or 2,000 kg/m^3

ρ_w = density of fluid = 1.00 g/cm^3 or 1,000 kg/m^3

μ_w = dynamic viscosity of water = 1.519 x 10^{-3} kg/ms @ 5˚C

d = particle diameter = 0.004 mm = 0.0000040 m (SILT and coarser)

The temperature of the fluid, in this case water, is dependent on the ambient temperature. In the calculations, 5°C is used as a conservative temperature. The simulated particle density adopted as 2.0 g/cm^3 is also considered conservative and it will produce an over specification of the system, providing a reasonable factor of safety.

Using Stokes' Law, the settling velocity of particles of 0.004 mm, assumed spherical, in water is calculated for 5°C water temperature and particle density, as follows:

$$V_s = =(9.81*1000*(0.000004^2))/(18*1.519*10^{-3})$$

$$0.00000574 \text{ m/s} = 5.74 \times 10^{-6} \text{ m/s}$$

Notig that m/s can be mathematically be written as $m^3/s/m^2$ and that there are 86,400 seconds in a day, a Surface Overflow Rate (SOR) can be calcualted for a settlement lagoon, as follows:

$$\text{SOR (surface overflow rate)} = 0.496 \text{ } m^3/d/m^2$$

8.2 SP5 SETTLEMENT AREA SPECIFICATION

The minimum surface area of any settlement lagoon, and specifically SP5 in this case, is sized to enable the settling velocity for the design overflow rate of the permitted Section 4 Discharge Licence, as follows:

$$A = Q / V_s$$

Where:

A = minimum lagoon surface area, m^2

Q = maximum inflow rate = 430 m^3/d = 0.005 m^3/s as is the volume arising on the floor sump to be treated in SP5

V_s = Settling velocity of the selected particle size = 0.496 $m^3/d/m^2$ as calculated, above

Minimum Area, A = Q / SOR

Minimum Area for SP5 as the receiver of Sump Waters:

$A = 430\ m^3/s / 0.5\ m^3/d/m^2 = 867\ m^2$

Calculations presented, above, demonstrate that the settlement lagoon dedicated to treating sump waters must be at least 867 m^2 in order to settle solids of particle size 0.004 mm, and greater, for a daily pumping rate from the sump of 430 m^3/d.

8.2.1 SP5 Current and proposed Area

The current dimensions of SP5 were surveyed in July 2024 as follows:

SP5 = 26 m (L) x 15 m (W) = 390 m^2

In order to meet the minimum requirements, it is proposed to enlarge SP5 to the following dimensions:

SP5 = 26 m (L) x 38 m (W) = 988 m^2

The enlarged pond is illustrated in Figure 5. With the upgraded dimensions of SP5 the actual SOR becomes 0.43 $m^3/d/m^2$, which being a lower value than required means insurance of settling velocities within SP5. The horizontal flow rate of water in the tank is lower than the vertical velocity of particles meaning they will have adequate time to drop out of suspension within the tank. This meets the requirements for appropriate management.

8.2.2 SP5 Calculated Retention Time

In order to have a minimum settlement time of 6 hours the minimum depth of water in the tank must be as follows:

$$\text{Minimum water depth, } D = SOR \times 6/24 = 0.496 \text{ m}^3/\text{d}/\text{m}^2 \times (6/24) = 0.11 \text{ m}$$

A minimum depth of 0.11 m is required for adequate settlement. Given the loss of capacity as sediment entrapment progresses a minimum depth of 1 m is proposed. Hence, the actual retention time upon commencement of becomes:

$$\text{Retention time} = D / SOR$$

$$= 1 \text{ m} / 0.42 \text{ m}^3/\text{d}/\text{m}^2$$

$$= 2.3 \text{ days} = 57 \text{ hours}$$

This is acceptable.

9 DESIGN ATTENUATION & TREATMENT FOR PROCESSING AREA'S RUNOFF

The remaining component of water that requires management and treatment is rainfall-runoff off the land areas at the site that are of higher elevation than the excavated bedrock zone.

At present, rainfall-runoff flows unimpeded across the site's ground surface from the gate, the Wash Plant's adjacent stockpile areas, car park and office buildings towards the northeast corner of the site. Here these waters flow through black PVC pipes into SP7 from which they are pumped up towards SP10 (refer to Figure 4). With the design intention to improve the efficacy of treatment of runoff in the northeastern portion of the site, it is proposed to split the processing area in terms of direct runoff drainage, as follows:

1. Yard South of Gate Runoff Area > to be directed to SP1 – SP5. An interceptor drain, as seen on the boundaries of forecourts in service stations, will be installed from close to the site entrance and deliver runoff from the pavement to the south of the gate to SP1.
2. Yard North of Gate Runoff Area > to be directed to SP6 – SP10. Runoff generated north of this interceptor drain will be directed towards the start of SP6 (the southeastern end of SP6). This can either be achieved via re-contouring the ground surface in this part of the site, or installing a new interceptor drain.

Refer to Figure 5 in which all proposed site improvements are presented at the end of this Audit Report.

The two areas have been mapped and quantified as follows:

- Yard South of Gate Runoff Area to be captured in interceptor drain and routed to inlet of SP1 = 28,200 m^2
- Yard North of Gate Runoff Area to be landscape rerouted towards inlet of SP6 = 16,370 m^2

9.1 DESIGN GREENFIELD RUNOFF RATE

Using the AAR and SOIL input data presented above the Q_{BAR} for each of the above areas contributing runoff have been calculated (see Table 10).

Table 10: Linear interpolation of QBAR for process area contributing runoff

Item	Fraction area, ha	units	Q_{BAR}	Q_{75}	Q100
50 ha as per IH124 methodology	50	m^3/s	0.396	0.741	0.777
		l/s	396	741	777
YARD SOUTH OF GATE runoff area > SP1 – SP5	2.82	m^3/s	0.022	0.042	0.044
		l/s	22	42	44
YARD NORTH OF GATE runoff area > SP6 – SP10	1.64	m^3/s	0.0133	0.0249	0.0261
		l/s	13.3	24.9	26.1

The applicant does not intend to vary the discharge rate in response to the return period greenfield runoff rate. The rates at which runoff can leave the yard's southern and northern areas will be limited to fixed rates of 22 l/s and 13, respectively, as shown in Table 10. This will the reduce risk of flooding to downgradient receptors.

All rainfall-runoff generated on the southern area will be collected in the new interceptor drain and flow by gravity to the inlet of SP1. Provided it is installed with a negligible gradient on relatively level ground the interceptor drain itself can serve as the attenuation device. If this is not feasible then appropriate storage will be provided in SP1. The drain outlet pipe shall be either appropriately sized to restrict outflow to 22 l/s. Failing that, the site can agree to a hydrobrake or similar limiter.

All rainfall-runoff generated on the northern yard area will be pumped from SP7 to SP10. The pumping rate from SP7 will be set equal to Q_{BAR}, i.e. 13 l/s. The berm height around the perimeter of SP6 can be raised to a specified level above the SP6 outlet pipe to provide the required attenuation storage. The outlet from SP6 should be either an appropriately sized pipe to restrict outflow to 13 l/s. Failing that, the site can agree to a hydrobrake or similar limiter.

9.2 YARD SOUTH OF GATE DESIGN ATTENUATION SIZING

The storage required in the SP1 – SP4 Primary Settlement Sequence in order to attenuate rainfall-runoff generated in the site to the south of the gate is 2,284 m^3 when the outflow is restricted to Q_{BAR}, as shown in Table 11.

Table 11: Design rainfall rates and attenuation storage using outflow of 22 l/s

Duration, D, hrs	FSU Rates for Rainfall (mm)	Rainfall x 1.2 Growth Factor (mm)	Contributing Area (m^2)	Calculated IN (m^3)	Calculated OUT (m^3)	Required Attenuation Volume [IN-OUT] (m^3)
0.25	17.4	20.9	28,231	589	20	570
0.5	23.4	28.1	28,231	793	40	753
1	31.6	37.9	28,231	1,071	79	991
2	42.5	51.0	28,231	1,440	158	1,281
4	57.3	68.8	28,231	1,941	317	1,624
6	68.2	81.8	28,231	2,310	475	1,835
12	91.9	110.3	28,231	3,113	950	2,163
18	**109.5**	**131.4**	**28,231**	**3,710**	**1,426**	**2,284**
24	121.9	146.3	28,231	4,130	1,901	2,229
48	139.5	167.4	28,231	4,726	3,802	924

There are a number of Design Options available for attenuating runoff generated in the yard to the south of the entrance gate:

- **Option 1:** Size the proposed interceptor drain so it meets the required attenuation volume. The proposed interceptor drain is approximately 136 m length. To provide 2,284 m^3 storage, the interceptor would need to take an open channel form with a cross-sectional area of 16.8 m^2 per unit length. This is **not considered feasible** due to haulage traffic.
- **Option 2:** Create a new dedicated attenuate pond before SP1. This is **not considered feasible** because Hydro-G and Envirologic advise that the number of ponds and the maintenance burden are numerous enough already.
- **Option 3:** Enlarge SP1 and raise perimeter embankments to appropriate height above water level. Currently, the area of SP1 is 394 m^2 and there is space to increase the footprint to 1,150 m^2. Widening and deepening SP1 will provide increased attenuation storage.
- **Option 4:** SP1 to SP4 currently have a combined active footprint of 1,355 m^2. However, these ponds are contained within a larger area of approximately 5,800 m^2 that has a raised perimeter berm. The height of the overall berm which forms the perimeter of the area containing SP1 to SP4 can be raised by a minimum height of 0.5 m above SP4's outlet pipe. This raised berm is mostly already in place as it supports a raised internal access road on the southern side of SP1-SP4 while the northern side of this area is largely defined by the raised willow plantation.

Hydro-G and Envirologic advise that a combination of Option 3 and 4 is reasonable and actionable.

A new berm will need to be installed at the outlet of SP4, to limit the flow from SP4 to the balance of the ELV for discharge volume minus the waters sent to SP5 already, which is 1,100 m^3/d - 430 m^3/d = 670 m^3/d = 7.75 l/s.

9.3 YARD NORTH OF GATE DESIGN ATTENUATION SIZING

The storage required in the SP6 – SP10 Secondary Settlement Sequence in order to attenuate rainfall-runoff generated in the site to the north of the gate [northern yard runoff area] is 1,366 m^3 when the outflow is restricted to Q_{BAR}, i.e., 13 l/s, as shown in Table 12.

Table 12: Design rainfall rates and attenuation storage using Q_{Bar} outflow limit of 13 l/s

Duration, D, hrs	FSU Rates for Rainfall (mm)	Rainfall x 1.2 Growth Factor (mm)	Contributing Area (m^2)	Calculated IN (m^3)	Calculated OUT (m^3)	Required Attenuation Volume [IN-OUT] (m^3)
0.25	17.4	20.9	16,810	351	12	339
0.5	23.4	28.1	16,810	472	23	449
1	31.6	37.9	16,810	637	47	591
2	42.5	51.0	16,810	857	94	764
4	57.3	68.8	16,810	1,156	187	969
6	68.2	81.8	16,810	1376	281	1,095
12	91.9	110.3	16,810	1,854	562	1,292
18	**109.5**	**131.4**	**16,810**	**2,209**	**842**	**1,366**
24	121.9	146.3	16,810	2,459	1,123	1,336
48	139.5	167.4	16,810	2,814	2246	568

SP6 currently has a footprint of 730 m^2 (Table 2). The provision of 1.9 m depth capacity is required at SP6 in order to provide the required 1,366 m^3 attenuation storage for the 18 hour Extreme Weather event. This depth can be provided by a combination of excavation and increased embankment berm heights. Other recontour scenarios are acceptable.

9.4 DESIGN SETTLEMENT LAGOONS TO TREAT RAINFALL-RUNOFF

Currently, SP1 receives rainfall runoff, dirty wash water from the Wash Plant and all sump water pumped forward. Waters then continue to flow through SP2, SP3, SP4 and SP5 prior to discharge to the Reamanagh Stream.

This lagoon sequence must be appropriately sized to ensure removal of fine silt particles. The design enhancement proposed for SP5 has already been presented, above. In this section, the settlement pond sequence SP1-SP4 enhancements are designed to have a minimum size capable of treating the maximum potential inflow.

Hydro-G and Envirologic have designed a system to remove all particles greater than 0.004 mm in diameter, considered indicative of fine silt which is significantly smaller than the size of most rock fragments. Background water temperature of 5°C was used in calculations.

9.4.1 Settlement Design SP1-SP4

As previously outlined, the overflow rate through the settlement lagoon should be equal to the settling velocity of the smallest particle the lagoon is designed to remove. The method for determining the size required for the settlement lagoons is based on Stoke's Law. As previously, the same equation for the same particle size is used to calculate the settlement velocity of particles:

$$V_s = g \,.\, (\rho_s - \rho_w)\, d^2 / 18\mu_w$$

Calculations demonstrate that the western settlement lagoon sequence dedicated to treating inflow waters must be at least 4,700 m^2 in order to settle solids of particle size 0.004 mm.

Figure 4 shows proposals for upgrading lagoons SP1-SP4 which provides 4,492 m^2 storage.

With an upgraded footprint of 4,700 m^2 across SP1-SP4, the actual SOR becomes 0.496 $m^3/d/m^2$, which complies with the design requirements.

In order to have a minimum settlement time of 6 hours the minimum depth of water in the tank must be as follows:

Minimum water depth, D = SOR x 6/24 = 0.5 $m^3/d/m^2$ x (6/24) = 0.12 m

A minimum depth of 0.12 m is required for adequate settlement. Given the loss of capacity as sediment entrapment progresses a depth of 1 m is proposed, hence the actual retention time becomes:

Retention time = D / SOR

= 4,700 m / 0.496 $m^3/d/m^2$

= 48 hours

9.4.2 Settlement Design SP6-SP10

The minimum combined surface area of the settlement lagoons SP6 - SP10 must be sized so as to facilitate the settling velocity for the rainfall-runoff generated in the northern half of the processing area. The restricted rate was calculated to be 13 l/s. Area required is calculated as follows:

$$A = Q / V_s$$

Where:

A = minimum lagoon surface area, m^2

Q = maximum inflow rate = 0.013 m^3/s

V_s = Settling velocity of the selected particle size = 0.496 $m^3/d/m^2$

Minimum Area, A = Q / SOR

Minimum Area, A = 1,123 m^3/d / 0.5 $m^3/d/m^2$ = 2,264 m^2

Calculations presented, above, demonstrate that the eastern settlement lagoon sequence dedicated to treating inflow waters equivalent to 1,123 m^3/d must be at least 2,264 m^2 in order to settle solids of particle size 0.004 mm.

Table presented the combined capacity of SP6-SP10 in their current form provides 2,562 m^2 storage. Hence no upgrades are proposed to eastern settlement lagoons.

With an existing footprint of 2,572 m^2 across SP6-SP10, the actual SOR becomes 0.44 $m^3/d/m^2$.

In order to have a minimum settlement time of 6 hours the minimum depth of water in the tank must be as follows:

Minimum water depth, D = SOR x 6/24 = 0.44 $m^3/d/m^2$ x (6/24) = 0.11 m

A minimum depth of 0.11 m is required for adequate settlement. Given the loss of capacity as sediment entrapment progresses a depth of 1 m is proposed. Hence, the actual retention time becomes:

Retention time = D / SOR

= 5,572 m / 0.496 $m^3/d/m^2$

= 55 hours

Therein completes the design justifications for the existing lagoons and specifications demonstrating that, with upgrades in capacity provided by lateral extensions to ponds and raising berms, future development can be supported. Calculations have also demonstrated that the existing Section 4 Licence remains fit for purpose going forward.

10 PROPOSED UPGRADES TO SURFACE WATER MANAGEMENT SYSTEMS

Having reviewed the current surface water management plan Hydro-G and Envirologic now present several measures which will improve entrapment of solids that are associated with the management of water within the site. In addition to removal of solids by settlement other measures are outlined to reduce volumes of dirty water generated in the site, reduce flow velocities, and reduce peak flows. Some of these measures require structural alterations whereas other measures involve re-routing of current flowpaths. The measures have been arrived at by workshopping with Breedon and they agree that they are feasible.

The measures are listed below in the order in which the various waters are generated within the site, starting in the active quarrying area. Having outlined the principles of the proposed upgrade measures, the sections that follow provide more detailed specifications for each component, and justification for same.

The mitigation measures listed below have been reviewed by the quarry manager in terms of feasibility, and there is the understanding that they will be implemented.

10.1 SUMP WATERS

Sump waters are currently pumped to the Water Storage Tanks, with the excess entering the Washing Plant Dirty Water Tank. This greatly increases the amount of dirty water to be managed by the settlement pond sequence.

In order to reduce the hydraulic load of silt laden dirty water entering the western settlement pond system, commencing with SP1, sump waters being pumped up the rising main shall be prevented from entering and mixing with the Washing Plant's Dirty Water.

Sump waters, which are relatively clean, will instead be piped directly to SP5 under gravity flow in a newly agreed underground pipeline. SP5 is already somewhat removed from the settlement pond sequence SP1 - SP4. The rising main could then drain by gravity to SP5. A new inflow to SP5 will also be benefitted by a small preliminary pond (SP5A) to reduce incoming flow velocities. These enhancements in the northwestern part of the site can be accommodated by currently unused space.

10.2 PROPOSED CHANGES AT THE WASH PLANT & NEW POND (SP12)

10.2.1 Design Concept

There is currently no recycling of water at the washing plant beside the big blue tanks that receive the sump waters. This causes a push on all waters through the northern settlement pond systems. It is possible to halt this surge and create a more passive settlement pond system with some hold backs. A new pond, SP12, is proposed directly to the south of the washing plant. Dirty water from the washing plant shall be directed into this pond. SP12 is intended to attenuate the high flow rates of dirty water generated at the washing plant and to provide initial settlement of heavier sediment. Where feasible this water shall be recycled back into the washing plant. Where clean water is required final rinsing at the washing plant it should be sourced from the Water Storage Tanks. Excess water from SP12 shall be directed towards SP1.

There are spatial restraints in this part of the site. A pond footprint of 1,000 m^2 is proposed, and a nominal depth of 1.0 m, giving a volume of 1,000 m^3. This will provide a large release of pressure on all parts of the Water Management Systems.

10.2.2 Proposed new regime for the Wash Plant

Rates of dirty water generated at the washing plant are unconfirmed. The plant operates for approximately 8 hours per day. Top-up water supply to the washing plant is from the blue water storage tanks, which in turn are filled with water pumped from the sump. Hydro-G & Envirologic are proposing a **NEW** regime whereby:

1. Water from the sump will still be pumped to the blue water tanks storage area beside the Wash Plant but the surplus of sump water will not flow into the tank that receives the dirty water from the washing of product, instead, the sump's surplus will be directed directly to SP5 for final clarification prior to discharge. As the water in the sump comprises clean surface water and groundwater, its sediment load is relatively low, compared to the Wash Plant's waters, and it is easier to treat in this condition. When required, the blue water storage tanks are topped up using sump water. In this scenario, SP1 to SP4 will be allowed to remain passive and not be supercharged with both hydraulic load from the sump and sediment load from the Wash Plant. As ease is intended for the SP1 – SP4 system.

2. On some days the washing plant is not in use and all sump water is pumped to SP5. With this in mind, SP5 has now been resized in this assessment to manage on days when the washing plant is not in operation and 100% of sump water is being pumped to SP5: groundwater and rainfall ingress has been calculated to be 430 m^3/d 0r 0.005 m^3/s.
3. On other days the washing plant may be in use all day. The top-up water will be from the water storage tanks. On these days the inflow to SP5 may be minimal. The proposed SP12 settlement pond sequence is now sized for the days when the washing plant is operating at full capacity.

It is acknowledged that there is some double counting with this approach, but it allows the settlement pond systems to be considered independently of one another.

For the purposes of sizing treatment systems, the daily volume of dirty water generated at the washing plant has been estimated with a conservative design approach using the entire volume of all waters collected in the sump as being used in the washing process, i.e. 430 m^3/d. As this is only operated for 8 hours per day the daily volume is adjusted to give likely operating rates of 53.8 m^3/h and 0.015 m^3/s.

These adjusted hourly process water rates at the washing plant are too high and on an unchecked, instantaneous, basis they would cause an exceedance of the Section 4 Discharge Licence's permitted discharge rate at the discharge point. To mitigate against this, Hydro-G & Envirologic present a proposal to install a new pond directly south of the washing plant with the aim of attenuating the dirty water generated by the washing plant and releasing this water from the central area of the site to the northern settlement areas at a rate that will enable site compliance with the permitted rate of discharge.

10.2.3 Proposed New Attenuation Pond – Wash Plant's Dirty Water (SP12)

As part of development works it is proposed to construct a new pond to the immediate south of the washing plant. Whilst some settlement of heavier solids will occur here its primary role is to attenuate dirty water flows. Design parameters are as follows:

- Maximum inflow to washing plant dirty water attenuation tank = 0.015 m^3/s over 24 hours = 1,291 m^3
- Maximum outflow from washing plant dirty water attenuation tank = 0.0037 m^3/s over 24 hours = 430 m^3
- Required capacity of dirty water attenuation pond = 1,291 – 430 m^3 = 861 m^3 (minimum)
- Recommended dimensions = 1,000 m^2 with depth of 1.0 m [1 m provides some settlement depth]

Refer to Figure 5 for location south of washplant and blue tanks.

10.2.4 Outlet from Dirty Water Attenuation Pond (SP12)

The outlet of the dirty water attenuation pond shall be fitted with an appropriately sized pipe capable of restricting outflow rates to 0.0037 m^3/s (3.7 l/s) or a hydrobrake or similar, as selected by Breedon management for the site. The pipe invert will be close to the pond base in a concrete chamber to facilitate regular cleaning. The pond will then drain at controlled rates between washing plant operational cycles (i.e. between the hours of 5pm and 8am).

The outflow from SP12 will be piped to the inlet of SP1 using existing pipe infrastructure. Dirty water will be treated in the Settlement Sequence SP1 to SP5, as it has always been. The difference now is that there is less hydraulic surge on SP1 because the sump waters will not be mixed with the dirty water from the Wash Plant – the aim of settlement design is to allow time for solids to settle. Most of the solids load at the site comes from the Wash Plant tank and the pavement runoff. There is no need to surge everything with the relatively clean sump waters.

A re-specification of all settlement ponds to remove fine silts was presented in detail in the preceding sections and summarised again here for ease of reference.

10.3 SETTLEMENT LAGOON SEQUENCE & PROPOSED ENHANCEMENTS

The IFI observations requested new consideration on improvement in settlement efficacy at the site.

Following multiple workshops between the Bweeng on-site management team, Hydro-G and Envirologic, management at the site now understand that the crest elevations of all inlet and outlet weirs must be of similar elevation and works are underway to ensure weir crests are raised to minimise head drop through each pond. Safe access is now being created for further surveying.

The overall aim at the site is no to ensure maximum efficiency in settlement ponds and the new Site Protocol is that the settlement lagoons will now be operated with laminar flow. This requires low head drop between inlet and outlet weirs and low flow velocities within the pond.

For maximum efficiency settlement ponds should operate with laminar flow. This requires low head drop between inlet and outlet weirs and low flow velocities within the pond.

10.3.1 Primary Settlement Sequence SP1 – SP4

The storage required in the SP1 – SP4 Primary Settlement Sequence in order to attenuate rainfall-runoff generated in the site to the south of the gate is 2,284 m^3 when the outflow is restricted to Q_{BAR}, as shown in Table 11. Extreme Rainfall Events, $QBAR_{rural}$ and the Conditions of the site's Section 4 Licence have been used to propose mathematically justified design specifications to each ponds structure and capacity (Section 9 of this Water Management Audit Report). Summary details are provided now for each individual Settlement Pond.

10.3.1.1 SP1

Currently, flow velocities in SP1 are high and overloaded with sediment because of continuous flow from the Wash Plant. Specific to SP1, improvements proposed include, as follows:

- As mentioned, the surge on SP1 is to be removed by a design proposal to treat the Wash Plant's dirty water in its own dedicated new SP12 and to deliver water from SP12 to SP1 in a controlled, slow, rate in the hours between 5pm and 8am.
- SP1 will still receive yard runoff but a proposed interceptor drain in the Yard near the gate (Figure 5) will reduce the load on SP1.
- A preliminary baffled and concreted chamber could also be installed immediately downstream of the inlet to SP1. The function of this will be to (i) reduce flow velocities, (ii) capture heavier sediment earlier in the settlement sequence. Alternatively, a rubble mat with boulders and cobbles could be incorporated to diffuse energy at the inflow point to SP1.
- There is scope to widen SP1 by approximately 11 m on its southern side. This will expand its footprint from 400 m^2 to 1,150 m^2. The access track on the northern side of SP1 shall remain to facilitate dredging. Enhancements of berm heights and pond depths will provide storm attenuation capacity for pavement runoff collected in the new yard drain in SP1.

10.3.1.2 SP2

There is scope to widen SP2 by approximately 10 m on its southern side. This will expand its footprint by 700 m^2 to 1,160 m^2.

10.3.1.3 SP1 – 4

SP1 to SP4 currently have a combined active footprint of 1,355 m^2. However, these ponds are contained within a larger area of approximately 5,800 m^2 that has a raised perimeter berm. The height of the overall berm which forms the perimeter of the area containing SP1 to SP4 can be raised by a minimum height of 0.5 m above SP4's outlet pipe. This raised berm is mostly already in place as it supports a raised internal access road on the southern side of SP1-SP4 while the northern side of this area is largely defined by the raised willow plantation.

A new berm will need to be installed at the outlet of SP4, to limit the flow from SP4 to the balance of the ELV for discharge volume minus the waters sent to SP5 already, which is 1,100 m^3/d - 430 m^3/d = 670 m^3/d = 7.75 l/s.

10.3.1.4 SP5

SP5 shall be altered to make it a single pond with a defined outfall/overflow. This will require installation of a new berm and overflow weir at its northern (downstream) end. SP5 can be widened by approximately 23 m on its southwestern side to give an enlarged width of 38 m. This will expand the footprint of SP5 from 390 m^2 to 1,000 m^2.

10.3.2 Secondary Settlement Sequence SP6 – SP10

The storage required in the SP6 – SP10 Secondary Settlement Sequence in order to attenuate rainfall-runoff generated in the site to the north of the gate [northern yard runoff area] is 1,366 m^3 when the outflow is restricted to Q_{BAR}, i.e., 13 l/s.

The black PVC pipes that drain the temporary screening area result in most rainfall-runoff generated in this area and yard areas further south entering SP7. SP7 is the final pond in the eastern settlement pond sequence and therefore waters that enter it directly receive no treatment (SP6 is effectively bypassed with this setup).

To resolve this, ground elevations to the south of the eastern settlement ponds should be re-contoured such that all yard runoff enters the eastern settlement pond sequence at the southern end (start) of SP6.

SP6 currently has a footprint of 730 m^2 (Table 2). A 1.9 m depth capacity is required at SP6 in order to provide the required 1,366 m^3 attenuation storage for the 18 hour Extreme Weather event. This depth can be provided by a combination of excavation and increased embankment berm heights. Other recontour scenarios are acceptable and enhancements to other ponds here are feasible.

10.4 STOCKPILES

Large stockpiles will be surrounded with small interceptor drains containing intermittent check dams. This will assist with entrapment of sediment at source and prevent transport of sediment in site runoff. This is the 'Source Control' concept of SUDs.

10.5 HAUL ROUTES

Preferential overland flow paths will be diverted into gullies and interceptor drains, as is practical.

Worn haul routes will be top dressed to prevent rutting, which increases wear on the roads.

The edges of many haulage routes within the site are defined by berms containing fine sediment, which can become mobilised during high intensity rainfall. Edge berms will be replaced with large boulders, as is practical.

Dedicated road sprinkler tractors will be utilised more intensively on haul routes and trafficked areas (including quarry floor) several times daily.

10.6 WATER CONSERVATION

In order to reduce carbon footprint at the site water management at the site will work towards minimising pumping costs.

Dust suppression sprinklers and water cannons could be activated using sensors in order to reduce the hydraulic load requiring treatment. Water used in dust suppression will be recycled from SP12, insofar as possible.

10.7 HOUSEKEEPING AT THE CONCRETE / READYMIX BATCHING PLANT

All trucks and machinery should be washed on the hardstanding slab next to the concrete truck washout tank (Plate 4).

At present some areas around the hardstanding area adjacent to the batching plant have no edge treatment installed. This results in cement-laden waters flowing over the edge of the slab, whereupon it enters a manhole for recirculation. Excess overflow from recirculation directs water to SP1 via a 200 mm black PVC pipe without any pre-treatment. Edge treatment would ensure that all runoff generated on the concrete hardstanding area are redirected appropriately.

Currently, waters are removed intermittently from the Concrete Batching Settlement Tank via a submersible pump on a float switch. The pumped flow rate was visually estimated at 0.2 l/s. This pump is positioned in the central chamber which means dirty waters are not traversing through all of the chambers prior to removal. The pumped waters outfall onto the hardstanding and flow on top of the slab, around the rear of the tanks, before being directed through a rough open channel where surplus recirculated waters are managed into SP1.

10.8 PROCESSING AREA INTERCEPTOR DRAIN

At present, rainfall-runoff flows unimpeded across the ground surface from the washing plant and office buildings towards the northeastern corner of the site. Here these waters flow through black PVC pipes into SP7 from which they are pumped up towards SP10. In order to reduce pumping costs, and to enhance the efficacy of treatment of runoff in the northeastern portion of the site it is proposed **to split the processing area in terms of drainage**, into a northern half and a southern half (se Figure 5). A new open channel acting as an interceptor drain will define this boundary. The interceptor drain will be installed from close to the site entrance and deliver runoff to SP1. Runoff generated upstream (i.e. south) of the interceptor drain will be directed to SP1.

Runoff generated north of this interceptor drain will be directed towards the start of SP6 (the southeastern end of SP6. This can either be achieved via re-contouring the ground surface in this part of the site, or installing a new interceptor drain along the northern area of the processing area.

10.9 HYDROCARBONS

Strict adherence to pollution control protocols is in place for re-fuelling operations. Drip trays are used and hydrocarbon spill kits are available if required.

All chemicals, oils and grease used in the operation of the licensee's premises are stored in dedicated containers on bund trays which are sufficiently sized to contain at least 1.1 times the volume of the largest container stored on/within the bund.

In addition to daily good practices, as per Breedon SOPs, the site's manager will conduct an audit of hydrocarbon storage areas on a Monthly Basis **on the first working day of each calendar month**. The Audit sheet will be sent to Breedon's National Environmental Manager for sign off and due diligence.

10.10 DISCHARGE POINT

Access to the location that is currently sampled as the 'discharge point' will be improved by virtue of steps. Currently, the discharge point cannot be clearly observed or accessed. Whilst it has a sign demarking its location, there is uneven ground and a small embankment between the discharge point and the river. Northern boundary stream from within the site will be ensured by the provision of a set of steps similar to the usual crossing over an electric fence.

11 IFI CONSIDERATIONS SPECIFICALLY ADDRESSED

The IFI Submission dated March 2024 raised points for consideration regarding the Discharge of Polluting Matter such as silt and fuel oils and protection of riparian zones and flood plains.

- ***IFI =*** *"The discharge of silt-laden waters to fisheries streams due to insufficient silt control measures can clog salmonid (salmon and trout) spawning beds and can also precipitate further riverbank erosion downstream. Inevitably this can lead to loss or degradation of valuable habitat. IFI requests that the riparian zones along watercourses should be maintained and that no material should be deposited within 10m of watercourses or open drains adjacent to the site. IFI is also of the view that no material should be deposited on floodplain areas, where they exist, as this may result in significant alteration of hydrological processes."*

  Management at the site agrees to the following:

  (1) No material will be deposited within 10m of watercourses or open drains adjacent to the site.
  (2) No material will be deposited on floodplain areas, where they exist.

- ***IFI =*** *"It is important to incorporate best practice and strategies to minimise discharges of silt/suspended solids to waters. Silt traps if appropriate should be constructed at locations that will intercept run-off from the site".*

  Response from Water Management Auditors Hydro-G and Envirologic:

Following the requests for consideration issued by the IFI, Breedon Ireland engaged Hydro-G and Envirologic to complete a detailed Audit of the Water Management Systems. A simplified schematic for the site was presented earlier and was followed by a labelled schematic (Figures 3 & 4). The upgrades proposed in textual description, below, are illustrated in Figure 5, after the list.

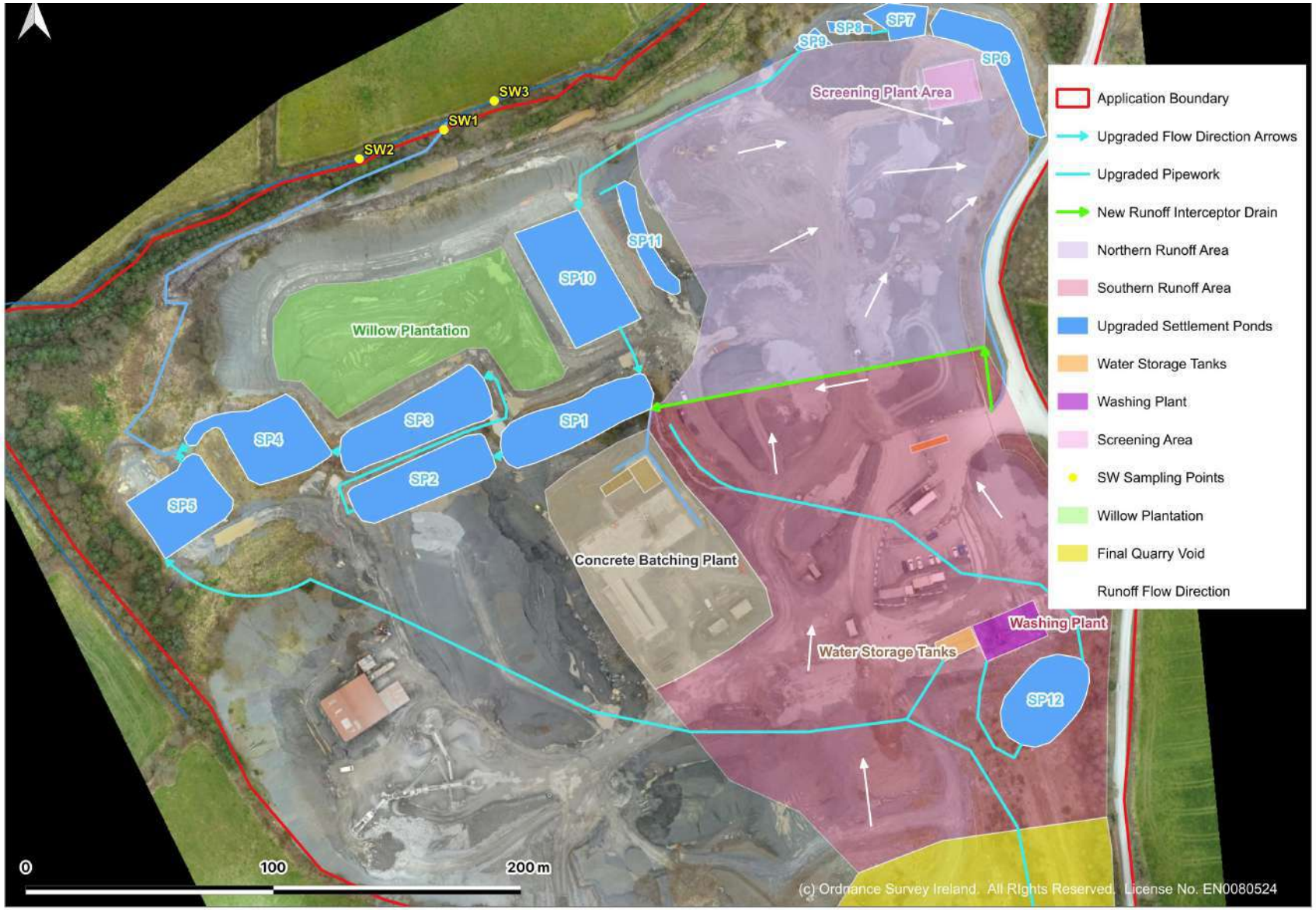
The complete list of upgrades proposed and agreed with the site include, as follows:

1. Overall, the site will move from constant sprinkler use to intermittent dust suppression measures, this will have water conservation, energy and economy benefits.
2. Source Control, as per SUDs, will be implemented at many locations at the site.
3. SP1 **will not** receive an uncontrolled and continuous mix of sump water and dirty wash water from the central processing area.
4. The balance of sump water not required to fill or top up the blue tanks **will not** be allowed to mix with dirty water and the current regime of mixing and delivery to SP1 will cease.
5. Any sump waters not required for filling or topping up of the blue tanks or for operational purposes will be sent by gravity feed in a new pipeline to SP5. The sump waters are the cleanest waters on site, with respect to sediment load. Therefore, the final settlement lagoon SP5 is expected to comprise only clean treated waters. It is also proposed to increase the size of SP5 by 23m in a lateral extension because there is unused land available to the west of it and within the current site boundary.
6. As outlined in the detail preceding, it is proposed to create of a new settlement pond (SP12) to the immediate south of the Wash Plant. This will enable a daytime / working time semi-closed loop Wash Plant system during the working hours of the site. The outlet from SP12 will be physically constrained in size so as to deliver a slow and controlled outflow to SP1 during the hours of 5pm and 8am.
7. SP1 – SP4 will receive rainfall runoff from the yard area between the Wash Plant, car park, offices and Concrete Batching Plant. Design calculations have been provided to support their correct specification and functioning.
8. SP1 – SP4 will be increased in size and volume, to provide additional capacity and enhance settlement functioning, as follows:
    a. SP1: There is scope to widen SP1 by approximately 11 m on its southern side. This will expand its footprint from 400 m2 to 1,150 m2. The access track on the northern side of SP1 shall remain to facilitate dredging. A 2m high berm will be created to provide storm attenuation capacity for pavement runoff collected in the new yard drain in SP1.
    b. SP2: There is scope to widen SP2 by approximately 10 m on its southern side. This will expand its footprint by 700 m2 to 1,160 m2.
    c. SP1 to SP4 currently have a combined active footprint of 1,355 m^2. However, these ponds are contained within a larger area of approximately 5,800 m^2 that has a raised perimeter berm. Increases in width and height will enable more treatment function and more attenuation on site.
9. SP5: There is scope to create a defined outfall/overflow from SP5. This will require installation of a new berm and overflow weir at its northern (downstream) end. SP5 can be widened by approximately 23 m on its southwestern side to give an enlarged width of 38 m. This will expand the footprint of SP5 from 390 m^2 to 1,000 m^2. The Jet tool used to reduce backward pressure can be removed.
10. A new Drain is proposed to transect the site between the gate and SP1 and that will ensure that the northeastern settlement lagoons (SP6 – SP10) are not overloaded. The design function of this Secondary Settlement System SP6 – SP10 is to receive rainfall runoff from the area to the southwest of the gate and,

for a portion of the year, to accommodate wash waters from temporary mobile Wash Plants. Design calculations have been provided to support their correct specification and functioning. SP6 currently has a footprint of 730 m2 (Table 2). A 1.9 m depth capacity is required at SP6 in order to provide the required 1,366 m3 attenuation storage for the Extreme Weather event (+20% Climate Change). This depth can be provided by a combination of excavation and increased embankment berm heights. Other recontour scenarios are acceptable and enhancements to other ponds here are feasible. Recontouring is advised in this northeastern area so as to stop waters entering SP7 after having bypassed SP6.

11. The outlet of SP10 is to SP1.
12. The emergency overflow from the concrete batching plant's settlement tank system will be restricted to reduce sending partially treated waters to SP1. Enhancements are prescribed in text of this Water Management Audit report.

Figure 5 Proposed Upgrades to the Existing Components of the Quarry Water Management



- *"Fuel oils, etc. should be stored on a sheltered dry elevated site well removed from aquatic zones. It is our view that refuelling of vehicles should take place in a designated area well away from aquatic zones and fuel oils must not, under any circumstances, discharge into an aquatic zone."*

  The site's management commit to the following:

  - No fuels will be stored near aquatic zones.
  - In addition to the compliance with Breedon's SOPs, a hydrocarbon storage audit can be completed on the first working Monday of each month. The Audit will be completed by the quarry manager and sent to the national Environmental manager for Breedon as a due diligence process.

- *"While IFI is aware of the significance of the SAC Munster Blackwater SAC as is correctly referenced within the application documents, the repeated statement that the SAC is over 2 km from the site may serve to undermine the significance of the receiving Reamanagh Stream which bounds the quarry. Small tributary streams provide crucial niche habitat for macroinvertebrate communities and most significantly from a fisheries perspective, spawning and nursery habitat for fish including salmonid and lamprey species. Where deleterious discharges occur, the negative impacts are immediate and then cumulative within the catchment, via habitat degradation and reduced spawning recruitment in relevant fish populations."*

  Response: With respect to potential impacts on aquatic life downstream of the site's licenced discharge, and potential for damage to downstream conservation objective sites and water dependent species, **Mr. Ross Macklin of Triturus Environmental Ltd. completed field works** and they are reported in a separate report entitled 'Aquatic & fisheries baseline report for the continued operation of a quarry development at Bweeng, Co. Cork (August 2024). In summary, the report found no deterioration in species for the upgradient and downgradient conditions. Readers are referred to the report itself for detail that reflects the level of survey that was completed, under licence.

- *"IFI notes from the application documents a number of references to the Discharge Licence currently held by the quarry and specifically to the sampling points SW1, SW2 & SW3 which relate to ongoing environmental monitoring of both the quarry discharge and the receiving surface water as conditions of said licence. The sampling point (SW1) for the discharge appears to be located within the quarry itself and not the discharge point and therefore may not accurately reflect the quality of the final discharge".*

  Response: SW1 comprises water exclusively from the site prior to its discharge into the receiving waters of Reamanagh Stream. Additional signage and improved safe and permanent access will be undertaken at the discharge point.

- *"Monitoring results suggest that there is no negative impact on the receiving aquatic habitat arising from quarry discharges, however IFI is concerned that the location of the sampling points, as marked on enclosed maps are upstream of a significant interface of the quarry boundary (approximately 300 m of channel) and the watercourse and therefore not likely to indicate any issues arising in this section of channel. A recent site*

inspection of the receiving stream shows significant settlement of fine silt and sand material in the channel immediately downstream of SW3 (SW3 appears to be the downstream limit of monitoring) and similar settled silt in the channel at points toward and immediately downstream of the stream crossing the public road where there are other surface water discharges along the quarry boundary. This deposited fine material may be indicative of locally elevated levels of suspended solids settling out within the channel, which were not observed in the channel further upstream within the monitored section. Monitoring in this downstream section may prove more indicative of any impacts arising from the quarry as a whole, including any unmarked, intermittent or accidental discharges."

- **Response: Hydro-G has sampled at SW4 (Figure 5) for physio- and hydrochemistry and Ross Macklin of Triturus Environmental Ltd. surveyed the Reamanagh stream stretch as part of Breedon's 2024 works at locations upgradient of the discharge through many locations downstream of the discharge. Triturus label SW4 as Survey Point A3. Triturus (2024) discussed their findings, as follows:**

  *"The three riverine sites in the study area downstream of the proposed quarry development, the Reamanagh Stream, South Kildapper River and the Lyre River (all tributaries of the Clyda River), were found to support a number of fish species of high conservation value. This included Atlantic salmon, lamprey (Lampetra sp.) and European eel. Lamprey and salmon are qualifying interest fish species of the hydrologically connected River Blackwater SAC (002170) downstream. While not of significantly high conservation value, wild brown trout populations are of high local biodiversity value and were recorded at all sites in the study area. However, no other aquatic species of high conservation value inclusive of macro-invertebrates (**Appendix A**), were recorded during the surveys undertaken in July 2024. However, a macrophyte community representative of the Annex I habitat , 'floating river vegetation' [3260] was present at site B4 on the Lyre River (**Table 4.3**)".*

  Hydro-G notes that Triturus (2024) reports the same for the river site upstream of the discharge. and for a stream not hydrologically connected to the quarry.

- **Response: Sampling locations SW4 and SW5 will be retained for annual Q-Value Sampling. While results from SW4 will represent the full extent of the site to its NE boundary point but it must be noted that the stream is also influenced by the agriculture. Readers are referred to Figure 2 and Table 1 of this report in which Hydro-G's summer 2024 water quality results are presented and discussed. For all parameters sampled, the quarry's Discharge is compliant with the Conditions of the Section 4 Licence and the quality of the discharge is better than the upstream and downstream receiving waters.**

- *While IFI is aware that significant improvements have been made to water treatment within the quarry by the current operator, unsatisfactory discharges have been observed arising from same with warnings issued in the past, and a prosecution under fisheries and local government legislation completed in relation to a deleterious discharge at the site in 2021. It is significant that previous IFI observations of unsatisfactory discharges have been made at locations downstream of the surface water and macroinvertebrate sampling points noted within the application. IFI notes that the applicant predicts a significant increase in the volume of water which will be*

generated, treated and discharged from the extended quarry, but does not detail augmentation of existing on-site treatment capacity for same. Given its own previous observations, as above, and in recognition of the increased intensity of rainfall events experienced in recent years IFI is concerned that existing treatment capacity may be insufficient to serve the larger quarry area, particularly during periods of high precipitation."

Response: the work presented here by Envirologic and Hydro-G demonstrates the likely groundwater inflow and required upgrades in the management of water at the site. The existing Section 4 Licence has hydraulic capacity to serve the site going forward into expansion, should permission be granted. However, IFI were correct in their assertion that the Surface Water Management components required upgrading in capacity and treatment function. A Climate Change factor of +20% has been applied in this work and the proposed design specification upgrades, for both attenuation and settlement treatment for solids, are supported mathematically and are physically and technically feasible within the site's current footprint.

Yours Sincerely

Dr. Pamela Bartley B.Eng, M.Sc., Ph.D

(087) 8072744 pamela@hydro-g.com

Appendix 7-B:
EU Directives

European Directives:

- Directive 2011/92/EU of the European Parliament and of the Council of 13 December 2011 on the assessment of the effects of certain public and private projects on the environment;
- Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment;
- Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000 establishing a framework for Community action in the field of water policy;
- Directive 2006/118/EC of the European Parliament and of the Council of 12 December 2006 on the protection of groundwater against pollution and deterioration;
- Directive 2007/60/EC of the European Parliament and of the Council of 23 October 2007 on the assessment and management of flood risks;
- Directive 2010/75/EU of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) (recast); and
- Directive 2006/21/EC of the European Parliament and of the Council of 15 March 2006 on the management of waste from extractive industries and amending Directive 2004/35/EC.

Appendix 7-C:
National Legislation and Regulations

Irish Government Acts, National Legislation and Regulations

- S.I. No. 349/1989, European Communities (Environmental Impact Assessment) Regulations, as amended;
- Planning and Development Act 2000, as amended;
- S.I. No. 600/2001 - Planning and Development Regulations, 2001, as amended.
- S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended;
- S.I. No. 272/2009 European Communities Environmental Objectives (Surface Waters) Regulations 2009, as amended;
- S.I. No. 684/2007 Waste Water Discharge (Authorisation) Regulations, 2007, as amended;
- S.I. No. 122/2010 European Communities (Assessment and Management of Flood Risks) Regulations 2010, as amended;
- S.I. No. 457/2008 European Communities (Environmental Liability) Regulations 2008, as amended;
- S.I. No. 404/2018 - European Union (Planning and Development) (Environmental Impact Assessment) (No. 2) Regulations 2018;
- Local Government (Water Pollution) Acts 1977, as amended;
- S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations, 1988;
- S.I. No. 268/2006 - European Communities (Quality of Shellfish Waters) Regulations 2006, as amended;
- S.I. No. 79/2008 - Bathing Water Quality Regulations 2008, as amended; and
- S.I. No. 99/2023 - European Union (Drinking Water) Regulations 2023, as amended.
- Water Environment (Abstractions and Associated Impoundments) Act 2022.
- S.I. No. 418/2024 - Water Environment (Abstractions and Associated Impoundments) Licencing Fees Regulations 2024
- S.I. No. 419/2024 - Water Environment (Abstractions and Associated Impoundments) Regulations 2024

Appendix 7-D:
Guidelines and Technical Standards

Guidelines

- DELG/EPA/GSI (1999). Groundwater Protection Schemes. Document prepared jointly by the Geological Survey of Ireland (GSI), the Environmental Protection Agency, and the Department of Environment, Heritage and Local Government.
- EPA (2003). Towards Setting Guideline Values for the Protection of Groundwater in Ireland. Interim Report.
- Fitzsimons, V., Daly, D. and Deakin, J. (2003). Draft GSI guidelines for assessment and mapping of groundwater vulnerability to contamination. Groundwater Chapter, Geological Survey of Ireland.
- DEHLG (2004). National Urban Wastewater Study. National Report.
- EPA (2006). Ireland Water Framework Directive Monitoring Programme.
- GSI (2006). Criteria used in aquifer classification. Available from http://www.gsi.ie/Programmes/Groundwater/Aquifer+Classification.htm
- IGI (2007). Guidelines on Water Well Construction. Available from http://www.igi.ie/assets/files/Water%20Well%20Guidelines/Guidelines.pdf
- Institute of Geologists of Ireland (2007). Recommended collection, presentation and interpretation of geological and hydrogeological information for quarry developments.
- European Commission (2007). Common Implementation Strategy (CIS) for the Water Framework Directive (2000/60/EC) Guidance on preventing or limiting direct and indirect inputs in the context of the Groundwater Directive 2006/118/EC. Guidance Document No. 17.
- Kilroy, G., Dunne, F., Ryan, J., O'Connor, A., Daly, D., Craig, M., Coxon, C., Johnston, P. and Moe, H. (2008). A Framework for the Assessment of Groundwater – Dependent Terrestrial Ecosystems under the Water Framework Directive. Environmental Research Centre Report Series No. 12.
- DEHLG (2009). Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities.
- EPA (2010). Methodology for Establishing Groundwater Threshold Values and the Assessment of Chemical and Quantitative Status of Groundwater, Including and Assessment of Pollution Trends and Trend Reversal.
- European Commission (2010). Common Implementation Strategy (CIS) for the Water Framework Directive (2000/60/EC). Guidance on risk assessment and the use of conceptual models for groundwater. Guidance document No. 26.
- EPA (2011). Guidance on the Authorisation of Direct Discharges to Groundwater.
- EPA (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.

Technical Standards

- British Standards (2015). Code of Practice for Ground Investigations BS5930:2015;.
- CIRIA (2007). The SuDS Manual. (C697). CIRIA publication, February 2007.

Appendix 7-E:
Borehole Logs

DUNNES DRILLING

DRILLERS LOG

WELL DRILLING AND HORIZONTAL DRILLING ENGINEERS
Dublin Road, Dromiskin, Dundalk, Co. Louth.
E-Mail: info@dunnesdrilling.com website: www.dunnesdrilling.com
Tel: +353 42 9372188 Fax: +353 42 9372714

Borehole for: Lagan
at Bweeng
Co. Cork

MW1 (far side of quarry)

Date	Depth m	Diam	Conditions
05/02/2017	0 - 2	200mm	Rock. Install 2m x 150mm steel lining.
	2- 6	150mm	Soft rock. Dry.
	6 - 12	"	Rock. Small inflow. Estimate 0.1m3/hr
	12 - 30	"	Purple & grey rock.
	30 - 47	"	Grey rock. Very hard. Dry.
			Abandon drilling due to drill bit losing buttons.

Total depth of well 47m
Estimated yield Dry.
Depth to rock Ground Level
Steel casing installed 2m of 150mm steel
PVC casing installed
Well screen
Other remarks Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

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Borehole for: Lagan
at Bweeng
Co. Cork

MW2 (half way down haul road)

Date	Depth m	Diam	Conditions
05/02/2017	0 - 6	200mm	Grey rock. Install 6m x 150mm steel lining.
05/03/2017	6 - 10	150mm	Grey rock. Hard. Dry.
	10 - 12	"	Soft brown rock. Dry.
	12 - 18	"	Soft brown rock. Water at 18m - 0.8m3/hr.
	18 -24	"	Hard grey rock into purple rock.
	24 - 30	"	Hard purple rock.
	30 - 36	"	Purple rock into grey rock at 35m. 0.8m3/hr.
	36 - 42	"	Soft grey rock.
	42 - 48	"	Grey and purple rock.
	48 - 50	"	Purple rock. 0.8m3/hr.

Total depth of well 50m
Estimated yield 0.8m3/hr
Depth to rock Ground Level
Steel casing installed 6m of 150mm steel
PVC casing installed none
Well screen none
Other remarks Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

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Borehole for: Lagan
at Bweeng
Co. Cork

MW3 (Patrick Flemings field - across road from bungalow)

Date	Depth m	Diam	Conditions
05/03/2017	0 - 6	200mm	Sandy clay into sand. Dry.
	6 - 10	"	Sand into very soft sandy rock.
	10 - 12	"	Soft rock. Damp. Install 12m x 150mm steel.
	12 - 18	150mm	Soft brown rock. Water at 18m - 0.1m3/hr.
	18 -24	"	Soft brown rock. Water at 24m - 2m3/hr.
	24 - 30	"	Purple rock. Brown rock. Water increasing. 7 to 8 m3/hr.
	30 - 36	"	Purple rock. Brown rock. Very soft. 8m3/hr.
	36 - 42	"	Purple rock.
	42 - 48	"	Purple rock.
	48 - 50	"	Purple rock. 8m3/hr.

Total depth of well 50m
Estimated yield 8m3/hr
Depth to rock 10m
Steel casing installed 12m of 150mm steel
PVC casing installed none
Well screen none
Other remarks Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

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Borehole for: Lagan
at Bweeng
Co. Cork

MW4 (Ml. Riordans field - top corner)

Date	Depth m	Diam	Conditions
05/03/2017	0 - 5m	200mm	Clay.
	5 - 6.5m	"	Soft brown rock. Install 7m x 150mm steel.
	6.5 - 8	150mm	Brown rock.
	8 - 12	"	Grey rock. Dry.
	12 - 18	"	Grey into purple rock. Dry.
05/04/2017	18 - 24	"	Very hard purple into very hard grey/green rock. Dry.
	24 - 30	"	Grey/green rock. 0.1m3/hr at 30m.
	30 - 36	"	Grey/green rock. Softer from 33m. 0.2m3/hr at 36m.
	36 - 42	"	Grey/green rock. Purple rock from 38m. 0.23m3/hr at 42m.
	42 - 48	"	Grey rock. Softer.
	48 - 54	"	Grey rock.
	54 -60	"	Grey rock. 0.23m3/hr.
	60 - 66	"	Purple rock.
	66 -72	"	Grey rock.
	72 - 75	"	Purple rock. 0.23m3/hr.

Total depth of well	75m
Estimated yield	0.23m3/hr
Depth to rock	5m
Steel casing installed	7m of 150mm steel
PVC casing installed	none
Well screen	none
Other remarks	Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

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Borehole for: Lagan
at Bweeng
Co. Cork

MW5 (Ml. Riordans field - bottom corner)

Date	Depth m	Diam	Conditions
05/04/2017	0 - 6m	200mm	Clay into gravels/shattered rock.
	6 - 12	"	Broken, shattered brown rock. Lot of water - 3m3/hr. Install 6m x 200mm steel
			Install 12m x 150mm steel lining c/w heavy duty casing shoe.
05/05/2017	12 - 18	150mm	Soft grey rock. 2m3/hr at 18m. (some water closed off with lining)
	18 - 24	"	Soft grey rock. 2m3/hr.
	24 - 30	"	Soft grey rock into purple rock at 29m. 3m3/hr at 30m.
	30 - 36	"	Soft purple rock. 4m3/hr at 36m.
	36 - 42	"	Soft purple rock. 4m3/hr at 42m.
	42 - 48	"	Soft purple rock. 5m3/hr at 48m.
	48 - 54	"	Harder grey rock. 5 - 6m3/hr at 54m.
	54 - 60	"	Green rock. 6m3/hr at 60m.
	60 - 66	"	Very hard purple rock.8m3/hr at 66m.
	66 -72	"	Very hard purple rock into grey rock at 71m. 8m3/hr.
	72 - 75	"	Very hard grey rock. 8m3/hr.

Total depth of well	75m
Estimated yield	8m3/hr.
Depth to rock	6m
Steel casing installed	6m of 200mm steel. 12m of 150mm steel.
PVC casing installed	none
Well screen	none
Other remarks	Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

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Borehole for: Lagan
at Bweeng
Co. Cork

MW6 (corner of bungalow car park)

Date	Depth m	Diam	Conditions
05/08/2017	0 - 4.5m	200mm	Sandy clay.
	4.5 - 6	"	Soft brown rock. Dry.
			Install 6m x 150mm steel lining.
	6 - 8	150mm	Soft brown rock.
	8 - 12	"	Hard purple rock. Dry.
	12 - 18	"	Purple into brown into hard green rock. 0.5m3/hr at 18m.
	18 - 24	"	Very hard green rock. 0.5m3/hr.
	24 - 30	"	Very hard green rock. Brown patch at 27m. 0.5m3/hr.
	30 - 36	"	Very hard green rock. 0.5m3/hr.
	36 - 42	"	Very hard green rock. Occassional softer patches. 0.5m3/hr.
	42 - 48	"	Very hard green rock. 0.5m3/hr.
	48 - 54	"	Very hard grey/green rock. Some white bits at 48 - 50m. 0.5m3/hr.
	54 - 60	"	Very hard green rock. Some purple bands. 0.6m3/hr at 60m.
	66 - 72	"	Very hard green rock into purple rock. 0.6m3/hr.
	72 - 75	"	Very hard purple rock. 0.6m3/hr.

Total depth of well	75m
Estimated yield	0.6m3/hr.
Depth to rock	6m
Steel casing installed	6m of 150mm steel.
PVC casing installed	none
Well screen	none
Other remarks	Flush cover fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

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Borehole for: Lagan
at Bweeng
Co. Cork

MW7 (at top of haul road)

Date	Depth m	Diam	Conditions
05/09/2017	0 - 3	200mm	Fill. Soft brown rock.
	3 - 6	"	Soft brown rock. Dry.
			Install 6m x 150mm steel lining.
	6 - 7	150mm	Soft brown rock.
	7 - 12	"	Purple rock. Dry.
	12 - 18	"	Grey, brown and purple rock. Dry.
	18 - 24	"	Medium into soft purple rock. 0.9m3/hr at 32m.
	24 - 30	"	Brown rock into purple rock. 3.2m3/hr at 30m.
	30 - 36	"	Alternating purple and brown rock - softer. 4.7m3/hr.
	36 - 42	"	Purple rock into hard green rock at 38 - 39m. 4.7m3/hr at 42m.
	48 - 54	"	Purple rock into very hard green rock. 4.7m3/hr.
	54 - 60	"	Very hard grey/green rock. Some white bits at 48 - 50m. 4.7m3/hr.
	54 - 60	"	Purple rock - hard and soft. Some white bits. 4.7m3/hr.
	60 - 66	"	Soft to medium purple/red rock. 4.7m3/hr.
	66 - 70	"	Purple into hard green rock. 4.7m3/hr at 70m.

Total depth of well	70m
Estimated yield	4.7m3/hr
Depth to rock	1m
Steel casing installed	6m of 150mm steel.
PVC casing installed	none
Well screen	none
Other remarks	Upstand pipe fitted.

Operator Brendan Dunne

DUNNES DRILLING

DRILLERS LOG

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Borehole for: Lagan
at Bweeng
Co. Cork

MW8 (shallow bore beside lagoon)

Date	Depth m	Diam	Conditions
05/09/2017	0 - 4	200mm	Soft brown clay.
			Install 3m x 50mm PVC screen, 1m x 50mm PVC plain casing.
			Place stone chippings to 0.7m below GL.
			Place and hydrate bentonite pellets from 0.7m to GL.

Total depth of well 4m
Estimated yield Damp only.
Depth to rock none
Steel casing installed none
PVC casing installed 1m x 50mm plain
Well screen 3m x 50mm screen
Other remarks Upstand pipe fitted.

Operator Brendan Dunne

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer

Sheet 1 of 7

Rev. DRAFT

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
02-05 0.00						0.00 - 6.80 : overburden.		Open hole drilling - no recovery.		
	0 (-) -	NA			(6.00)					
6.00					6.00					
02-05		NR			(0.80)			No recovery.		
	67 (43) 11				6.80					
7.50		23				6.80 - 30.40 Discontinuities, very closely spaced, locally closely spaced to 16.10m then medium spaced, locally closely spaced, dipping 14 to 16°, stepped, rough, with 0.5 to 3mm thick grey silt smear.		Strong thinly foliated pinkish grey fine and medium grained META-MUDSTONE as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics.		
02-05		18								
	100 (83) 20									
		19			(6.70)					
10.50										
02-05		12								

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
02-05-17	17.00	10.50	6.00	76	48		7.30
03-05-17	08.00	10.50	6.00	76	48		8.10

Rotary Flush

From (m)	To (m)	Type	Return (%)
0	70.50	water	100

GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit Design: NQ	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer

Sheet 2 of 7

Rev. DRAFT

RUN DETAILS					STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Discontinuities / Detail	DESCRIPTION Main	Geology	Instrument/ Backfill
	100 (95) 23	16 28 16			13.50		Strong thinly foliated pinkish grey fine and medium grained META-MUDSTONE as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics. *(continued)*		
02-05					(1.10) 14.60	14.00 - 14.30 Joint, vertical dip, stepped, smooth, with 0.5 to 2mm thick grey silt smear and dark orange brown iron stain, open.	13.50m: carried out packer test. Strong thinly flow banded green 'mottled' white calcitic fine grained with fine grained flat and elongate lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS.		
	100 (85) 20	15 17			(0.70) 15.30	15.00 - 15.20 2 No parallel joints, subvertical dip, stepped, rough, with 0.5 to 1mm thick grey silt smear, open. 15.30 - 15.50 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick grey silty fine sand smear, open.	Strong thinly foliated pinkish grey fine and medium grained META-MUDSTONE as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics.		
16.50 02-05		8 17				15.85 - 16.20 Joint, subvertical dip, stepped, tight, 15.85m to 15.90m open as drilling induced?	Strong thinly foliated dark green and green fine and medium grained META-SANDSTONE with some mica as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics.		
	100 (93) 60	2 9				19.10 - 19.55 Joint, subvertical dip, stepped, rough, with 0.5 to 2mm thick grey silty fine sand smear and minor dark orange brown iron stain, open.			
19.50 02-05	100 (95) 68	5			(10.40)	20.55 - 20.80 Joint, subvertical dip, stepped, smooth, with 0.5 to 1mm thick pinkish grey silt smear, open.	20.50m: carried out packer test.		
20.50 02-05	100 (93) 18	9				21.25 - 22.00 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick orange brown silt smear and			

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit Design: NQ	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer

Sheet 3 of 7

Rev. DRAFT

RUN DETAILS						STRATA			
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION Discontinuities / Detail	DESCRIPTION Main	Geology	Instrument/ Backfill
22.50						much orange and dark orange brown iron stain and powder, open.	Strong thinly foliated dark green and green fine and medium grained META-SANDSTONE with some mica as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics. *(continued)* 22.55m to 22.80m: 30mm wide vertical milky white quartz vein. 23.00m to 23.40m: light green 'marbled' with milky white calcitic veinlets. 24.15m to 24.50m: medium strong coarse grained. 24.50m to 24.55m: grey silt. 24.90m to 25.00m: 30mm wide dipping 60° milky white quartz vein. 25.00m to 25.45m: medium strong orangish brown coarse grained 'vuggy'.		
02-05	100 (94) 51	7							
		0				23.60 - 23.85 Joint, subvertical dip, stepped, smooth, with 0.5mm thick orange brown silt smear and dark orange brown iron stain, open.			
		18							
25.50									
02-05		15			25.70				
	100 (94) 46	11				25.75 - 26.00 Joint, subvertical dip, stepped, smooth, with 0.5 to 5mm thick bluish grey silt smear, open to moderately wide.	Strong thinly foliated light greyish purple fine grained META-SILTSTONE as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics.		
27.50									
02-05	100 (95) 58	12			(4.70)		27.50m: carried out packer test.		
28.50									
02-05		16				28.55 - 29.55 Joint, vertical dip, stepped, rough, with 0.5mm thick dark orange brown iron stain and powder, open.			
	100 (95) 60	5							
		11			30.40	30.00 - 30.35 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick orange brown silt smear and minor orange and orange brown iron stain and powder, open. 30.40 - 57.10 Discontinuities, medium spaced, locally widely spaced, dipping 18 to 20°, stepped, rough, with 0.5 to 3mm thick grey silt smear.	29.90m to 30.40m: medium strong orangish brown coarse grained 'vuggy'. Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS.		
31.50									
02-05		4							
	100	3							

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
03-05-17	17.00	25.50	6.00	76	48		8.10
04-05-17	08.00	25.50	6.00	76	48		8.10

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit: NQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer

Sheet 4 of 7

Rev. DRAFT

RUN DETAILS						STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Geology	Instrument/ Backfill
	(95) 93	2						Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS. *(continued)*		
34.50		2						34.50m: carried out packer test.		
02-05	100 (96) 95	0								
		1								
37.50		2								
02-05	100 (97) 96	0								
		0								
40.50		0								
02-05	100 (99) 98	2						41.00m to 41.15m: with anastomosing milky white quartz.		
41.50								41.50m: carried out packer test.		
02-05	100 (98) 97	1								
43.50		2								
02-05										

Drilling Progress and Water Observations

Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
04-05-17	17.00	41.50	6.00	76	48		8.10
05-05-17	08.00	41.50	6.00	76	48		8.10

Rotary Flush

From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit: NQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer

Sheet 5 of 7

Rev. DRAFT

RUN DETAILS						STRATA				
Depth / Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick-ness)	DESCRIPTION: Discontinuities	Detail	Main	Geology	Instrument/ Backfill
46.50	100 (98) 97	0 1 1			(32.30)			Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS. *(continued)*		
02-05 48.50	100 (97) 96	0 0								
02-05 49.50	100 (98) 97	0 1						48.50m: carried out packer test.		
02-05 52.50	100 (98) 97	1 0 1								
02-05	100 (97) 96	2 2								

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing

Rotary Flush			
From (m)	To (m)	Type	Return (%)

GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit: NQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer	Sheet 6 of 7
	Rev. DRAFT

RUN DETAILS						STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
55.50								Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS. *(continued)*		
02-05		2						55.50m: carried out packer test.		
		2								
	100 (97) 87	6				57.10 - 70.50 Discontinuities, medium spaced, locally closely spaced, dipping 12 to 14°, stepped, rough, with 0.5 to 2mm thick grey silt smear.				
58.50		6				57.20 - 57.45 Joint, subvertical dip, stepped, rough, with 0.5mm thick brown clay smear, open.		58.10m to 58.15m: medium strong fissile.		
02-05		0								
	100 (98) 94	0				60.60 - 60.75 Joint, vertical dip, stepped, tight.				
61.50		2								
02-05	100 (91) 59	6			62.70	61.75 - 61.95 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick green silt smear, open. 62.15 - 62.35 Joint, subvertical dip, stepped, rough, with 0.5 to 1mm thick green silt smear, open.		62.50m: carried out packer test.		
62.50					(1.10)	62.70 - 63.70 Joint, vertical dip, undulating, smooth, with 0.5 to 3mm thick grey silt smear and dark orange brown iron stain, open to moderately wide.		Strong thinly foliated purplish grey fine grained META-SILTSTONE as probable alteration of Ballytrasna Formation by volcanic activity of the Carrigcleenamore Volcanics.		
02-05	100 (97) 42	11			63.80	64.20 - 64.30 Joint, dipping 60°, stepped, rough, with 0.5 to 1mm thick greenish grey silt smear, open. 64.70 - 64.80 Joint, dipping 60°, stepped, rough, with 0.5 to 1mm thick greenish grey silt smear, open.		Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS.		
64.50										
02-05		6								
	100	2								

Drilling Progress and Water Observations								Rotary Flush				GENERAL REMARKS
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing	From (m)	To (m)	Type	Return (%)	
05-05-17	17.00	58.50	6.00	76	48		8.10					50mm solid pipe installed to 9.00m bgl.
08-05-17	08.00	58.50	6.00	76	48		8.10					

All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit Design: NQ	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

irish drilling

DRILLHOLE LOG

Project	Location	DRILLHOLE No
Bweeng	Co Cork	**MW9**

Job No	Date	Ground Level (m OD)	Co-Ordinates ()
2017-C	02-05-17 08-05-17		

Engineer	Sheet	Rev.
	7 of 7	DRAFT

RUN DETAILS					STRATA				
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION Discontinuities	Detail	Main	Geology	Instrument/ Backfill
	(92) 77	1						Strong thinly flow banded green 'mottled' white calcitic groundmass with light green and dark green subrounded to subangular and flat fine and coarse gravel sized lapilli as pyroclastic 'GREENSTONE' of the CARRIGCLEENAMORE VOLCANICS. *(continued)*		
67.50		7			(6.70)	67.30 - 67.55 Joint, subvertical dip, stepped, rough, with 0.5mm thick grey silt smear and minor orange brown iron stain, open.				
02-05		3				68.45 - 68.90 Joint, vertical dip, stepped, rough, with 0.5 to 1mm thick brown silt smear, open.				
	100 (97) 80	5								
70.50		2			70.50					
								70.50m: carried out packer test. BH terminated at 70.50m bgl on REs instruction.		

Drilling Progress and Water Observations							
Date	Time	Depth	Casing Depth	Casing Dia	Core Dia mm	Water Strike	Water Standing
08-05-17	17.00	70.50	6.00	76	48		8.10

Rotary Flush			
From (m)	To (m)	Type	Return (%)

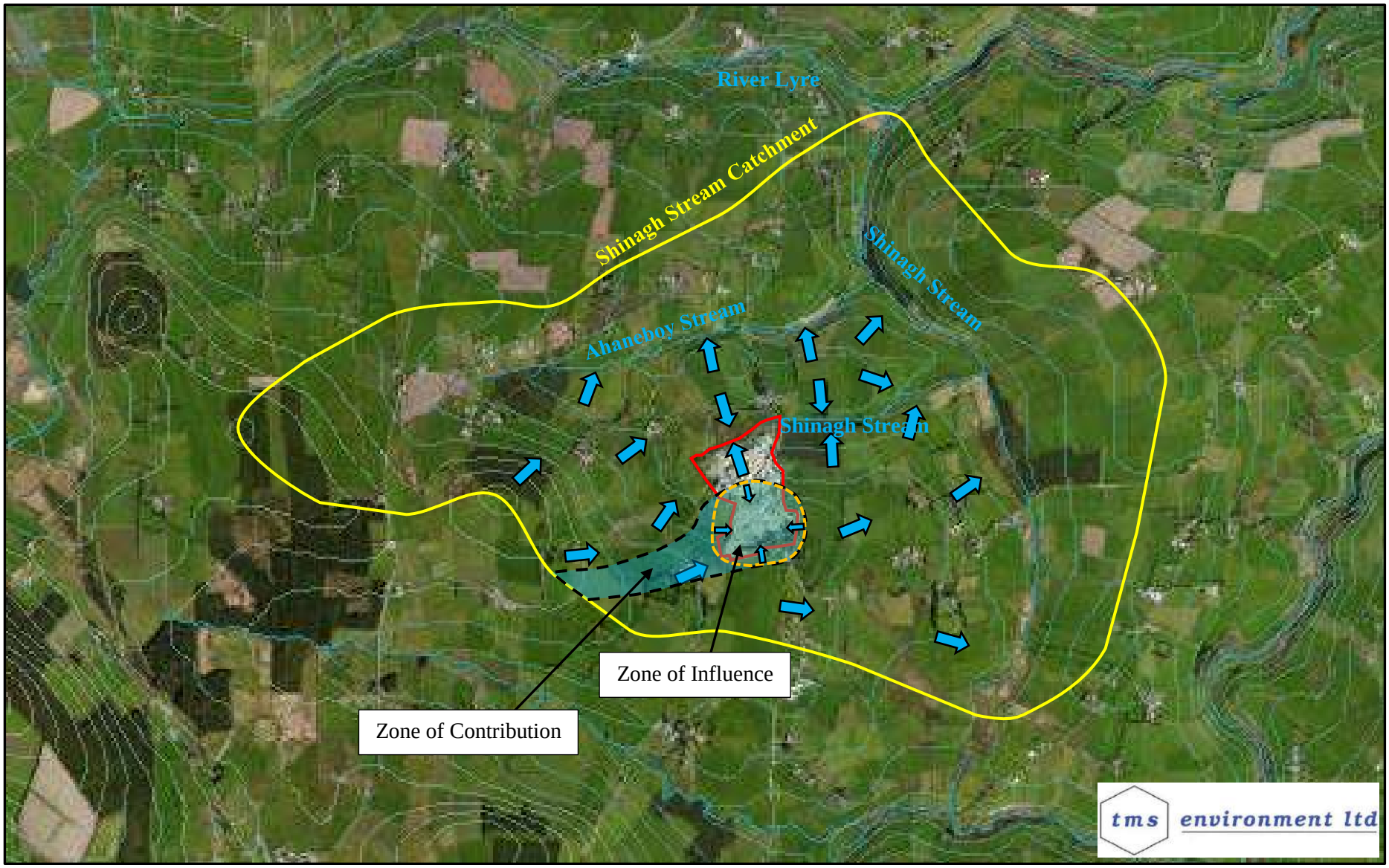
GENERAL REMARKS

50mm solid pipe installed to 9.00m bgl.

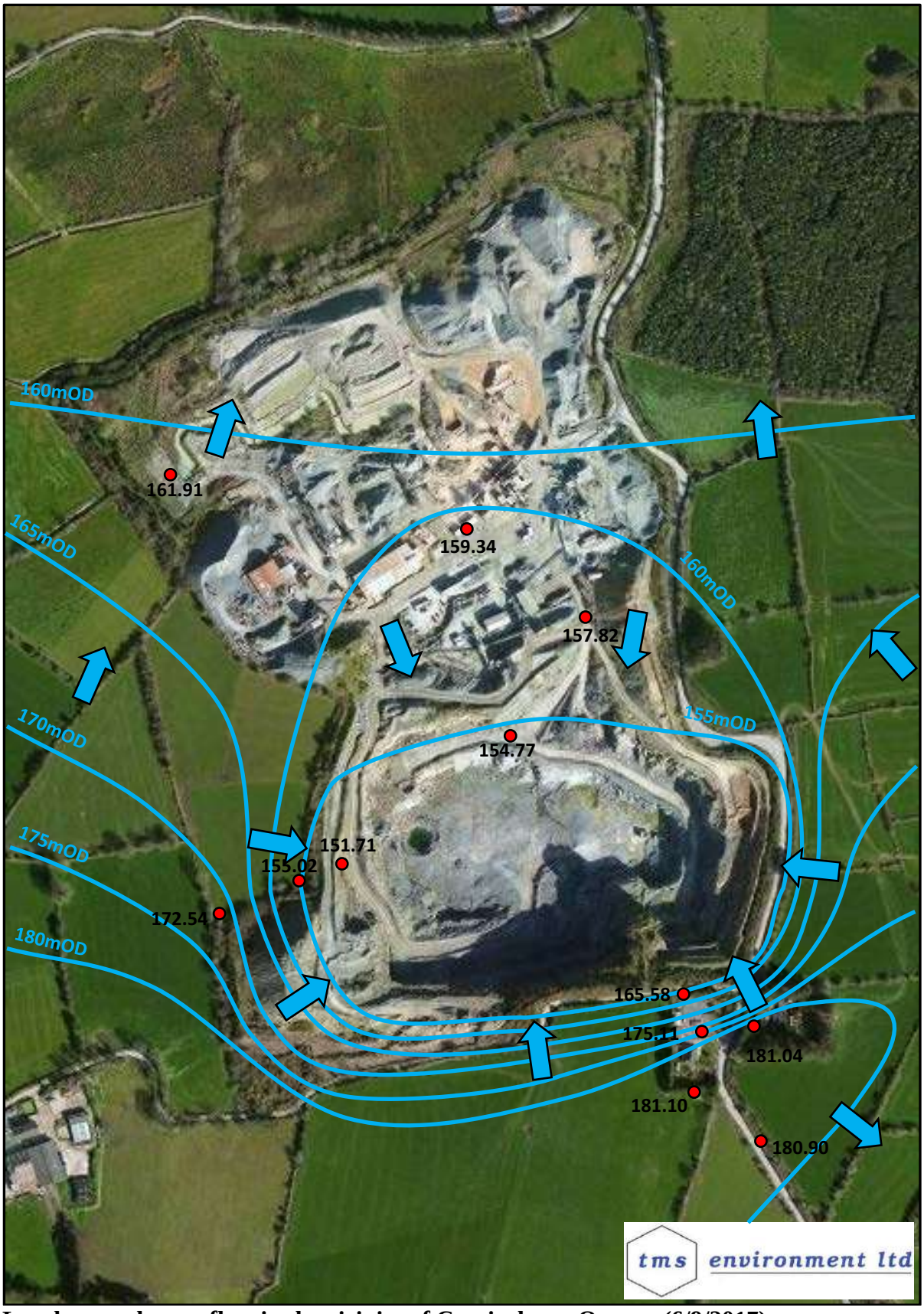
All dimensions in metres Scale 1:68.75	Client: Lagan	Method/ Plant Used: Hydreq	Bit: NQ Design	Driller: AS	Logged By: EAT

IDL AGS3 UK DH BWEENG RC MW9 JUNE 28 2017.GPJ IDL TP TEMPLATE.GDT 28/6/17

Appendix 7-F:
Regional and Local Groundwater Flow Direction Illustrations



Regional groundwater flow in the vicinity of Carrigcleena Quarry



Local groundwater flow in the vicinity of Carrigcleena Quarry (6/9/2017)

Appendix 7-G:
Field Record Sheets

GROUNDWATER SAMPLING FIELD RECORD SHEET

Site location: Bweeng, Co Cork
SLR job number: 501.00584.00023
Date: 10/05/2021 – 11/05/2021
Time: 11:00 – 17:45 on site. 07:30 – 12:40 on site
Staff: Jake Shiel
Equipment: Waterra, YSI, Dipmeter, Loggers.

	MW03	MW04	MW05	MW07	MW09
Groundwater level (m bgl)	3.81	25.34	4.16	19.14	15.63
Total depth (m)	50	75	75	70	70.5
Volume of water in borehole (litres)					
Waterra/bailer	Waterra	Waterra	Waterra	Waterra	Waterra

Temperature (°C)	10.3	10.4	9.5	10.3	10.5
Dissolved oxygen (%)	8.7	52.5	9.9	56.9	28.9
Dissolved oxygen (mg/l)	0.97	5.85	1.13	6.36	3.21
Specific conductivity (µS/cm)	169.3	412.5	345.0	329.6	173.1
Conductivity (µS/cm)	122.6	297.4	242.9	237.4	125.2
pH	5.97	6.22	6.01	6.19	5.64

	MW03	MW04	MW05	MW07	MW09
pHmv	33.2	19.1	30.5	20.6	51.4

Odour	Occasional	No	No	No	No
Sheen	No	No	No	No	No
Silt	Low	Minor - Low	Low	Low	Minor
Colour	Black	Cloudy Translucent	Dark Grey	Grey Cloudy	Cloudy Translucent
Free product	No	No	No	No	No

Well purged dry	No	No	No	No	No

Any other field observations:

No standpipe in any Borehole except MW09. As a result, foot valve got damaged on the side of the casing. As a of scraping against the casing flecks of metal appeared in the bucket.

MW01: Downloaded Logger and Baro.

MW03: Orange precipitate on logger and rope. Used 10m tubing because other tubing couldn't get further down.10% method. Downloaded Logger.

MW04: Used 30m tubing and 10% method. Tough getting tubing down fully. Downloaded Logger.

MW05: Orange precipitate on logger and rope. Used 10m tubing because other tubing couldn't get further down.10% method. Downloaded Logger.

MW06: Downloaded Logger. Labelled as MW09 on logger.

MW07: Used 30m tubing and 10% method. Tough getting tubing down fully.

MW09: Re-installed logger. Labelled as MW06 on Logger. Could not attach pump directly to casing. Made a stand for the pump to rest on.

ONE WELL VOLUME (50mm diameter casing)	BS 10175
Terrier Borehole with 50mm Pipe	4l/m
6" Borehole with 50mm Pipe	5.5l/m
6" Borehole with 100mm Pipe	11.5l/m
8" Borehole with 50mm Pipe	8.25l/m
8" Borehole with 100mm Pipe	14.25l/m
Note : *Purging should continue until Removal of at least three well volumes, or pH, conductivity and temperature readings have stabilised (any two successive reading are within 10% of eachother). If well is not recovering and it is not possible to meet these criteria then a grab sample should be obtained.*	

Appendix 7-H:
Surface Water and Groundwater Quality Results

		Lab. Report Reference Number:	27398			27568			27908		
	Period		Q2 2020			Q3 2020			Q4 2020		
	Sampling Date		21/05/2020			10/07/2020			22/10/2020		
	Sampling Point		SW1	SW2	SW3	SW1	SW2	SW3	SW1	SW2	SW3
Parameter	Units	Discharge Licence ELV at SW1									
Temperature	Deg C	-	15.1	16.1	15.1	15.4	15.6	15.4	9.7	9.3	9.8
pH	pH Units	6.0 - 9.0	6.7	7.3	6.6	7.78	7.01	7.76	7.01	6.66	6.93
Conductivity	uS/cm @25°C	-	291	703	294	290	250	276	221	172	193
DO	mg/l	-	-	-	-	9.85	6.62	9.27	10.15	8.35	10.6
BOD	mg/l	10	<1	1	1	<2	2.29	<2	<2	2.1	<2
Suspended Solids	mg/l	35	7.1	25.1	5.3	<3	295	46.7	<3	<3	3.4
Total Nitrogen	mg/l	15	3.9	-	-	6.1	0	0	5.85	0	0
Mineral Oil	ug/l	5	<10	-	-	<10	0	0	<10	0	0
Ammonia	mg/l	-	-	<0.02	0.03	0	0.11	0.31	0	0.03	<0.02
Barium	ug/l										
Cadmium	mg/l										
Total Chromium	mg/l										
Copper	mg/l										
Lead	mg/l										
Mercury	ug/l										
Nickel	mg/l										
Zinc	mg/l										
Chromium VI	mg/l										

		Lab. Report Reference Number:	28147			28459			28733		
	Period		Q1 2021			Q2 2021			Q3 2021		
	Sampling Date		19/01/2021			29/04/2021			13/07/2021		
	Sampling Point		SW1	SW2	SW3	SW1	SW2	SW3	SW1	SW2	SW3
Parameter	Units	Discharge Licence ELV at SW1									
Temperature	Deg C	-	8	7.8	7.9	14.3	12.7	12.8	13.2	12.9	12.8
pH	pH Units	6.0 - 9.0	7.6	7.8	7.7	6.9	7.6	7.5	7.4	7.1	7.1
Conductivity	uS/cm @25°C	-	259	189	187	370	311	237	389	423	432
DO	mg/l	-	10.16	9.99	9.91				4.78	3.47	3.62
BOD	mg/l	10	<2	6.1	6.4	2.9	2.5	2.5	<2	<2	2.3
Suspended Solids	mg/l	35	9.1	35	27	5.6	<3	<3	6.5	45	49
Total Nitrogen	mg/l	15	3.51	0	0	4.81	0	0	2.9	0.8	0.87
Mineral Oil	ug/l	5	<10	0	0	<10	0	0	<10	-	-
Ammonia	mg/l	-	0	0.62	0.6	0	<0.02	1.9	-	0.03	0.03
Barium	ug/l										
Cadmium	mg/l										
Total Chromium	mg/l										
Copper	mg/l										
Lead	mg/l										
Mercury	ug/l										
Nickel	mg/l										
Zinc	mg/l										
Chromium VI	mg/l										

		Lab. Report Reference Number:	29162			29451			29887		
	Period		Q4 2021			Q1 2022			Q2 2022		
	Sampling Date		26/10/2021			13/01/2022			05/04/2022		
	Sampling Point		SW1	SW2	SW3	SW1	SW2	SW3	SW1	SW2	SW3
Parameter	Units	Discharge Licence ELV at SW1									
Temperature	Deg C	-	15.6	14.2	14.1	N/A	N/A	N/A	9.9	10.1	9.8
pH	pH Units	6.0 - 9.0	7.4	7.5	7.5	7.43	7.44	7.41	7.3	7.4	7.4
Conductivity	uS/cm @25°C	-	381	234	238	311	301	294	366	244	233
DO	mg/l	-	9.06	9.31	9.36	7.65	7.71	7.15	10.97	10.92	10.69
BOD	mg/l	10	<2	<2	<2	2.9	2.7	3.3	<2	<2	<2
Suspended Solids	mg/l	35	<3	18	16	3.3	16	8.5	6.8	3.8	<3
Total Nitrogen	mg/l	15	5.53	-	-	3.84	3.92	3.91	3.96	4.2	4.21
Mineral Oil	ug/l	5	<10	<10	<10	<10	<10	<10	<10	<10	<10
Ammonia	mg/l	-	-	<0.02	<0.02	-	<0.02	<0.02	<0.02	<0.02	0.02
Barium	ug/l					47.1	49.2	51.3			
Cadmium	mg/l					<0.0006	<0.0006	<0.0006			
Total Chromium	mg/l					<0.0006	<0.0006	<0.0006			
Copper	mg/l					<0.0009	<0.0009	<0.0009			
Lead	mg/l					<0.006	<0.006	<0.006			
Mercury	ug/l					<0.01	<0.01	<0.01			
Nickel	mg/l					<0.003	<0.003	<0.003			
Zinc	mg/l					<0.018	<0.018	<0.018			
Chromium VI	mg/l					<0.002	-	-			

		Lab. Report Reference Number:	30429			30823			31413		
	Period		Q3 2022			Q4 2022			Q1 2023		
	Sampling Date		27/07/2022			06/10/2022			01/03/2023		
	Sampling Point		SW1	SW2	SW3	SW1	SW2	SW3	SW1	SW2	SW3
Parameter	Units	Discharge Licence ELV at SW1									
Temperature	Deg C	-	16.2	14.2	14	13.5	12.8	13	7.2	7.1	7.3
pH	pH Units	6.0 - 9.0	7.4	7.6	7.4	7.24	6.36	6.43	7.3	7.6	7.5
Conductivity	uS/cm @25°C	-	349	172	239	341	229	267	460	276	213
DO	mg/l	-	10.86	7.81	7.69	NR	NR	NR	9.4	9.6	9.5
BOD	mg/l	10	3.8	3.5	3.5	2.4	5.9	2.2	2.5	2.1	2.8
Suspended Solids	mg/l	35	7	<3	<3	15	332	83	4.6	27	12.8
Total Nitrogen	mg/l	15	3.62	-	-	1.85	6.88	3.11	4.07	-	-
Mineral Oil	ug/l	5	<10	-	-	<10	-	-	<10	-	-
Ammonia	mg/l	-	-	0.04	0.03	<0.02	0.22	0.2	-	0.21	0.12
Barium	ug/l										
Cadmium	mg/l										
Total Chromium	mg/l										
Copper	mg/l										
Lead	mg/l										
Mercury	ug/l										
Nickel	mg/l										
Zinc	mg/l										
Chromium VI	mg/l										

		Lab. Report Reference Number:	31780			32070			32434		
	Period		Q2 2023			Q3 2023			Q4 2023		
	Sampling Date		13/06/2023			24/08/2023			08/11/2023		
	Sampling Point		SW1	SW2	SW3	SW1	SW2	SW3	SW1	SW2	SW3
Parameter	Units	Discharge Licence ELV at SW1									
Temperature	Deg C	-	17.7	dry	17.4	16.4	16.6	16.3	8.1	8	8.2
pH	pH Units	6.0 - 9.0	7.56	dry	7.82	8.4	7.5	8.3	8.1	8	8.2
Conductivity	uS/cm @25°C	-	265	dry	284	264	215	226	304	197	252
DO	mg/l	-	9.29	dry	9.56	8.77	8.98	8.91	8.53	8.41	8.61
BOD	mg/l	10	3.2	dry	3.6	2.2	2	2.3	2.4	2.4	2.4
Suspended Solids	mg/l	35	<3	dry	49	16.2	<3	12.7	7.5	<3	3
Total Nitrogen	mg/l	15	2.39	dry	-	3.03	-	-	2.3	-	-
Mineral Oil	ug/l	5	<10	dry	-	<10	-	-	<10	-	-
Ammonia	mg/l	-	-	dry	<0.02	-	<0.02	0.04	-	0.23	0.27
Barium	ug/l										
Cadmium	mg/l										
Total Chromium	mg/l										
Copper	mg/l										
Lead	mg/l										
Mercury	ug/l										
Nickel	mg/l										
Zinc	mg/l										
Chromium VI	mg/l										

		Lab. Report Reference Number:	32763			33174			33625		
	Period		Q1 2024			Q2 2024			Q3 2024		
	Sampling Date		07/02/2024			09/05/2024					
	Sampling Point		SW1	SW2	SW3	SW1	SW2	SW3	SW1	SW2	SW3
Parameter	Units	Discharge Licence ELV at SW1									
Temperature	Deg C	-	4.1	4.2	4.2	10.4	10.3	10.3	11.4	11.2	11.1
pH	pH Units	6.0 - 9.0	8.2	8.1	8.3	8.2	8.1	8.2	8.3	8.1	8.2
Conductivity	uS/cm @25°C	-	297	288	304	224	187	189	326	285	198
DO	mg/l	-	8.91	8.98	8.93	8.81	8.72	8.84	8.73	8.96	9.06
BOD	mg/l	10	3.4	2.1	2.1	5.5	4.5	4.4	5.54	5.09	6.44
Suspended Solids	mg/l	35	7.1	6.4	<3	<3	<3	<3	10.5	5.1	<3
Total Nitrogen	mg/l	15	3.41	-	-	2.5	-	-	3.27	-	-
Mineral Oil	ug/l	5	<10	-	-	<10	-	-	<10	-	-
Ammonia	mg/l	-	-	<0.02	<0.02	-	0.01	0.01	-	0.03	0.29
Barium	ug/l										
Cadmium	mg/l										
Total Chromium	mg/l										
Copper	mg/l										
Lead	mg/l										
Mercury	ug/l										
Nickel	mg/l										
Zinc	mg/l										
Chromium VI	mg/l										

		Lab. Report Reference Number:	32434		
	Period		Q4 2024		
	Sampling Date				
	Sampling Point		SW1	SW2	SW3
Parameter	Units	Discharge Licence ELV at SW1			
Temperature	Deg C	-	8.1	8	8.2
pH	pH Units	6.0 - 9.0	8.1	8	8.2
Conductivity	uS/cm @25°C	-	304	197	252
DO	mg/l	-	8.53	8.41	8.61
BOD	mg/l	10	2.4	2.4	2.4
Suspended Solids	mg/l	35	7.5	<3	3
Total Nitrogen	mg/l	15	2.3	-	-
Mineral Oil	ug/l	5	<10	-	-
Ammonia	mg/l	-	-	0.23	0.27
Barium	ug/l				
Cadmium	mg/l				
Total Chromium	mg/l				
Copper	mg/l				
Lead	mg/l				
Mercury	ug/l				
Nickel	mg/l				
Zinc	mg/l				
Chromium VI	mg/l				

Period		Q2 2021			Q3 2021			Q4 2021		
Sampling Date		29/04/2021			13/07/2021			26/10/2021		
Parameter	Unit	BH1	BH2	MW2	BH1	BH2	MW2	BH1	BH2	MW2
Temperature										
ph		5.2	5.1	6.2	7.21	6.45	5.45	7.3	7.5	7.5
Conductivity	uS/cm @25DegC	90	194	303	702	212	203	229	231	337
DO	mg/l									
BOD	mg/L 02	3.5	3.2	<2	<2	<2	<2	4.4	3.5	<2
COD	mg/L O2	39	21	<5	7	5	<5	68	47	38
Ammonia	mg/L N	0.07	0.1	<0.02	<0.02	0.08	0.04	0.5	0.43	<0.02
Orthophosphate	mg/L							0.03	0.09	<0.02
Nitrite	mg/L N	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.01	0.01	<0.002
Nitrate	mg/L NO3	3.44	5.08	5.26	3.98	5.26	5.9	14	14.4	14.3
Sulphate	mg/L SO42-	2.27	21.42	15.24	5.08	16.6	13.8	19.2	18.8	21.2
Alkalinity	mg/L CaCO3	21	38	120	10	12	109	24	23	101
total dissolved solid	mg/L	56	116	233	2603	42	142	97	155	196
Chloride	mg/L Cl	8.5	31.5	16	11.6	32.2	18.7	31.5	30	19
EPH(C10-40)	µg/L									
Sodium	mg/L	3.66	13.9	11.2				<0.01	11.2	12.1
Potassium	mg/L	0.52	<1.8	1.05				1.89	1.64	1.2
Sulphide	mg/L S2-	<0.020	<0.020	<0.020				<0.01	0.0126	<0.01

Period		Q1 2022			Q2 2022			Q3 2022			Q4 2022		
Sampling Date		10/02/2022			05/04/2022			27/07/2022			07/10/2022		
Parameter	Unit	BH1	BH2	MW7	BH1	BH2	MW7	BH1	BH2	MW7	BH1	BH2	MW7
Temperature													
ph		6.74	6.69	6.91	7.7	7.6	7.3	7.2	7.2	7.02	5.5	5.4	6.7
Conductivity	uS/cm @25DegC	94	198	321	215	221	340	104	213	294	81.5	172	288
DO	mg/l												
BOD	mg/L 02	<2	<2	<2	<2	3.9	2.8	3.9	18	3.9	2.7	3.9	2.1
COD	mg/L O2	18	24	23	53	32	42	5	145	16	15	16	<5
Ammonia	mg/L N	0.04	0.03	0.04	0.04	0.09	0.13	<0.02	0.65	<0.02	0.03	<0.02	<0.02
Orthophosphate	mg/L	<0.02	0.21	<0.02	0.02	0.12	0.13	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Nitrite	mg/L N	<0.5	<0.5	<0.5	<0.002	<0.002	<0.002	<0.002	0.05	<0.002	<0.002	<0.002	<0.002
Nitrate	mg/L NO3	3.51	5.99	5.48	8.83	8.9	7	3.34	3.54	4.81	3.1	4.28	4.73
Sulphate	mg/L SO42-	6.84	19.9	13.7	22.1	24.2	20.9	5.2	19.6	14.2	4.48	17.9	15.1
Alkalinity	mg/L CaCO3	22	9	106	<20	<20	109	10.5	34	114	10	15	118
total dissolved solid	mg/L	138	189	261	149	156	210	53.5	144	200	93	137	208
Chloride	mg/L Cl	10	29.6	17	50	32.5	25	10	4	21.5	11	29	18
EPH(C10-40)	µg/L												
Sodium	mg/L	4.43	15.5	11.1	11.6	12.3	12.7	4.88	<15	12.7	3.95	10.4	11.6
Potassium	mg/L	0.54	1.88	0.93	<1.8	<3.6	0.92	0.36	<9	0.77	0.42	1.07	0.82
Sulphide	mg/L S2-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	1.08	<0.01	<0.01	<0.01	<0.01

Period		Q1 2023			Q2 2023			Q3 2023		Q4 2023	
Sampling Date		09/01/2023			04/04/2023			27/07/2023		08/11/2023	
Parameter	Unit	BH1	BH2	MW7	BH1	BH2	MW7	BH1	BH2	BH1	BH2
Temperature											
ph		6.61	6.74	6.17	7.6	7	7.2	7.2	7.4	8.3	8.1
Conductivity	uS/cm @25DegC	745	785	286	156	166	271	89	174	116	162
DO	mg/l									6.09	6.13
BOD	mg/L 02	7.3	2.4	2.7	5.3	5.6	5.9	2.5	6.1	2.09	3.8
COD	mg/L O2	<5	5	<5	12	28	155	20	19	20	18
Ammonia	mg/L N	1.55	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.17	1.23	0.4
Orthophosphate	mg/L	0.26	<0.02	<0.02	0.03	<0.02	0.06	0.02	<0.02	<0.02	<0.02
Nitrite	mg/L N	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	0.02	0.015	<0.02
Nitrate	mg/L NO3	15.1	3.62	3.69	3.71	3.64	3.73	1.52	2.43	1.95	3.03
Sulphate	mg/L SO42-	10	15	5	<5	19.5	18.2	4.86	20.6	10.3	24.9
Alkalinity	mg/L CaCO3	27	9	78	45	9	100	21	16	27	16
total dissolved solid	mg/L	85	106	147	68	80	166	61	109	74	159
Chloride	mg/L Cl	15.8	25.5	19.5	11.5	22.5	15.8	17	32	12.3	23.3
EPH(C10-40)	µg/L									58	51
Sodium	mg/L	7.64	8.9	9.55	9.1	10.4	9.47	5.3	12	5.2	13
Potassium	mg/L	0.71	1.11	0.76	0.54	<1.8	0.83	1.3	3	3.6	2.2
Sulphide	mg/L S2-	0.0292	<0.01	<0.01	<0.01	<0.01	<0.01	24	35	0.027	0.03

Period		Q1 2024		Q2 2024		Q3 2024	
Sampling Date		10/01/2024		08/04/2024		01/08/2024	
Parameter	Unit	BH1	BH2	BH1	BH2	BH1	BH2
Temperature							
ph		7.4	7.1	7.7	6.9	7.9	7.7
Conductivity	uS/cm @25DegC	121	177	117.4	114	206	184
DO	mg/l	6.91	6.27	7.34	7.55	7.87	7.48
BOD	mg/L 02	2.5	8.8	3.5	3.4	2.9	2.5
COD	mg/L O2	<5	28	12	<5	13	10
Ammonia	mg/L N	<0.02	<0.02	<0.01	0.01	0.03	0.02
Orthophosphate	mg/L	0.02	<0.02	0.03	0.01	0.05	<0.02
Nitrite	mg/L N	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Nitrate	mg/L NO3	3.58	3.3	3.26	3.47	2.28	2.28
Sulphate	mg/L SO42-	<5	21.6	5.06	22.4	24.6	21.4
Alkalinity	mg/L CaCO3	24	18	12	10	17.2	9.56
total dissolved solid	mg/L	92	155	99.5	149	488	252
Chloride	mg/L Cl	11.6	23.5	11.3	21.5	28.6	26.6
EPH(C10-40)	µg/L	6.2	13	5.8	13	11	170
Sodium	mg/L	0.52	1.7	0.6	1.9	18	14
Potassium	mg/L	15	11	16	17	20	3
Sulphide	mg/L S2-	<0.01	<0.01	<0.01	<0.01	0.017	0.017

Appendix 7-I:
Description of Effects (EPA, 2022)

Descriptions of Effects (EPA, 2022)

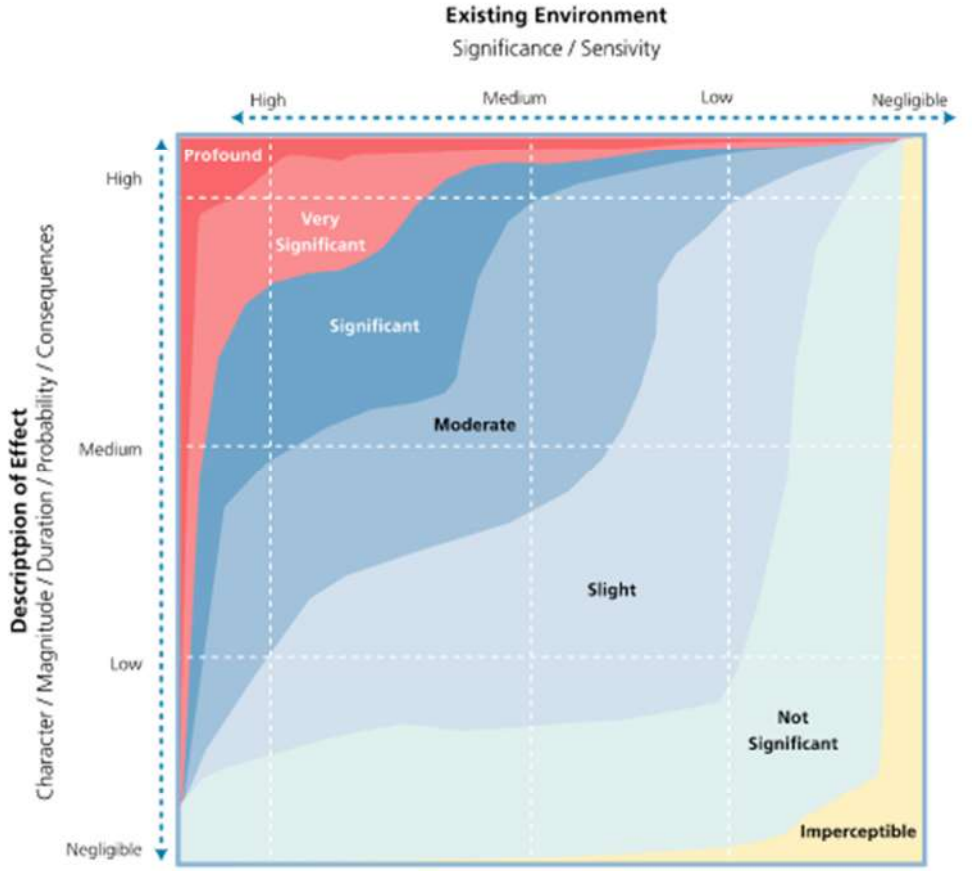
Impact Characteristic	Term	Description
Quality of Effects	Positive Effects	A change which improves the quality of the environment
	Neutral Effects	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error
	Negative / Adverse Effects	A change which reduces the quality of the environment
Describing the Significance of Effects	Imperceptible	An effect capable of measurement but without significant consequences
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight Effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate Effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
	Significant Effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
	Profound Effects	An effect which obliterates sensitive characteristics
Describing the Extent and Context of Effects	Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect
	Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Probability of Effects	Likely Effects	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
	Unlikely Effects	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)
Describing the Duration and Frequency of Effects	Momentary Effects	Effects lasting from seconds to minutes
	Brief Effects	Effects lasting less than a day
	Temporary Effects	Effects lasting less than a year
	Short-term Effects	Effects lasting one to seven years
	Medium-term Effects	Effects lasting seven to fifteen years
	Long-term Effects	Effects lasting fifteen to sixty years

Impact Characteristic	Term	Description
	Permanent Effects	Effects lasting over sixty years
	Reversible Effects	Effects that can be undone, for example through remediation or restoration
	Frequency of Effects	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually.
Describing the Types of Effects	Indirect / Secondary Effects	Likely, significant effects on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway.
	Cumulative Effects	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	Do-Nothing Effects	The environment as it would be in the future should the subject project not be carried out.
	Worst Case Effects	The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
	Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
	Synergistic Effects	Where the resultant effect is of greater significance than the sum of its constituents, (e.g. combination of SOx and NOx to produce smog).

Appendix 7-J:
Classification of the Significance of Effects

Determining Significance

Figure 3.4 shows how comparing the character of the predicted effect to the sensitivity of the receiving environment can determine the significance of the effect.



There are seven generalised degrees of effect significance that are commonly used in EIA. Imperceptible, Not Significant, Slight, Moderate, Significant, Very Significant and Profound. Generalised definitions of each of these are provided in Table 3.4. When more specific definitions exist within a specialised factor or topic, e.g. biodiversity, these should be used in preference to these generalised definitions. (ref. Advice Notes[68].)

(Source: Figure 3.4 Environmental Protection Agency (May 2022), *'Guidelines on the Information to be contained in Environmental Impact Assessment Reports'*).

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APPENDICES

Appendix 8-A: Dust Risk Screening Assessment

Introduction

Background

8.1 This Chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, addresses the potential effects of a planned extension to Bweeng Quarry on air quality. The existing quarry is located at Carrigcleena More, Bweeng, Co. Cork.

8.2 The proposed development being applied for under this current planning application is shown on EIAR Figure 2-2 and will consist of:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c. 3.7 hectares;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Overburden storage;
- Operation landscaping including perimeter screening berms around the proposed extension area; and
- Restoration of the quarry to natural habitat after-uses.

All related ancillary site works within an overall application area of c. 28.8 hectares, and all for a period of 20 years and a further 2 years to complete final restoration of the site.

8.3 Further information on the proposed development, site activities, environmental management systems and controls at the application sites are provided in the Chapter 2 of this EIAR.

8.4 The proposed development at Bweeng Quarry will have the potential to generate fugitive dust emissions and particulates (PM_{10}), which may result in impacts on local air quality. Combustion emissions (primary PM_{10}, and oxides of nitrogen) from vehicle exhaust emissions associated with the extraction and transportation of aggregates may also have the potential to impact on local air pollution.

8.5 The proposed development will have an annual extraction rate of c. 250,000 to 275,000 tonnes per year, in line with existing output levels. Based on this output level the proposed development will generate a maximum of c. 42 HGV trips per day. The existing concrete plant together with the permitted blockyard (not yet constructed) generates a maximum of 23 HGV trips per day. The development will also continue to generate some light vehicular traffic, principally by employees and visitors travelling to and from the quarry. This equates to 26 staff and visitor light vehicle trips daily.

Scope of Work

8.6 The focus of this assessment is the potential impact on local residential amenity of fugitive dust emissions and particulate matter generated by the proposed development. Dust emissions are likely to arise during the following activities:

- soil stripping, earthworks, and topsoil stockpiling (site preparation and restoration works)

- handling and processing of excavated rock
- transfer, end-tipping and stockpiling of aggregates.
- trafficking by heavy goods vehicles (HGVs) over paved / unpaved surfaces
- landscaping and final restoration activities.

8.7 With respect to the potential for air quality impacts, the key objective at the application site is to manage activities to ensure that air emissions are prevented where possible, and the effects of any residual releases are minimised.

8.8 This EIAR chapter describes and assesses the existing air quality baseline characteristics of the area at and around Bweeng Quarry based on site specific surveys and EPA data. Impacts on air quality arising from the proposed development are assessed. Mitigation measures are identified where required, to eliminate and reduce these impacts insofar as practical.

8.9 The following sections of this chapter describe the potential air quality impacts associated with the planned development activities. The following issues are addressed separately:

- relevant legislation, standards, and guidance;
- baseline conditions pertaining to measured (or estimated) existing air quality levels around the existing quarry footprint;
- methodology used to assess the potential impacts of planned activities on air quality at local properties;
- assessment of the impacts;
- description of mitigation measures that are incorporated into the construction, design and operation of the proposed development to eliminate or reduce the potential for increased air quality impacts (if required);
- summary of any residual impacts and reinstatement;
- summary of cumulative impacts; and
- monitoring proposals.

Consultations / Consultees

8.10 Following a review of published development plans and site surveys, it was considered that there was no requirement for any further formal external consultations to be carried out in respect of air quality for the purposes of this assessment. There was however significant consultation with other specialist contributors to this EIA Report.

Contributors / Author(s)

8.11 The air quality impact assessment presented in this Chapter was prepared by SLR Consulting Ireland. The lead consultant for the study was Tim Paul MSc CEng MIEI MICS MIQ.

Limitations / Difficulties Encountered

8.12 This assessment is compiled based on published regional and local data, guidance documents, and site-specific field surveys. No difficulties were encountered in compiling the required information.

Regulatory Background

8.13 The following sections describe the main legislative policy requirements in respect of air quality associated with the proposed development.

Legislation

Air Quality Standards

8.14 The Government's policy on air quality within Ireland is set out in the Air Quality Standards (AQS) Regulations 2011. The CAFE Directive was transposed into Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). It replaces the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and the EPA Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999 (S.I. No. 33 of 1999). The 4th Daughter Directive was transposed by the Arsenic, Cadmium, Mercury, Nickel, and Polycyclic Aromatic Hydrocarbons in Ambient Air Regulations 2009 (S.I.no. 58 of 2009).

8.15 The AQS sets out a framework for reducing hazards to health from air pollution and ensuring that international commitments are met in Ireland.

8.16 The AQS sets standards and objectives for ten priority pollutants. Standards establish concentrations of pollutants in the atmosphere which can broadly be taken to provide a certain level of environmental quality. Objectives are policy targets, often expressed as maximum concentrations, not to be exceeded (either without exception, or with a limited number of exceedances within a specified timescale).

8.17 Under the AQS, the following pollutants are monitored and controlled:

- nitrogen oxides
- sulphur dioxide
- carbon monoxide
- ozone
- particulate matter (PM_{10}, $PM_{2.5}$ and black smoke)
- benzene and volatile organic compounds
- heavy metals; and
- polycyclic aromatic hydrocarbons.

8.18 These pollutants are monitored at 32 stations across the country and together they form the national ambient air quality network. A summary of relevant air quality limit values in relation to human health are presented in Table 8-1. Air quality limit values in relation to vegetation protection are presented separately in Table 8-2.

8.19 The air quality monitoring network is coordinated and managed by the EPA, as the National Reference Laboratory for air quality. The results of the monitoring are compared to limit values set out in EU and national legislation on ambient air quality. Map-based assessments of air quality are prepared and published by the EPA.

Table 8-1 Relevant Air Quality Limit Values for Protection of Human Health

Human Health	Limit or Target Value			Information and Alert Thresholds (where applicable)		Long Term Objective
Pollutant	Averaging Period	Value	Maximum Number of Allowed Occurrences	Period	Threshold Value	
Nitrogen Dioxide (NO_2)	Hour	200 µg/m^3	18	1 hour alert	400 µg/m^3 Exceeded for 3 consecutive hours	
	Year	40 µg/m^3	0			
Sulphur Dioxide (SO_2)	Hour	350 µg/m^3	24	1 hour alert	500 µg/m^3 Exceeded for 3 consecutive hours	
	Day	125 µg/m^3	3			
Particulate matter with aerodynamic diameter of less than 10 µm (PM_{10})	Day	50 µg/m^3	35			
	Year	40 µg/m^3	0			
		20 µg/m^3 (ECO)				

Table 8-2 Summary of Air Quality Limit Values: Protection of Vegetation

Vegetation		Critical level or Target Value		Long-term Objective
Pollutant	Averaging Period	Value	Value	Date
Nitrogen dioxide (NOx)	Calendar year	30 µg/m^3		
Sulphur Dioxide (SO_2)	Calendar year and winter (October to March)	20 µg/m^3		

Planning Policy and Development Control

National Spatial Strategy (NSS) / National Planning Framework – Project Ireland 2040

8.20 The National Planning Framework 2040 (published in February 2018) is a national planning framework for Ireland. The framework provides the policies for all regional and local plans. In the framework, the extractive industries are recognised as important for the supply of aggregates and construction materials to variety of sectors. It emphasises that the planning process will play a key role in realising the potential of the extractive industries and protecting

reserves of aggregates and minerals. Aggregates and minerals will continue to be enabled where this is compatible with protection of the environments.

8.21 There are no specific policies in relation to air emissions in NPF for extractive or production of construction aggregates and materials. The general objective is to facilitate development and to protect the environment at the same time.

Guidelines Extractive Industry Emissions Limit Values

8.22 Section 261 of the Planning and Development Act 2000 (as amended), which regulated a significant proportion of established extractive development, came into effect in April 2004. The planning guidelines[1] for the extractive industries '*Quarries and Ancillary Activities – Guidelines for Planning Authorities'* were published by the Department of the Environment, Heritage, and Local Government at around the same time.

8.23 Separately, in 2006, the EPA published complementary guidance aimed at quarry operators, planning authorities and the general public *Environmental Management Guidelines for Environmental Management in the Extractive Industry (Non-Scheduled Minerals)*[2].

8.24 The Irish Concrete Federation (ICF), the trade body representing the interests of quarry operators and producers of construction materials, has also published the ICF Environmental Code to provide guidance for its members on best practice in the environmental management of quarries. The document was last updated in 2005.

Site Specific Dust Deposition Emission Limit Values

8.25 Condition 23 attached to P. Ref. QR073 (as amended by ABP Ref. 04.QC.2156) states:

> *Dust deposition levels arising from activities on the site shall not exceed 350 milligrammes per square metre per day averaged over 30 days when measured at the site boundary by a suitably qualified person.*

Guidance Relating to Air Quality / Dust Nuisance

8.26 A range of monitoring techniques exists for dust deposition rates (i.e., Bergerhoff and Frisbee gauges). There is currently no Irish, European Union (EU) or World Health Organisation (WHO) statutory standards or limits appropriate for the assessment of deposited dust and its propensity to generate annoyance.

8.27 Industry standard criteria levels for the gravimetric assessment of dust deposition from extractive industry in Ireland are set out in the DoEHLG (2004) planning guidelines for the extractive industry, the ICF Guidelines (2005) and EPA (2006) Environmental Management Guidelines. Each of these Guidelines recommend the use of the Bergerhoff method for measuring dust deposition. In line with this approach, the guidelines recommend the TA Luft dust deposition limit value of 350 mg/m^2/day (total dust deposition averaged over a 30-day period), measured at site boundaries

8.28 When the rate of accumulation of the coarser fraction of dust (referred to as deposited dust) is sufficiently rapid to cause fouling or discolouration, then it is generally considered to

[1] Quarries and Ancillary Activities – Guidelines for Planning Authorities (DoEHLG, 2004)

[2] https://www.epa.ie/pubs/advice/general/EPA_management_extractive_industry.pdf

introduce a nuisance. The point at which an individual perceives dust deposition as a nuisance and causes a complaint is highly subjective.

8.29 The action of wind over dry ground will carry dust particles into the air. Although large emissions of dust occur naturally, man-made dust events are caused by a range of activities including agriculture, road traffic, construction works (including the handling and storage of soils and particulate matter) and by vehicles using paved and unpaved haul roads.

8.30 For operations involving the mechanical break up of solids, the most common concern regarding dust emissions is the potential nuisance effect from the larger fractions of dust.

Guidance on Assessment of Mineral Dust Impacts for Planning

8.31 Guidance on the assessment of the impacts of extractive operations on air quality has been prepared by the Institute of Air Quality Management (IAQM, 2016)[3]. This guidance uses a simple distance-based screening process to identify those operations where the dust impacts are unlikely to be significant and therefore require no further assessment. Where more detailed assessment is required, a basic assessment framework is presented which employs the Source-Pathway-Receptor approach to evaluate risk of impacts and effects.

Air Quality and Ecological Receptors

8.32 Much of the research on the effects of particulate matter on vegetation has focussed on the chemical effects of alkaline dusts. A summary of a review of available research on behalf of the UK's Department for the Environment Transport and Regions (DETR) concluded that:

"The issue of dust on ecological receptors is largely confined to the associated chemical effect of dust, and particularly the effect of acidic or alkaline dust influencing vegetation through soils."

8.33 An Interim Advice Note (IAN) prepared as a supplement for Volume 11, Section 3, Part 1 of the UK DMRB (Design Manual for Roads and Bridges) and now incorporated into LA 105) suggests that only dust deposition levels above 1,000 mg/m^2/day are likely to affect sensitive ecological receptors. This level of dust deposition is approximately five times greater than the level at which most dust deposition may start to cause a perceptible nuisance to humans. It states that most species appear to be unaffected until dust deposition rates are at levels considerably higher than this.

8.34 Guidance on the assessment of the air quality impacts of development on designated nature conservation sites prepared by the Institute of Air Quality Management (IAQM, 2019). This guidance is also useful to evaluate the effects of air pollution on habitats and species using air quality assessment.

8.35 The predicted scale of dust effects may be classified as either 'significant', or not 'significant'. Where effects are predicted to be 'significant', further mitigation is likely required before the proposals are to be acceptable under planning policy.

Air Quality and Health Effects

8.36 The main health effects of air pollution can include stroke, heart disease, lung cancer, and both chronic and acute respiratory diseases, including asthma. These conditions can lead to sickness and ill health as well as premature mortality.

[3] http://www.iaqm.co.uk/text/guidance/mineralsguidance_2016.pdf

8.37 The recent EPA reports, Air Quality in Ireland 2021 detail the main air quality trends based on monitoring from the national ambient air quality network.

8.38 Ireland met all the EU legal requirements in 2021 but failed to meet the WHO guidance levels for health in 2021. Selected pollutants that failed the WHO AQG levels in 2021 were: PM_{10}, $PM_{2.5}$, NO_2, Ozone, SO_2, and PAHs.

8.39 Europe as part of the Green Deal and the EU's Zero pollution visions for 2050 is revising its air quality standards to align them closely with the lower WHO recommendations.

8.40 A summary of relevant Air Quality limit values in relation to human health was presented previously in Error! Reference source not found..

Receiving Environment

Study Area

8.41 The application site is located within the townland of Carrigcleena More, Bweeng Co. Cork, approximately 2.5 km northeast of Bweeng village. The application site and the overall site are located within undulating rural agricultural landscape.

8.42 There are isolated private residential property and agriculture farms located throughout the surrounding rural landscape, predominantly along the local road network.

8.43 Two local roads bound the quarry at its southern and eastern boundaries. Access to the quarry is from local road L1214 approximately mid-way at the eastern site boundary. The Reamanagh Stream bounds the quarry to the north and flows in an easterly direction into the Lyre River a tributary of the River Blackwater.

8.44 The lands surrounding and within the application site predominantly comprise farm fields. The application site is not subject to any statutory or non-statutory nature conservation designations. Dwellings in the vicinity of application site are generally located along the local road network comprise farmsteads or isolated on-off residences, with occasional small clusters. The nearest dwellings to the application site boundary are shown in Figure 8-2.

Baseline Study Methodology

Baseline Dust Monitoring

8.45 Ongoing, baseline dust monitoring has been undertaken by TMS Environmental Ltd to measure compliance with the 350 mg/m^2/day emission limit around the existing quarry footprint.

8.46 Monitoring was undertaken using the 'Bergerhoff method' referred to in the TA Luft Air Quality Standard. The 'Bergerhoff' dust deposition gauge used in the survey comprises a plastic collection bottle with protective basket, mounted on a post and set at 1500 mm above ground level. The input of atmospheric borne particulate material into the collection bottle takes place over a pre-determined measurement period (usually one month) by exposing it to the environment. The total dust collected in the bottle is expressed as deposition of total particulate matter (mg/m^2/day) arising from human activity in the area surrounding the application site.

PM_{10} Monitoring

8.47 The application site and surrounding area fall into Air Quality Zone D, categorised as rural Ireland by the EPA. The nearest PM_{10} air quality monitoring location within a similar Zone D area is located at Mallow, Co. Cork. As such, it is considered the most appropriate dataset available for assessment of air quality baseline concentrations within the study area.

Sources of Information

8.48 A desk study was carried out to examine all relevant information relating to air quality conditions around the application site. Met Eireann, the National Meteorological Service, was consulted in relation to the climate / weather data in respect of the study area (https://www.met.ie/climate-ireland/1971-2000/rosslare.html). The EPA website was examined to note information on baseline air monitoring data around the application site (http://www.epa.ie/air/quality/data/).

8.49 Information published on its website by the National Parks and Wildlife Service (NPWS) (http://webgis.npws.ie/npwsviewer/), (part of the Department of the Environment, Community and Local Government, DoECLG), in respect of designated ecological sites, protected habitats and species was also reviewed, together with Ordnance Survey maps and aerial photography (http://map.geohive.ie/mapviewer.html).

Field Survey / Monitoring / Inspection Works

8.50 Dust deposition surveys were undertaken at and around the application site by TMS Environmental Ltd, at monitoring locations shown in Figure 8-2. The dust deposition monitoring results recorded over this period are presented and reviewed as part of this assessment. A survey of the extent of existing residential housing around the application site was also undertaken.

8.51 The locations of baseline dust deposition monitors are shown on Figure 8-2 are as follows:

- D1 – located at the north-eastern boundary
- D2 – located at the south-eastern boundary
- D3 –located at the south-western boundary
- D4 –located at the north-western boundary

Background Air Quality

8.52 As previously noted, the closest air quality monitoring location to the quarry in a similar Zone D area is located at Mallow, Co. Cork. Monitoring stations continuously monitor concentrations of particulate matter with an aerodynamic diameter of less than 10 µm (PM_{10}). Recent annual mean concentrations monitored at Mallow (published on the EPA website[4]) are presented in Table 8-3 below.

[4] Secure Archive for Environmental Research Data – http://erc.epa.ie/safer/.

Table 8-3 Background PM_{10} Concentrations Mallow, Co. Cork (Source: EPA)

Year	Annual Mean (µg/m³)	Number of Days >50 µg/m³
2022	13.5	1

8.53 Table 8-3 above indicates that PM_{10} concentrations monitored at the Mallow monitoring site are below the annual mean Air Quality Standards (AQS) of 40 µg/m³ and comply with the requirement that a 24-hour mean of 50 µg/m³ should not be exceeded more than 35 times in a calendar year.

8.54 For rural areas, such as those surrounding the application site, the primary source of PM_{10} would be residential solid fuel emissions and local agricultural or rural based activities for deposited dust.

Dust Deposition Monitoring

8.55 The results of the quarterly dust deposition monitoring undertaken by TMS Environmental Ltd. between January 2020 and 2024 are presented in Table 8-4 below.

Table 8-4 Dust Deposition Monitoring Results

Period	Sample Date	Report Ref.	D1 (mg/m²/day)	D2 (mg/m²/day)	D3 (mg/m²/day)	D4 (mg/m²/day)
Q1 2020	09/01/2020 - 06/02/2020	27151	98	56	181	102
Q2 2020	21/05/2020 - 18/06/2020	27490	88	36	69	Note 1
Q3 2020	09/07/2020 - 12/08/2020	27699	171	Note1	257	Note 2
Q4 2020	22/10/2020 - 26/11/2020	28007	106	73	33	33
Q1 2021	19/01/2021 - 17/02/2021	28227	Note 1	328	163	101
Q2 2021	29/04/2021 - 25/05/2021	28551	34	234	224	Note1
Q3 2021	13/07/2021 - 17/08/2021	28865	181	Note 2	Note 1	Note 2
Q4 2021	26/10/2021 - 25/11/2021	29275	44	Note 1	Note 2	163
Q1 2022	13/01/2022 - 11/02/2022	29601	131	Note 1	Note 2	Note 1
Q2 2022	05/04/2022 - 04/05/2022	30093	120	126	50	75
Q3 2022	27/07/2022 - 30/08/2022	30591	55	316	Note 1	Note 1

Period	Sample Date	Report Ref.	D1 (mg/m²/day)	D2 (mg/m²/day)	D3 (mg/m²/day)	D4 (mg/m²/day)
Q4 2022	06/10/2022 - 08/11/2022	31002	45	132	38	77
Q1 2023	23/02/23 – 23/03/23	31503	156	69	99	83
Q2 2023	04/04/23 – 02/05/23	31625	Note 1	21	12	133
Q3 2023	25/07/23 - 22/08/23	32069	80	30	183	92
Q4 2023	08/11/23 – 06/12/23	32549	153	135	45	61
Q1 2024	10/01/24 - 07/02/23	32764	38	73	344	83
Q2 2024	09/05/24 – 06/06/24	33277	94	41	329	181
Note 1 – Organic contamination in the vessel.						
Note 2- Collection vessel broken.						

8.56 As may be seen, the recorded dust deposition rates at Bweeng Quarry are below the compliance deposition limit of 350 mg/m^2/ day measured at the site boundary.

Meteorology: Dispersion of Emissions

8.57 The most important climatological parameters governing the atmospheric dispersion of particles are as follows:

- wind direction determines the broad transport of the emission and the sector of the compass into which the emission is dispersed; and
- wind speed will affect ground level emissions by increasing the initial dilution of particles in the emission. It will also affect the potential for dust entrainment.

8.58 Rainfall is also an important climatological parameter in the generation of dust; enough rainfall can suppress dust at the source and eliminate the pathway to the receptor. According to Arup (1995)[5], rainfall greater than 0.2 mm per day is sufficient to suppress dust emissions.

Local Wind Speed and Direction Data

8.59 The closest weather station with sufficient records of wind direction and wind speed considered representative of conditions experienced at the application site is Cork Airport Meteorological Station. A windrose for the average conditions recorded at Cork Airport over an 18-year period is presented in Error! Reference source not found.. The predominant wind

[5] Arup Environmental, Ove Arup and Partners (1995) The Environmental Effects of Dust from Surface Mineral Workings, HMSO, London (ISBM 11 75 3186 3)

direction is from the south-western quadrant. Moderate to high-speed winds (>2 m/s) occur for approximately 92.3% of the time.

Rainfall Data

8.60 Relevant rainfall data applicable to the site has been obtained from the Irish Meteorological Service website for the Cork Airport station (1981 – 2010). The annual average days with rainfall greater than 0.2 mm are 204 days per year. Natural dust suppression (from rainfall) is therefore considered to be effective for 55% of the year.

Sensitive Receptors

Ecological Receptors

8.61 The application site is not subject to any statutory nature conservation designation. There is one Natura 2000 site within a 2 km radius of the application site at Bweeng, this site is identified in Table 8-5.

Table 8-5 Natura 2000 or Designated Site(s) within a 2 km of Application Site

Natura 2000 Site	Site Code	Location at Closest Point to Application Site (m)
Blackwater River (Cork/Waterford) SAC	002170	2100

8.62 Based on the nature, size, and scale of the planned development, it is considered that the maximum distance for which the project should be evaluated in terms of Natura 2000 or designated nature sites is up to a maximum radius of 2 km unless there are any potential source-pathway-receptor links between the proposed development at Bweeng any Natura 2000 or designated site(s) beyond this distance. At a distance greater than 2 km, and in the absence of any potential source-pathway-receptor link, it is generally considered that no Natura 2000 or designated sites would be affected by any direct loss of habitat or otherwise impacted upon.

8.63 At 2.1 km from the application site, at its closest point, the Blackwater River SAC lies just within the potential zone of influence of the proposed development at Bweeng Quarry and as such, it is therefore deemed appropriate to screen it in as part of this air quality assessment.

Human Receptors

8.64 Sensitive locations are those where people may be exposed to dust from existing or planned activities. Locations with a high sensitivity to dust include hospitals and clinics, hi-tech industries, painting and furnishing and food processing. Locations classed as being moderately sensitive include schools, residential areas, and food retailers.

8.65 There nearest sensitive receptors to the application area are detailed in Table 8-6 below

Table 8-6 Nearest Sensitive Receptors to the Application Area

Receptor reference	Receptor	Sensitivity	Distance (m) / Direction from site boundary
R01	Residential	Medium	200 / N
R02	Residential	Medium	300 / NW
R03	Residential	Medium	500 / W
R04	Residential	Medium	800 / W
R05	Residential	Medium	800 / W
R06	Residential	Medium	300 / SW
R07	Residential	Medium	300 / SW
R08	Residential	Medium	200 / S
R09	Residential	Medium	300 / SE
R10	Residential	Medium	500 / E

Scoping

Evaluation Methodology

8.66 Fugitive dust emissions and particulate matter arising from the application site activities have the potential to affect existing sensitive receptors in the area due to a potential increase in airborne dust deposition.

8.67 Increased combustion emissions (primarily oxides of nitrogen) from vehicle exhaust emissions associated with the proposed development also have the potential to contribute to local air pollution.

8.68 The significance of impacts due to emissions from the application site are dependent upon the magnitude of the emissions, the prevailing meteorological conditions for the location, and the proximity of sensitive locations to the emission sources.

8.69 This impact assessment is based upon a comparison of the baseline (both current and projected without the new development proposals) situation against the air quality impacts resulting from the 'with development' proposal scenario. The potential for 'in-combination' effects from other planned or proposed sources or air pollutants in the area has also been considered.

8.70 Each of the activities associated with extraction development have been assessed for potential air quality impacts including:

- emission from preparatory works, including demolition, construction and stripping, placement and stockpiling of soil (construction stage earthworks / trackout);
- emissions from rock extraction and processing ;

- emissions from the transfer, end-tipping and stockpiling of aggregates;
- PM_{10} contribution from operational activities; and
- traffic exhaust emissions.

8.71 The methodology used in each assessment is presented in the sub-sections below which also provide an explanation of the significance criteria to describe the impacts of the proposed development on air quality.

8.72 For the purposes of environmental assessment of releases of dust from construction and mineral activities, the classifications of PM_{10} and 'deposited dust' are typically applied. The impacts associated with PM_{10} are related to potential health impacts while deposited dust is related to potential nuisance effects. The assessment of the potential impacts of each fraction has, therefore, been undertaken separately.

Significance Criteria

8.73 The following air quality specific significance criteria have been used to assess the significance of air quality impacts in preference to overall descriptors of significance.

8.74 To determine the significance of particulate matter effects associated with the development, an evaluation of the sensitivity of the surrounding area is required. Receptors can demonstrate different sensitivities to changes in environment and are classified as per Table 8-7 below (and IAQM Construction Dust Guidance).

Table 8-7 Methodology for Defining Sensitivity to Dust and PM_{10} Effects

Sensitivity of Area	Human receptors	Ecological Receptors(a)
Very High	Very densely populated area More than 100 dwellings within 20 m Local annual mean PM_{10} concentrations exceed the Objective. Works continuing in one area of the site for more than 1-year	European Designated sites
High	Densely populated area. 10-100 dwellings within 20 m of site. Local annual mean PM_{10} concentrations close to the Objective (36 – 40 µg/m^3)	Nationally Designated sites
Medium	Suburban or edge of town Less than 10 receptors within 20 m Local annual mean PM_{10} concentrations below the Objective (30 – 36 µg/m^3)	Locally designated sites
Low	Rural area; industrial area No receptors within 20 m	No designations

Sensitivity of Area	Human receptors	Ecological Receptors(a)
	Local annual mean PM_{10} concentrations well below the Objective (<30 µg/m^3) Wooded area between site and receptors	
Very High	Very densely populated area More than 100 dwellings within 20 m Local annual mean PM_{10} concentrations exceed the Objective. Works continuing in one area of the site for more than 1-year	European Designated sites
Notes: (a)-Only applicable if ecological habitats are present which may be sensitive to dust effects.		

8.75 Table 8-8 below illustrates how the interaction of magnitude and sensitivity results in the significance of an environmental effect, with the application of mitigation measures as per the IAQM Construction Dust Guidance.

Table 8-8 Impact Significance Matrix – Dust Effects (With Mitigation)

Sensitivity of Surrounding Area	Risk of Site Giving Rise to Dust or PM_{10} Effects		
	High	Medium	Low
Very High	Slight Adverse	Slight Adverse	Negligible
High	Slight Adverse	Negligible	Negligible
Medium	Negligible	Negligible	Negligible
Low	Negligible	Negligible	Negligible

Construction Stage Dust Impacts - Methodology

8.76 The Institute of Air Quality Management (IAQM) assessment of risk at construction stage is determined by considering the predicted change in conditions because of the proposed development. The risk category for potential effects arising from preparatory site works is divided into two potential activities:

- earthworks
- trackout.

8.77 Based on the scale and nature of the works including areas, soils and operations at the site, a dust emission class is defined for each of the activities. These dust emission classes are then used to determine the risk categories presented below. These risk categories determine the potential risk of dust soiling effects assuming no mitigation measures are applied.

8.78 Table 8-9 illustrates how the interaction of distance to the nearest receptor and the dust emission class results in the determination of risk category from ***earthworks activities***.

Table 8-9 Determination of Risk Category from Earthworks Activities

Distance To Nearest Receptor		Dust Emission Class		
Human (m)	**Ecological (m)**	**Large**	**Medium**	**Small**
<20	-	High Risk Site	High Risk Site	Medium Risk Site
20 – 50	-	High Risk Site	Medium Risk Site	Low Risk Site
50 – 100	<20	Medium Risk Site	Medium Risk Site	Low Risk Site
100 – 200	20 – 40	Medium Risk Site	Low Risk Site	Negligible
200 – 350	40 – 100	Low Risk Site	Low Risk Site	Negligible

8.79 Table 8-10 illustrates how the interaction of distance to the nearest receptor and the dust emission class results in the determination of risk category from ***trackout movements***.

Table 8-10 Determination of Risk Category from Trackout Movements

Distance To Nearest Receptor		Dust Emission Class		
Human (m)	**Ecological (m)**	**Large**	**Medium**	**Small**
<20	-	High Risk Site	Medium Risk Site	Medium Risk Site
20 – 50	<20	Medium Risk Site	Medium Risk Site	Low Risk Site
50 – 100	20 – 100	Low Risk Site	Low Risk Site	Negligible

8.80 Mitigation measures are recommended based on the evaluation of risk in accordance with the IAQM Dust and Air Emissions Mitigation Measures Guidance.

Operation Stage Dust Impacts - Methodology

8.81 A staged approach has been adopted to the assessment of operations stage impacts generated by the proposed development. This ensures that the approach taken for the assessment of risk is proportional to the risk of an unacceptable impact being caused. As such, where a simple review of the situation shows that risk of a health or nuisance impact is negligible, this will be sufficient. In cases where the risk cannot be regarded as insignificant, a more detailed assessment may be required, such as a quantitative screening assessment or an advanced dispersion modelling exercise, as appropriate.

8.82 Guidance on the assessment of the impacts of extractive operations on air quality has been prepared by the Institute of Air Quality Management (IAQM). This guidance uses a simple distance-based screening process to identify those operations where the dust impacts are unlikely to be significant and therefore require no further assessment. Where assessment that is more detailed is required, a basic assessment framework is presented which employs the Source-Pathway-Receptor approach to evaluate risk of impacts and effects.

8.83 The predicted scale of dust effects may be classified as either 'significant', or not 'significant'. Where effects are predicted to be 'significant', further mitigation is likely required before the proposals are to be acceptable under planning policy.

8.84 A semi-quantitative assessment of fugitive dust emissions from the proposed development has been undertaken. The assessment has been undertaken by constructing a conceptual model that takes into consideration the potential sources, surrounding receptors, and the pathway between source and receptor to assess the magnitude of risk of impact on local amenities.

8.85 The distance from the source to the sensitive receptor is crucial. The initial risk screening stage (Tier 1) focuses upon the potential for dust generation at the site and the distance between source and receptors. In Tier 1 of the assessment, a representative selection of dust sensitive receptors in each direction of the application site is identified within the 1 km study area.

8.86 Further assessment is required for those nearest receptors within 500 m of dust generating activities. Receptors within 500 m of dust generating processes progress onto a Tier 2 assessment. Other residential receptors beyond 500 m are considered too far away to be impacted by potential dust from the site and not considered any further in this assessment.

8.87 Tier 2 involves identifying source-pathway-receptor linkages and a semi-quantitative assessment of the likelihood and magnitude of any effects that could be associated with each pollutant linkage. This assessment takes account of:

- wind direction and speed data (to estimate frequency of exposure)
- proximity to source (to estimate magnitude of exposure)
- sensitivity of receptor
- occurrence of natural dust suppression (rainfall patterns).

8.88 This information is used to inform a semi-quantitative assessment of the likely magnitude of impact and is based upon professional experience of the assessor as the issue of dust nuisance on local receptors is a subjective issue, where public perception on what constitutes 'acceptable' levels varies from one person to the next. Assigning significance to nuisance impacts is qualitative and involves a judgement based on the likely magnitude, frequency, duration, and reversibility (or recovery) of the impact. In this context, significant impact is taken to mean what is generally not publicly acceptable and desirable.

8.89 Note that the Tier 2 risk screening assessment **does not consider proposed mitigation measures** to be implemented at the proposed development. These will include provision of perimeter screening berms, dust suppression measures etc., identified in the section dealing with Mitigation Measures later in this Chapter.

8.90 Following the results of the risk assessment, mitigation measures are detailed, and the residual impact assessed. The detailed methodology used within the assessment is described in more detail in Error! Reference source not found..

PM_{10} Contribution from Site-Based Activities: Methodology

8.91 In terms of whether the PM_{10} concentration in the local area is likely to exceed the AQS, the following information has been reviewed:

- existing PM_{10} concentrations
- expected additional contribution of PM_{10} from site operations.

8.92 In terms of estimating the potential magnitude of impact from site operations, a UK edition of the LAQM Technical Guidance (LAQM.TG (03)) stated that fugitive dust from stockpiles and quarry operations can potentially contribute up to 5 µg/m^3 towards annual mean background concentrations of the coarse fraction of particulates (2.5 – 10 µm diameters) in the surrounding area.

8.93 Given the nature and scale of proposed activities, the potential PM_{10} impact of increased intake is similar or lower. However, to ensure a robust assessment of potential PM_{10} impacts, the upper limit of 5 µg/m^3 has been applied to represent the development contribution to annual ambient PM_{10} concentrations. This value has then been added to existing background levels to assess whether the Air Quality Standards objective is likely to be exceeded.

Traffic Emissions - Methodology

8.94 Atmospheric emissions related to site proposals are primarily associated with the exhaust emissions from heavy duty vehicles (HDVs also termed heavy goods vehicles HGV's). The decision as to whether an assessment of potential impact is required is based upon the criteria set out in the DMRB.

8.95 The criterion for assessment of air quality contained within the latest DMRB guidance (LA 105) focuses on roads with relatively high changes in flows or high proportion of HDV / HGV traffic.

8.96 The following traffic scoping criteria shall be used to determine whether the air quality impacts of a project can be scoped out or require an assessment based on the changes between the do something traffic (with the project) compared to the do minimum traffic (without the project) in the opening year:

- annual average daily traffic (AADT) >= 1,000; or
- heavy duty vehicle (HDV) AADT >= 200; or
- a change in speed band; or
- a change in carriageway alignment by >= 5 m.

Assessment of Impacts

Construction Stage Impacts – Assessment

8.97 An overview of the sources and processes associated with the preparatory site works (topsoil and overburden removal) and the construction / infrastructure (local road realignment) activities, and their respective potential for dust deposition (both dust and smaller particles), is presented in Table 8-11.

Table 8-11 Site Activities: Sources of Dust Emissions

Activity	Source	Emission potential	Comments
Earthworks and Trackout	Excavators / Dozers / HGVs	High - dry or fine materials during strong windy weather	Temporary, variable from day to day depending on prevailing meteorological conditions, level, and location of activity.
		Low – coarse or wet materials during conditions of low wind speed	Soils immediately used to construct berms, used in restoration works or placed in stockpiles.

8.98 A summary of the determined risk category for proposed operation identified is presented in Table 8-12.

Table 8-12 Site Activities: Risk of Dust Emissions

Source	Risk of Dust Soiling Effects	Ecological Effects
Earthworks	Low risk	Negligible
Trackout	Low risk	Negligible

8.99 While the overall risk category has been assessed as 'low risk' to 'negligible', if the soils stripping activities were not mitigated, the effects of dust during dry and windy conditions could possibly lead to occasional increases in nuisance dust immediately surrounding the application area. However, these are not considered to be significant given the limited duration of such meteorological conditions and the limited change in the extent and scale of the proposed activities.

Operational Stage Dust Impact – Assessment

8.100 When commenced and operational, the principal air quality impacts generated by the proposed development will be dust and traffic related emissions. An overview of the sources and processes associated with the extraction activities, and their respective potential for dust deposition, is presented in table 8-13 below.

Table 8-13 Sources of Particulate Emissions

Activity	Source	Emission potential	Comments
Material transfer to processing area	On-site vehicle, Dry loose material.	High when dry material being handled during strong windy weather	Emissions due to prevailing meteorological conditions and amount of dry loose material. Emissions due to re-suspension of loose material on surfaces.
Processing of rock	Processing plant, Dry loose material	High when dry material being processed during strong windy weather	Emissions due to prevailing meteorological conditions (high winds).

Activity	Source	Emission potential	Comments
Material transfer to storage area	On-site vehicle, Dry loose material	High when dry material being handled during strong windy weather	Emissions due to prevailing meteorological conditions and amount of dry loose material. Emissions due to re-suspension of loose material on surfaces.
Material storage	Dry loose material in stockpiles	High when dry material being stored during strong windy weather	Emissions due to prevailing meteorological conditions (high winds).
Material loading to HGV	On-site vehicle, Dry loose material	High when dry material being handled during strong windy weather	Emissions due to prevailing meteorological conditions and amount of dry loose material. Emissions due to re-suspension of loose material on surfaces.
Transfer off site / traffic off site	HGV / Road vehicles	Low - on paved road surfaces	Dependent on the amount of loose material on road surface available for re-suspension and track out.

Human Receptors

8.101 A total of 10 representative receptors were identified within the c.1 km study area around the application site. Using the tiered assessment methodology, 8 of these receptors located within 500 m have progressed onto a Tier 2 assessment as they are considered to have a greater risk of dust impact. Each receptor is assessed against the frequency of exposure and the distance from the source to the receptor (i.e., the pathway) in accordance with the methodology described in **Appendix 8-A.**

8.102 The frequency of exposure of each receptor is based upon the frequency of winds capable of carrying dust particles blowing in the direction, from the source to the receptor, on days when rainfall does not inhibit dust from becoming airborne. Representative data on the local wind climate is therefore required for this section of the assessment.

8.103 A wind-rose for the site is presented in Error! Reference source not found. for Cork Airport Meteorological Station and illustrates the predominant wind directions from the south-west. The potential for the generation of airborne dust will increase with wind speed, with winds greater than 3 m/s capable of carrying airborne dust[6].

8.104 A wind rose showing the frequency of winds at wind speeds of greater than 2 m/s is presented in Figure 8-1 with the individual frequencies for each 10-degree compass sector used within the assessment. In this assessment, wind speeds over 2 m/s were used as this is how the data on percentage occurrence of wind frequency and wind speed is calculated and presented by Met Eireann. For this reason, the impact assessment presented herein is conservative.

8.105 A summary of the risk assessment of dust impacts at the selected Tier 2 properties / locations arising from the proposed development activities (in the absence of any mitigation measures) is presented in Table 8-14 below.

[6] Department of the Environment, Transport, and the Regions, 1995. *The Environmental Effects of Dust from Surface Mineral Workings* – Volume 2. Technical Report. December 1995.

Table 8-14 Dust Risk Assessment Screening (Without Mitigation Measures)

Receptor Reference	Distance From Operations (m)	Relevant Wind Direction (A)	Potential Exposure Duration (B)	Relative Wind / Distance Rank (C)	Risk Evaluation
R1	200N	170-190	2.4	1 /5	Insignificant
R2	300 NW	130–150	1.8	1 /4	Insignificant
R3	500W	80-100	1.8	1/2	Insignificant
R6	300SW	30-60	<1.0	1/4	Insignificant
R7	300SW	30-60	<1.0	1/4	Insignificant
R8	200S	10-350	<1.0	1/5	Insignificant
R9	300SE	310-330	3.0	2/4	Acceptable
R10	500E	260-280	1.8	1/2	Insignificant
(A) – relevant wind direction based on upwind sector which would potentially convey from site towards the receptor.					
(B) – Potential duration of exposure based on frequency of moderate to high wind speed (adjusted for dry days only) as described in the methodology in Appendix 8-A.					
(C) – Ranking as per methodology in Appendix 8-A *Refer to* **Figure** 8-2 *for Receptor Locations*					

8.106 From Table 8-14 above, it is observed that the risk of impact from dust emissions associated with the proposed development at Bweeng (without any mitigation measures in place) varies from:

- Insignificant at R1, R2, R3, R6, R7, R8 and R10;
- Acceptable at R9

8.107 Using the screening assessment tool, the Air Quality Assessment (outlined in Appendix 8-A) considers that there is generally an insignificant to moderate adverse risk that dust may cause an impact at sensitive receptors within 500 m of the source of the dust generated activities.

8.108 Note that this assessment ***does not consider*** implementation of mitigation measures within the proposed development that include provision of perimeter screening berms and strengthened boundary vegetation / screen planting, dust suppression measures etc. (as outlined in the section of Mitigation Measures section below). This assessment is conservative based on the moderate wind speeds included in the risk evaluation.

Ecological Receptors

8.109 The quarry and application site are not subject to any statutory nature conservation designation. Based on the findings of the semi-quantitative assessment above, the fact that the nearest designated nature site (River Blackwater SAC) is:

- located at a significantly greater distance (approximately 2.1 km away at its closest point); and
- separated and screened from the site by intervening topography, hedgerows and trees.

It is concluded that the planned development will have a negligible dust deposition impact and that it can be screened out from any further dust impact assessment.

Traffic Emissions - Assessment

8.110 For the purposes of assessment, the projected traffic movements associated with the proposed development will generate a maximum of 42 HGV trips per day, although levels on most days will likely be less than this. In addition, HGV traffic from the existing concrete plant together with the permitted blockyard (not yet constructed) equates to a maximum of 23 HGV trips per day. In view of

- the existing development and associated HGV traffic movements across the local road network
- the fact that none of the roads in the surrounding local road network meet any of the traffic / alignment criteria set out in LA 105.

It is considered that the extent of any change and the likely impact of the proposed development can be deemed 'negligible' in terms of local air quality and that no further air quality assessment is necessary.

8.111 On this basis, the impact of the proposed development can be screened out and combustion emissions (primarily oxides of nitrogen) from vehicle exhaust emissions associated with the transportation of materials will not have the potential to contribute to local air pollution.

PM_{10} Contribution from Extraction / Production Activities - Assessment

8.112 In terms of PM_{10}, the maximum annual mean measured baseline background concentration was 13.5µg/m^3 in 2022 at Mallow, Co. Cork monitoring station. Therefore, the potential contribution up of 5 µg/m^3 towards annual mean background concentrations of the coarse fraction (2.5 – 10 µm diameters) of particulates (in the immediate area of the site) is insignificant and well below the annual objective of 40 µg/m^3.

8.113 Therefore, the potential impacts in relation to increase in ambient PM_{10} concentrations can be classified as 'negligible' when the limited duration of conditions and the magnitude of change in the extent and scale of activities are considered to significantly reduce the generation of airborne PM_{10} beyond the site development boundary.

8.114 Given the limited magnitude of change in the extent and scale of planned activities at the quarry, the available monitoring data are taken to be representative of ambient PM_{10} concentrations likely to arise over the life of the proposed quarry extension. As such, any potential future impact in relation to increased ambient PM_{10} concentrations is classified as 'negligible'.

Unplanned Events (i.e., Accidents)

8.115 Accidents, malfunctions, and unplanned events refer to events or upset conditions that are not part of any activity or normal operation of the proposed development planned by the Applicant. Even with the best planning and the implementation of preventative measures, the potential exists for accidents, malfunctions, or unplanned events to occur during the proposed development operations.

8.116 Many accidents, malfunctions and unplanned events are, however, preventable and can be readily addressed or prevented by good planning, design, emergency response planning,

and mitigation. In terms of air quality impact, the following unplanned events could influence the local area:

- equipment malfunction
- vehicle collision
- dry and windy weather conditions with dust suppression equipment malfunction
- accidental material spillages during transport.

8.117 In relation to air quality, the impacts of any unplanned events are negligible. If unplanned events were not mitigated, the effects of dust during dry and windy conditions could possibly lead to occasional increases in nuisance dust and 24-hour mean PM_{10} concentration immediately surrounding the quarry and application site. However, these are not considered to be significant given the limited duration of such meteorological conditions and the likely limited scale of any incident.

Cumulative / Synergistic Impacts

8.118 In essence, cumulative impacts are those which result from incremental changes caused by other past, present, or reasonably foreseeable actions together with those generated by the proposed development. Therefore, the potential impacts of the proposed development cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

8.119 This air quality impact assessment herein indicates that the proposed development will not contribute to a significant increase in local air pollution by way of excessive air / dust emissions. There are no other significant sources of air emissions approved or planned within 2 km of the application site and no potential for significant cumulative impacts has been identified. The cumulative impact of the proposed development is therefore classified as insignificant.

Interaction with Other Impacts

8.120 The potential impact on air quality by the project on sensitive receptors including sensitive ecological receptors and people living in the area has been fully assessed in this chapter. The overall impact of the project on these receptors is further considered in Chapter 4 Population and Human Health and Chapter 5 Biodiversity.

Mitigation Measures

8.121 A range of dust mitigation and management measures will continue to be implemented at Bweeng Quarry. These include the measures listed in Table 8-15 below:

Table 8-15 Particulate Emission Mitigation Measures

Source / Receptor	Emission Potential	Recommended Mitigation Measures	Effectiveness
Excavators / HGV Loading	High – dry or fine material during strong windy weather	Minimise drop heights when handling materials. Maximise use of excavated soil in construction of vegetated screening berms or in quarry restoration works. Dampen materials using mist cannon, sprinklers, or water bowser	High
	Low – material of high moisture content during conditions of low wind speed	Minimise drop heights when handling material. Protect from wind where possible.	High
On-site Vehicles	High when travelling over un-surfaced and dry site roads.	Minimise length of on-site haul routes.	High
		Use of mist cannon / sprinklers / water bowser t dampen haul routes during dry weather periods.	High
		Restrict vehicle speeds to less than 20kph. Install signage and undertake staff training.	High
		Routing of traffic and away from any surrounding sensitive receptors.	High
Road Vehicles (transfer off-site)	Low / Moderate on paved road surfaces	Use of road sweeper to reduce the amount of material available for re-suspension.	Moderate / High
		Travel over paved surfaces / access road.	High
		Direct all HGVs through wheelwash facility	High
Stockpiles	High when dry or fine material being stored or handled during strong windy weather	Seed / vegetate surfaces of completed perimeter mounds and stockpiles of restoration soils.	High
		Locate stockpiles to take advantage of any available shelter from wind.	
		Use of mist cannon / sprinklers / bowser to moisten materials during periods of dry and windy weather	
		Limit mechanical disturbance of materials more likely to become airborne and/or time operations having regard to expected weather conditions	High

Source / Receptor	Emission Potential	Recommended Mitigation Measures	Effectiveness
Moderate and Slight Adverse Risk Receptors	High – during dry and strong windy weather	Hardstanding areas/site roads, stockpiles with the potential to give rise to dust will be regularly watered as appropriate during dry and/or windy conditions by dust cannon, sprinklers, or water bowser. Mechanical road sweeper utilised to clean internal paved surfaces, and the public road.	High

Trackout Measures

8.122 When adverse conditions apply (dry, windy weather), water from a bowser will be sprayed on dry unpaved road surfaces to minimize dust rise. Any paved surfaces around the site and/or along the access road leading in and out of the quarry will also be sprayed as required.

8.123 All heavy goods vehicles leaving the application site will be routed through the existing wheelwash facility to remove and / or dampen any particulate materials attaching to the undercarriage and to prevent transport of fine particulates off-site, onto the local public road network.

Residual Impact Assessment

8.124 With the range of mitigation and management measures to be implemented, it is considered that the risk of dust impact at receptors from the proposed development will be further reduced from that assessed in Section 8.105 above, to insignificant or less.

Monitoring

8.125 Dust deposition monitoring will continue to be undertaken at Bweeng Quarry for the duration of extraction activities at the proposed development (in accordance with conditions attached to the existing / future planning permission and in line with the EPA and DoEHLG guidelines). Dust monitoring will be undertaken at the existing monitoring locations D1 to D4 on a quarterly basis using the Bergerhoff Method.

8.126 Dust monitoring locations shall be reviewed and revised where and as / when necessary as the proposed development progresses. The results of the dust monitoring will continue to be submitted to Cork County Council on a quarterly basis for review and record purpose.

Figures

Figure 8-1 Windrose for Cork Airport Meteorological Station 2002 – 2020

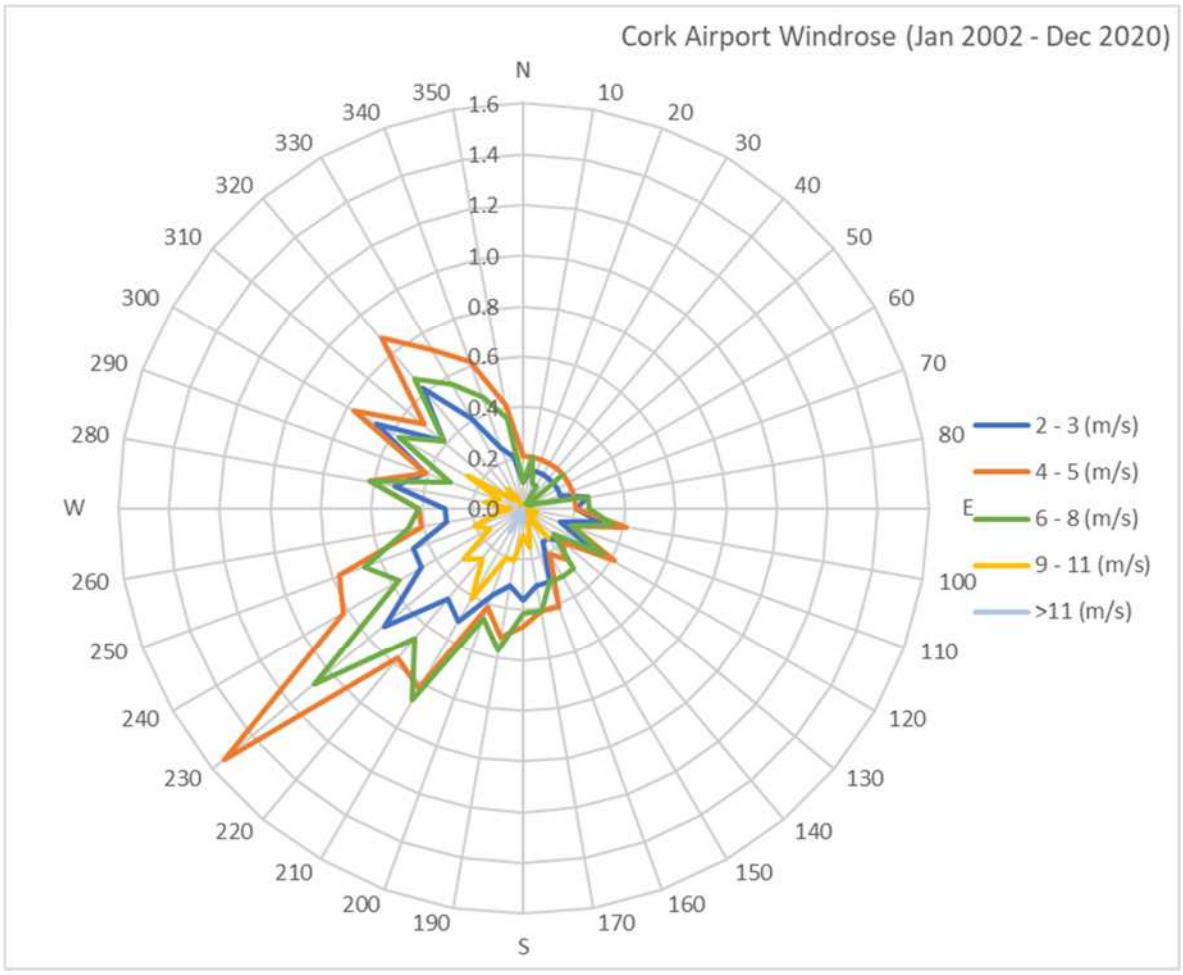
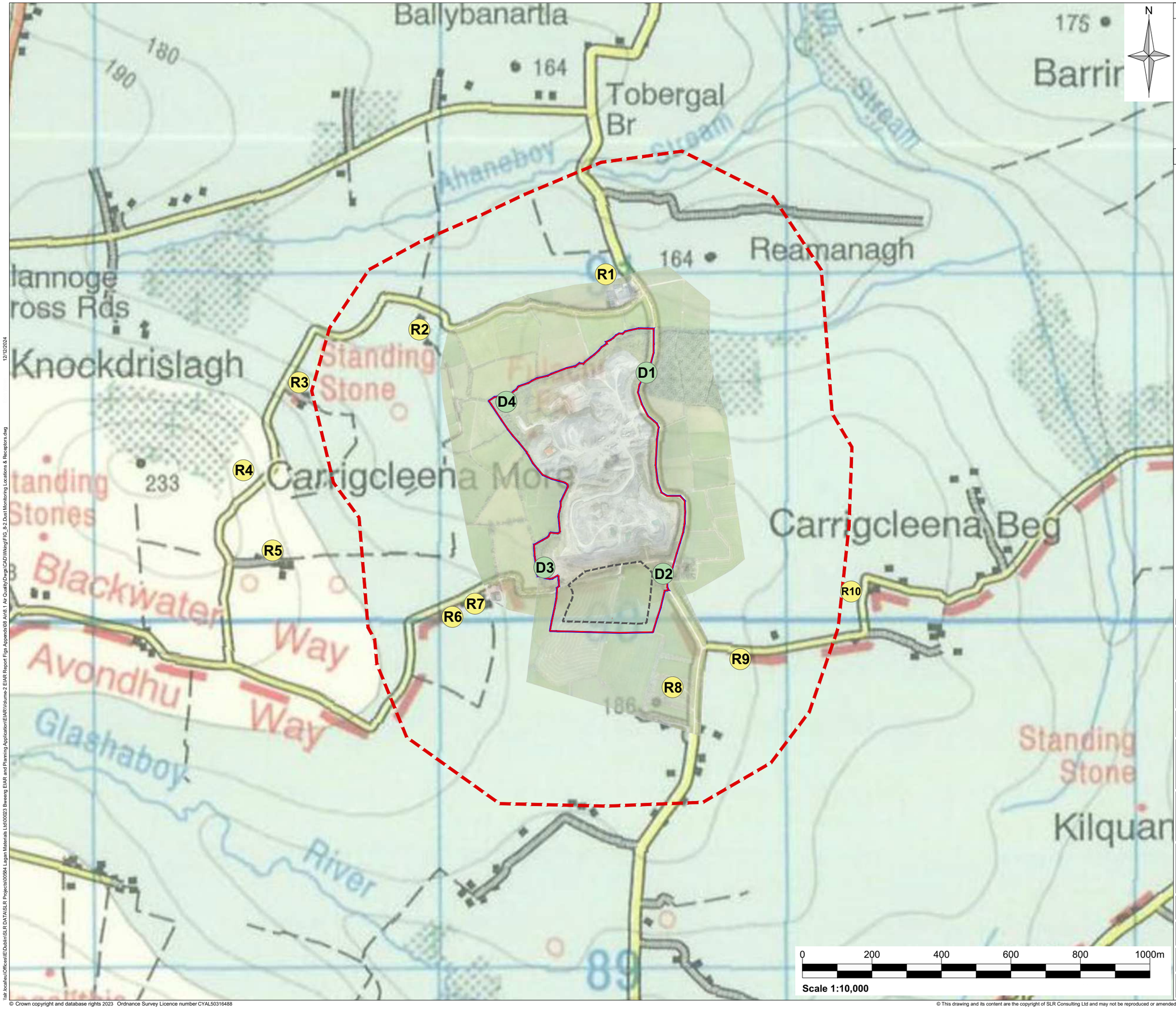


Figure 8-2 Receptor and Dust Monitoring Locations



Notes:

1. Extract from Ordnance Survey 2500 Digital Mapping - Map No. 6052, 6053, 6097 & 6098.

Legend:

- LAND INTEREST BOUNDARY (c.28.8 Hectares)
- APPLICATION AREA (c.28.8 Hectares)
- QUARRY EXTENSION (c.3.7 Hectares)
- 500m OFFSET FROM PLANNING APPLICATION BOUNDARY
- D2 — DUST MONITORING LOCATION
- R2 — RECEPTOR LOCATION

Rev	Amendments	Date	By	Chk	Auth

SLR

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Drawing Status & Suitability Code: **FINAL**

Client: BREEDON IRELAND

Project: CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Drawing Title: DUST MONITORING LOCATIONS & RECEPTORS

Scale		SLR Project No.
1:10,000	@ A3	501.V00584.00023

Designed	Drawn	Checked	Authorised
EW	EW	TP	TP
Date	Date	Date	Date
12/24	12/24	12/24	12/24

Drawing Number: **FIGURE 8-2** Rev. **1**

12/12/2024

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Appendices

Appendix 8 A: Dust Risk Screening Assessment Methodology

DUST RISK SCREENING ASSESSMENT METHODOLOGY

The methodology applied in the assessment is a semi-quantitative risk assessment methodology, in which the probability of an impact occurring and the magnitude of the impact, if it were to occur, are considered. This methodology is the Tier 2 assessment of the dust assessment methodology. If identified dust sensitive receptors are not screened out within Tier 1, this approach provides a mechanism for identifying the areas where mitigation measures are required, and for identifying mitigation measures appropriate to the risk presented by the development, (i.e., the assessment does not take account of proposed mitigation being put in place).

The magnitude of the potential risk at each receptor is classified depending on the frequency of exposure and the distance from the site to the receptor. Frequency of exposure is represented by the percentage of moderate to high winds (over 3 m/s) from the direction of the site.

The screening assessment tool assesses the significance of the distance from site and the frequency of exposure of each receptor by assigning a ranked number. Receptors with a higher potential for dust impacts would therefore result in a higher value whilst receptors with lower potential would expect to carry a lower value. The value corresponding to an evaluation of risk is a product of the significance of the distance and frequency of exposure, each is assigned a value representing its significance. The multiplication of the two values assigned gives a total, which is then corresponded to a qualitative term of risk magnitude.

A.1.1 Frequency of Exposure Criterion

The potential for any site to emit dust is greatly influenced by weather. Increased wind speed increases the potential for the generation of airborne dust due to the suspension and entrainment of particles in airflow. A worst-case situation would be strong, warm, drying winds which increase the rate at which dust is lifted from an untreated surface and emitted into the air. Wind can also have the effect of spreading dust over a large area. Conversely, rainfall decreases dust emissions, due to both surface wetting and increasing the rate at which airborne dust is removed from air. An article on dust generation from quarry/pit operations[7] suggests that rainfall of greater than 0.2 mm per day is considered sufficient to effectively suppress windblown dust emissions.

The frequency of exposure to dust emissions represents the percentage of time that wind speeds capable of carrying airborne dust (greater than 3 m/s) are blowing from the site to the direction of the receptor. Frequencies are calculated based on meteorological data. For screening assessment wind speeds greater than 2 m/s were considered as this is how data on percentage occurrence of wind frequency and wind speed is calculated and presented by Met Eireann. For this reason, the assessment is conservative.

For the screening assessment, a value of 1 mm would be used for the criteria to classify days as ‘dry’ or ‘wet’; five times the recommended value, using annual average rainfall data. The average number of days when rainfall exceeds 1 mm would be provided for each month and calculated over the year to provide an average.

The resulting frequency of moderate to high wind speeds with the potential of carrying airborne dust towards receptors would then be classified into the criteria in Table 8 A-1 with the respective rank value assigned.

[7] Leeds University. Good Quarry. http://www.goodquarry.com/article.aspx?id=55&navid=2

Table 8 A-1 Frequency of Exposure – Risk Classification

Risk Category	Criteria
1	Frequency of winds (>2 m/s) from the direction of the dust source on dry days are less than 3%
2	The frequency of winds (>2 m/s) from the direction of the dust source on dry days are between 3% and 6%
3	The frequency of winds (>2 m/s) from the direction of the dust source on dry days are between 6% and 9%
4	The frequency of winds (>2 m/s) from the direction of the dust source on dry days are between 9% and 12%
5	The frequency of winds (>2 m/s) from the direction of the dust source on dry days are between 12% and 15%
6	The frequency of winds (>2 m/s) from the direction of the dust source on dry days are greater than 15%

A.1.2 Distance to Source Criterion

In assessing dust impacts, the distance from the source to the sensitive location is crucial, as airborne, and deposited dust tend to settle out close to the emission source. Smaller dust particles remain airborne for longer, dispersing widely and depositing more slowly over a wider area.

Guidance indicates that larger dust particles (greater than 30 µm) will largely deposit within 100 m of sources. Smaller particles (less than 10 µm) are only deposited slowly. Concentrations decrease rapidly on moving away from the source, due to dispersion and dilution.

To allow for this effect of distance, buffer zones are often defined by mineral planning authorities around potentially dusty activities to ensure that sufficient protection is provided. They have not been established in any rigorous scientific way, but usually range from 50 m to 200 m. The 1995 UK DoE Guidance on dust from surface mineral working's, however, recommends a stand-off distance of 100-200 m from significant dust sources (excluding short-term sources), although it is recognised that these distances can be reduced if effective mitigation measures are identified and implemented. In terms of identifying sensitive locations therefore, and to represent an extreme worst-case scenario, consideration only needs to be given to sensitive receptors within 500 m of the site boundary. Receptors at a distance greater than 500 m have therefore been screened out in Tier 1 of the assessment.

The criteria for classifying the distance from receptor to source and thus assigning a rank value has therefore been based on the various references to dust behaviour described above. The rank classifications are presented below in Table 8 A-2. A risk category is maintained for receptors more than 500 m for circumstances where although a receptor is beyond 500 m from the dust source, its sensitivity for example is sufficient for it to be taken onto a Tier 2 assessment.

Table 8 A-2 Distance to Source – Risk Classification

Risk Category	Criteria
1	Receptor is more than 500 m from the dust source
2	Receptor is between 400 m and 500 m from the dust source
3	Receptor is between 300 m and 400 m from the dust source
4	Receptor is between 200 m and 300 m from the dust source
5	Receptor is between 100 m and 200 m from the dust source
8	Receptor is less than 100 m from the dust source

A.1.3 Sensitivity of Receptors

Sensitive locations are those where the public may be exposed to dust from the site. Locations with a high sensitivity to dust include hospitals and clinics, hi-tech industries, painting and furnishing and food processing. Locations classed as being moderately sensitive include schools, residential areas, and food retailers. Table 8 A-3 below[8] shows examples of dust sensitive facilities.

Table 8 A-3 Examples of Dust Sensitive Facilities

High sensitivity	Medium sensitivity	Low sensitivity
Hospitals and clinics	Schools and residential areas	Farms
Retirement homes	Food retailers	Light and heavy industry
Hi-tech industries	Greenhouses and nurseries	Outdoor storage
Painting and furnishing	Horticultural land	
Food processing	Offices	

A.1.4 Evaluation of Risk

Once a rank value has been assigned to the frequency of exposure and distance to source, an overall risk can be evaluated by combining the two risk categories, along with consideration of the sensitivity of the receptor. For low sensitivity receptors the risk of dust impact is considered to be significantly lower than for medium and high sensitive receptors. Therefore, a factor of 0.5 would be applied to the final risk evaluation ranking.

For each receptor, the relative magnitude of risk is given by identifying which of the score categories in Table 8 A-4 it falls into. This final evaluation represents the risk of dust impacts prior to control and mitigation measures being employed on site.

[8] **Ireland M. (1992)** "Dust: Does the EPA go far enough?", Quarry Management, pp23-24.

Table 8 A-4 Risk Evaluation Ranking (Without Mitigation)

Magnitude of Risk	Score
Insignificant	7 or less
Acceptable	8 to 14
Slight Adverse	15 to 24
Moderate Adverse	25 or more

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Introduction

Background

9.1 This Chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, addresses the potential effects of the proposed development on Climate and vice versa. The existing quarry is located at Carrigcleena More, Bweeng, Co. Cork.

9.2 The proposed development comprises:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c. 3.7 hectares.;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Overburden storage;
- Operation landscaping including perimeter screening berms around the proposed extension area;
- Restoration of the quarry to natural habitat after-uses;

All related ancillary site works within an overall application area of c. 28.8 hectares, and all for a period of 20 years and a further 2 years to complete final restoration of the site.

9.3 The proposed development will have an annual extraction rate of c. 250,000 to 275,000 tonnes per year, in line with existing output levels. Based on this output level the proposed development will generate a maximum of c. 42 HGV trips per day. The existing concrete plant together with the permitted blockyard (not yet constructed) generates a maximum of 23 HGV trips per day. The development will also continue to generate some light vehicular traffic, principally by employees and visitors travelling to and from the quarry. This equates to 26 staff and visitor light vehicle trips daily. Further information on the proposed development, site activities, environmental management systems and controls at the application sites are provided in EIAR Chapter 2.

Scope of Work

9.4 The following sections of this Chapter describe the potential climate change impacts associated with the proposed quarry extension development. The following issues are addressed separately:

- climate change legislative framework / policy context
- analysis of evolving environmental baseline trends
- identifying climate change concerns in relation to proposed development
- assessing effects (cumulative effects and uncertainty)

- identifying alternatives and mitigation measures
- identifying monitoring and adaptive management.

Consultations / Consultees

9.5 No specific matters in relation to climate have arisen during our consultations with Cork County Council and other statutory consultees.

Contributors / Author(s)

9.6 The climate impact assessment presented in this Chapter was prepared by SLR Consulting Ireland. The lead consultant for the study was Conor Hughes MSc. Energy Science.

Limitations / Difficulties Encountered

9.7 There are currently no published guidelines and established methodology providing specifically for assessment of climate impacts from quarrying activities in Ireland. This Chapter of the EIAR has therefore been prepared based on general cross-sectoral guidance.

Legislative Framework / Policy Context

9.8 In recent years, there has been increasing public awareness about the implications of past, ongoing, and continued future emissions of greenhouse gases on the earth's climate. The implications of such change will potentially have significant impact on local communities and national populations across the world. The ever-increasing awareness and acceptance of this reality has, in recent years, prompted significant public policy development around emissions and climate change.

9.9 An overview of the legislative framework and policy context which informs this assessment of potential climate impacts of the proposed development at Bweeng Quarry is presented in 0. This provides background detail in respect of the following:

- National Policy on Adaption to Climate Change
  - Sectoral Adaption Plans
  - Local Level Adaption
  - The Climate Change Action Plan 2021 (CAP 2021)
- Regulation / Control of Greenhouse Gas Emissions
  - Paris Agreement (2015)
  - Kyoto Protocol (2008-2012)
  - EU 2021-2030 Targets for non-ETS sector emissions- Effort Sharing Regulations
  - Energy White Paper (2015)
- Future Management of Flood Risk
- EIA Directive 2014/52/EU
- Published Guidelines

- Guidance on Integrating Climate Change and Biodiversity into EIA
- Assessing Greenhouse Gas Emissions and Evaluating their Significance
- Climate Change and Major Projects
- Sector Planning Guidelines for Climate Change Adaption
- Local Authority Strategy Development Guidelines.

Cork County Council Climate Adaption Strategy 2019-2024

9.10 Under the National Adaptation Frameworks (NAF) the Environment Directorate of Cork County Council developed the Climate Adaptation Strategy for Cork County. The strategy establishes an extreme weather event baseline and predicts the challenges and risks that climate change will pose for the county in the future. It also proposes a series of actions to adapt to those climatic changes which are already taking place.

9.11 Based on the risk register and the priority risks categorised by Cork County Council, seven high level goals were identified:

- Local Adaptation Governance and Business Operations: To support implementations of adaptation planning in all Council activities and operations. To build resilience within Cork County Council to support service delivery.
- Infrastructure and Built Environment: To increase resilience of roads and transport infrastructure and of Council owned assets housing stock.
- Land use and Development: To integrate climate action considerations into land use planning.
- Drainage and Flood Management: To adapt to the increased risk and impact of flooding. To liaise and work with other bodies responsible for management of water resources.
- Natural Environment, Built & Cultural Heritage: To develop approaches to protect the natural and key cultural assets in Cork County Council.
- Community, Health & Wellbeing: To build capacity & resilience within communities regarding climate adaptation.
- Other Sectors & Agencies: To collaborate with other Sectors and Agencies in programs relating to climate action and adaptation planning.

RECEIVING ENVIRONMENT

Climate Environmental Baseline

Regional Context

9.12 Observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising sea level are unequivocal evidence of warming of the climate system globally. Global mean temperature has increased by 0.8°C compared with pre-industrial times for land and oceans, and by 1.0°C for land alone. Most of the observed increase in global average temperatures is very likely due to increases in anthropogenic greenhouse gas concentrations.

9.13 In future years, landmasses are expected to warm more than the oceans at northern middle and high latitudes. Despite possible reductions in average summer precipitation over much of Europe, precipitation amounts exceeding the 95th percentile are very likely in many areas; thus, episodes of severe flooding may become more frequent despite the general trend towards drier summer conditions. In an ensemble-based approach using outputs from 20 global climate models (GCMs), the Mediterranean, north-east and north-west Europe are identified as warming hot spots but with regional and seasonal variations in the pattern and amplitude of warming. Regional climate models (RCMs) also project rising temperatures for Europe until the end of the 21st century, with an accelerated increase in the second half of the century.

9.14 For precipitation, the larger-scale summer pattern shows a gradient from increases in Northern Scandinavia to decreases in the Mediterranean region. By contrast, increases in wintertime precipitation primarily north of 45°N are a consistent feature of RCM projections over Europe, with decreases over the Mediterranean. Overall, then, there are consistent projections of change for northern and north-west Europe, including Ireland.

9.15 Ireland has a typical maritime climate, with relatively mild and moist winters and cool, cloudy summers. The prevailing winds are south-westerly in direction. The climate is influenced by warm maritime air associated with the Gulf Stream which has the effect of moderating the climate, and results in high average annual humidity across the country. The area of least precipitation is along the eastern seaboard of the country, in the rain shadow of the Leinster uplands.

9.16 Mean seasonal temperature will change across Ireland. Several studies have applied selected IPCC Special Reports on Emissions Scenarios (SRESs) to model climatic changes across Ireland at a regional scale. Despite the different methods and scenario combinations used, there is agreement in projected changes in temperature for Ireland. However, there are more disparities in the magnitude and sign (i.e., +/-) for the precipitation changes projected for the island.

9.17 **Table 9-1** summarises climate impact projections for Ireland, estimates of projections confidence are derived from published projection data from the Local Authority Adaptation Strategy Development Guidelines[1].

Table 9-1 Climate Impacts Projections: 30-Year Overview[1]

Variable	Summary	Confidence	Projected Changes
Sea Levels Rise	Strong increase	High	Projections of sea level rise to 2100 suggest a global increase in the range of 0.09-0.88 m with a mean value of 0.48 m. For 2050, it is reasonable to assume a sea level rise in the region of 25 cm above present levels. It should be noted that due to a limited understanding of some important effects that contribute to rates of increase, these estimates of sea level rise may prove optimistic, and estimates of up to 4-6 m have been projected by some models.
Storm Surge	Strong increase	Medium	An increase in the number of intense cyclones and associated strong winds are expected over the north - east Atlantic. By

[1] Local Authority Adaptation Strategy Development Guideline, EPA 2016

Variable	Summary	Confidence	Projected Changes
			the 2050s, storm surge heights in the range of 50-100 cm are expected to increase in frequency for all coastal areas with exception of the southern coast.
Coastal Erosion	Moderate increase	Low	Currently approximately 20 % of Ireland's coastline is at risk of coastal erosion, particularly areas of the south and east coast and in isolated areas on the west coast. Rates of increase will be determined by local circumstances; however, it is expected that areas of the south-west are likely to experience the largest increase.
Cold Snaps / Frost	Moderate decrease (winter/night)	High	By mid-century, minimum temperatures during winter are projected to increase by ~2 °C in the southeast and ~2.9 °C in the north. This change will result in fewer frost days and milder night-time temperatures.
Heatwaves	Strong increase (summer)	High	Seven significant heatwaves (defined as 5+ days @ >25 °C) have been recorded in Ireland over the past 30 years, resulting in approximately 300 excess deaths. By mid-century, a projected increase in summer maximum daily temperature of approximately 2 °C will likely intensify heatwaves, with maximum temperatures increasing and heatwave duration lengthening.
Dry Spells	Strong increase (summer)	Medium	There have been eight periods of insignificant rainfall in Ireland in the past 40 years. Of these, the events of 1976, 1995 and 2018 were the most severe, averaging 52, 40 and 54 days in duration respectively across Irish rainfall stations. An approximate 20 % decrease in summer precipitation in many areas is strongly indicated under a high emissions scenario. This decrease is likely to result in progressively longer periods without significant rainfall, posing potentially severe challenges to water sensitive sectors and regions.
Extreme Rainfall	Strong increase (winter)	Low	Heavy precipitation days (in which more than 20 mm of rain falls) are likely to increase in frequency in winter. By the 2050s an increase in the number of heavy precipitation days of around 20 % above the level of 1981-2000 is projected under both low-medium and high emissions scenarios. This may have serious consequences for flood risk in sensitive catchments.
Flooding	Moderate increase (winter)	Low	An Irish Reference Network of hydrometric stations has been established to assess signals of climate charge in Irish hydrology.

Variable	Summary	Confidence	Projected Changes
			This network has detected an increasing trend in high river flows since 2000. Projections of future flows are beset by uncertainty at the catchment scale, but a broad signal of wetted winters and drier summers is evident across several independent studies.
Wind Speed	Minor increase (winter)	Medium	Observed wind speed over Ireland has not changed significantly in recent times, but it is anticipated that the distribution of wind will alter slightly in future, with winters marginally windier and summers marginally less so. Though the average wind speed is anticipated to change in only a minor way over the coming decades, the frequency of extreme windstorms is expected to increase due to alternations in the origin and track of tropical cyclones.

Local Context

9.18 The weather station at Cork Airport which is located approximately 30 km to the south-east of the application site is considered representative of conditions experienced at the application site.

Temperature

9.19 The moderating influence of the Atlantic Ocean is felt throughout Ireland. The annual mean temperature for different areas in Ireland varies between mountainous regions, lowlands, and the coast. Mean daily maximum temperatures are typically between 8.2 to 18.7 °C and mean daily minimum temperatures are typically between 3.0 to 11.8 °C, as can be seen in Table 9-2.

9.20 The mean daily duration recording of sunshine for the area around Cork Airport is 3.9 hours. December is the dullest month, with 1.7 hours for Cork Airport of mean daily duration. May is the sunniest month, with 6.2 hours for Cork Airport and of mean daily duration, explained largely by its long days and finer weather.

Table 9-2 Cork Airport Meteorological Station Temperature Averages (°C)

	2022 (°C)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Daily Max	9.1	10.1	11	12.5	15.7	17	20	21.7	17.3	14.6	11.3	7.2	14.0
Mean Daily Min	3.8	3.9	3.6	5.5	8.5	9.7	12.3	12.4	10.3	9.2	6.3	2.2	7.3
Mean Temperature	6.5	7.0	7.3	9.0	12.1	13.4	16.1	17.1	13.8	11.9	8.8	4.7	10.7
	2021												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Daily Max	7.2	8.2	10.3	11.2	13.1	17.5	20.4	18.6	17.4	14.2	10.9	9.5	13.2
Mean Daily Min	2.2	3.4	4.4	4.1	5.9	10	12.9	12.1	11.7	8.4	5.6	5.9	7.2

	2022 (°C)												
Mean Temperature	4.7	5.8	7.3	7.7	9.5	13.7	16.6	15.4	14.6	11.3	8.2	7.7	10.2
	2020												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Mean Daily Max	8.7	9	9.6	13.1	15.1	16.9	18.5	18.9	16.8	12.7	10.8	7.9	13.2
Mean Daily Min	3.6	3	2.7	6	7.8	10.2	11.2	12.2	10.1	6.6	5.8	3	6.85
Mean Temperature	6.2	6.0	6.1	9.6	11.4	13.6	14.8	15.5	13.5	9.7	8.3	5.5	10.0
	Long Term Averages (1981 – 2010)												
	Jan	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**	**Year**
Mean Daily Max	8.2	8.3	9.9	11.8	14.4	17	18.7	18.5	16.5	13.2	10.3	8.5	12.9
Mean Daily Min	3.0	3.1	4.0	4.9	7.4	10.0	11.8	11.8	10.2	7.7	5.2	3.7	6.9
Mean Temperature	5.6	5.7	6.9	8.4	10.9	13.5	15.3	15.2	13.3	10.5	7.8	6.1	9.9

Wind

9.21 Results from the synoptic meteorological station at Cork Airport, located approx. 30 km south-east of the application site over the period 2002-2020, indicate that the main wind direction is from a west and south-westerly direction, with an annual incidence of 37.9 % for winds between 200° and 280°; and 24 % for winds between 290° and 0° refer to Figure 9-1. The lowest frequency is for winds blowing from the east and south-east direction.

9.22 The mean yearly wind speed at Cork Airport over the period 1981 to 2010 is 10.5 knots, or 5.4 m/s, with maximum gusts of 65.9 knots or 33.9 m/s. The average number of gale days per year is 10.8; showing that the area is “windy”, without experiencing the extreme gusts that occur on the west coast (Table 9-3).

Table 9-3 Cork Airport Meteorological Station Wind Data (1981-2010)

Wind (knots)	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Year
Mean monthly speed	12.1	12.0	11.6	10.3	10.1	9.4	9.0	9.0	9.4	10.7	10.9	11.6	10.5
Max. gust	78.0	83.0	70.0	62.0	59.0	49.0	57.0	54.0	58.0	75.0	66.0	80.0	65.9
Max. mean 10-minute speed	52.0	54.0	43.0	40.0	40.0	33.0	40.0	38.0	39.0	48.0	46.0	56.0	44.1
Avg. days with gales	2.3	1.8	1.3	0.3	0.3	0.0	0.1	0.2	0.3	1.0	1.2	1.9	10.8

Rainfall / Precipitation

9.23 During the period 1981-2010, long-term monthly rates of precipitation were between 76.5 mm and 133.1 mm at the Cork Airport station, with winter months receiving the heaviest amounts. The mean of the Met Eireann records indicates that average annual rainfall around Cork Airport is approximately 1227.9 mm / year; refer to Table 9-4. The average rainfall data indicates that the greatest daily total (73.2 mm) falls in the month of July.

Table 9-4 Cork Airport Meteorological Station Precipitation (1981-2010)

Rainfall (mm)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Monthly Total	131.4	97.8	97.6	76.5	82.3	80.9	78.8	96.8	94.6	138.2	120.0	133.1	1228
Greatest Daily Total	45.7	49.9	55.2	34.2	34.9	59.7	73.2	60.9	58.9	52.1	47.9	41.9	73.2
Mean No. of days with ≥0.2 mm	20	17	19	16	15	14	15	15	16	19	19	19	204

IMPACT ASSESSMENT

Methodology

9.24 In Ireland some sectors have independently begun the process of identifying key vulnerabilities for their activities. The report by the Irish Academy of Engineering, Ireland at Risk Critical Infrastructure – Adaptation for Climate Change (The Irish Academy of Engineering, 2009) and the report by the Heritage Council and Fáilte Ireland (the National Tourism Development Authority), Climate Change, Heritage and Tourism, Implications for Ireland's Coast and Inland Waterways (ed. Kelly and Stack, 2009) are examples of initiatives of this kind.

9.25 Other research work on adaptation in specific sectors has been carried out or commissioned by other Government Departments/bodies such as the OPW, CoFoRD (programme of competitive forest research for development research programme, etc. (e.g., CLIMADAPT).

9.26 A National Climate Change Vulnerability Scoping Study (Sweeney and Coll, 2012) was undertaken to identify first generation vulnerabilities for Ireland based on a sensitivity analysis across key sectors. The analysis identified a clustering of impacts and their importance in relation to an assessment of likely resilience by sector. The assessment methodology used was an impacts-first, science-first classical approach. The priority sectors identified are biodiversity and fisheries; water resources and the built coastal environment; forestry and agriculture.

9.27 As each sector develops its sectoral adaptation plan (under the Climate Action and Low Carbon Development Act 2015), detailed vulnerability and risk analysis will be required. Some preliminary work has been undertaken on costing the impacts of climate change in Ireland. This is now being supported by more detailed analysis of the current and future costs of flood risk management.

9.28 The implementation of adaptation is being supported by the development of a suite of guidelines, tools, and approaches. These include the Local Authority Adaptation Strategy Development Guideline; and the Irish climate information platform “Climate Ireland”, which includes data, information, tools, and approaches for local level adaptation decision making. Work is ongoing to develop sectoral decision-making tools and supports.

9.29 There are no specific tools developed for assessing climate change for extraction industry. The Climate Change and Major Project guidelines on how to make investments resilient to climate change provides a methodology for undertaking a vulnerability and risk assessment.

9.30 Climate change adaptation and mitigation re to be increasingly integrated in the preparation and approval of proposed development. Adaptation seeks to ensure adequate resilience of proposed development to the adverse impacts of climate change based on Vulnerability. Mitigation seeks to reduce the emissions of greenhouse gases.

Development Vulnerability

9.31 The aim of the vulnerability assessment is to identify the relevant climate hazards foreseen at the development location. Main steps include identifying and combining the sensitivity and exposure of the project which will describe the vulnerability, while the risk will be determined by likelihood and impact. Adaptation through project options, appraisal, and planning will depend on the assessed project vulnerability and risk.

9.32 Timescale for the project vulnerability and risk assessment shall correspond to the lifespan of the project. During the lifespan, there could be significant changes in frequency and intensity of weather events due to climate change, which should be considered. Detailed methodology charts for development vulnerability assessment are presented in 0.

Greenhouse Gases Emissions

9.33 All projects have the potential to emit greenhouse gas (GHG) emissions to atmosphere during the construction, operational and decommissioning phase of the development. Direct GHG emissions may be caused by operational activities and project commissioning / decommissioning. Indirect GHG emissions may be due to increased demand for energy and indirect GHG generating activities. Indirect GHG activities linked to the development projects may include transport, space heating of buildings / offices or loss of habitats that provide carbon sequestration, (e.g., through land-use change).

9.34 The significance of a project's GHG emissions should be based on its net impact, which may be positive or negative. Where GHG emissions cannot be avoided, the significance of a project's emissions shall be reduced by mitigation or project design. Where GHG emissions remain significant but cannot be reduced further approaches to compensate project emissions should be considered.

9.35 Currently in Ireland, there is no set methodology to evaluate significance criteria or a defined threshold for GHG emissions for the mineral extraction industry. Due to the inconsistences between the different methods and their assumptions for assessment, there is no single agreed method by which to assess a project carbon budget. The method of assessment varies according to the type and scale of the development.

9.36 Due to a lack of guidelines and an established methodology, the assessment of significance of the GHG emissions is based on whether the development's GHG emissions cumulatively represent a considerable contribution to the global atmosphere and whether the development as continued or extended will replace existing development that would have a higher GHG profile.

9.37 Where the GHG emissions cannot be avoided, the mitigation should aim to reduce the development emissions at all stages.

Development Vulnerability Assessment

9.38 The aim of the vulnerability assessment is to identify the relevant climate hazards for the project at the foreseen location. A development vulnerability assessment for the proposed development is presented in Appendix 9-C: Development Vulnrability Assessment.

9.39 Based on the development vulnerability assessment, measures to improve the resilience of the project to extreme rainfall, flood, flash flood, storms, and winds are required.

Greenhouse Gas Emissions Assessment

9.40 For this assessment, GHG emissions have been calculated for the proposed development based on annual energy use at the proposed development at Bweeng in future years.

9.41 For the purposes of this climate assessment, it has been assumed that the projected traffic movements associated with the proposed development and related activities will generate a maximum of 130 HGV movements (equivalent to 65 (42 + 23) return trips) per day for 275 days in a year (50 weeks, 5.5 days a week), although levels on most working days will likely be less than this. For the purposes of this assessment, it has also been assumed that the average distance travelled for each delivery will be 25 km each way (or 50 km in total).

9.42 It is estimated that up to c. 5,531 litres of diesel will be consumed each week (for 50 weeks per year) to power on-site mobile plant & equipment, and back-up generator. It is also assumed that the processing plant, weighbridge, wheelwash, pumps and lighting and heating for site offices, welfare facilities and other buildings will collectively consume up to 5,027 kWh of electrical power per week.

9.43 Total annual GHG emissions associated with the proposed site activities are presented in Table 9-5.

Table 9-5 GHG Emissions Calculations

Type	Annual Value	Distance Travelled (km)	Conversion factor	Calculated CO_2e kg	Total annual CO_2e kg
Traffic (trips)	17,875 no.	50	0.71266	636,940	
Energy (Diesel)	276,554 litres		2.60016[a]	719,085	
Electrical Power (Offices / Processing Plant)	251,362 kWh		0.3458[b]	86,920	
TOTAL					1,442,945

[a] *Conversion factor for 2020 Primary Energy Conversion SEAI: diesel (kg/litre)*

[b] *Energy conversion factor for 2021 SEAI statistics* (Conversion Factors | SEAI Statistics | SEAI)

9.44 Based on the calculated total of 1,442,945 CO_{2e} kg (1443 CO_{2e} tonnes) and a comparison to Ireland's 2023 emissions value of 55.01 MTonnes of CO_{2e}, it is assessed that proposed operations would be a maximum of 0.0026% of Ireland's annual CO_{2e} emissions for the duration.

9.45 Based on the scale and extent of proposed activities, GHG emissions generated by the proposed new quarry extension are assessed as not making a significant contribution to the global atmosphere.

MITIGATION

9.46 Mitigation is designed to increase the resilience of the development, or wider environmental receptors, to climate change and focuses on increasing ability to absorb climate related shocks.

Project Adaptation against Expected Climate Change Effects

9.47 In the context of climate change, measures to increase the adaptive capacity of the proposed development and disaster risk reduction strategies can be developed with a view to reducing vulnerability and increasing its resilience. Significant incidents related to the climate change that affect operation of the proposed development should be recorded for future analysis.

9.48 Based on a development vulnerability assessment (refer to Appendix 9-C: Development Vulnerability Assessment), measures to improve the resilience of the project to extreme rainfall, flash flood, storms, and winds are considered. Table 9-6 details specific mitigation measures for the proposed development relating to climate change adaptation.

Table 9-6 Mitigation Measures Related to Climate Change Adaptation

Main Concerns Related to:	Proposed Alternatives or Mitigation Measures
Extreme Rainfall, Flood, Flash Flood	Development scheme layout avoids mapped flood hazard areas.
	Designed to provide adequate resilience for the water management system.
Storms and Winds	Implement procedures to facilitate operational shutdown where required during extreme weather conditions.
	Ensure the selection, design, operation, and maintenance of plant and equipment meets required standards.
Risk Reduction Mechanism	Secure and maintain insurance for site assets and operations.

Proposed Reduction of GHG Emissions

9.49 The Applicant will implement a GHG monitoring programme at Bweeng. Based on the GHG monitoring results, the company will establish short, medium, and long-term objectives and targets for a GHG reduction programme and energy management plan.

9.50 **Table 9-7** details specific mitigation measures for the Bweeng in respect of the GHG reduction programme.

Table 9-7 Mitigation Measures Related to GHG Reduction Programme

Main Concerns Related to:	Proposed Alternatives or Mitigation Measures
Energy - electricity supply	Consider using renewable energy sources / suppliers.
Direct GHG emissions	Use energy efficient machinery / energy, consider future use of electric plant & machinery where practical.
GHG emissions related to transport	Unnecessary equipment / transport journeys should be avoided by management of transport and travel demands. Equipment should not be left in un-necessary idling mode.

Accidents, Malfunctions and Unplanned Events

9.51 Accidents, malfunctions, and unplanned events refer to events or upset conditions that are not part of any activity or normal operation of the proposed development planned by the Applicant. Even with the best planning and the implementation of preventative measures, the potential exists for accidents, malfunctions, or unplanned events to occur during the proposed extraction.

9.52 Many accidents, malfunctions and unplanned events are, however, preventable and can be readily addressed or prevented by good planning, design, emergency response planning, and mitigation. In terms of climate change impact, the following unplanned events could influence the local area:

- equipment malfunction
- vehicle collision
- accidental material spillages during transport
- accidental overflow of silt lagoons.

9.53 The water management system is for the extreme rainfall events. The proposed development has been designed to be located outside the designated flood zones, refer to the flood risk assessment provided in Chapter 7.

9.54 In relation to climate change, the impacts of any unplanned events are negligible.

Monitoring

Project Adaptation against Expected Climate Change Effects

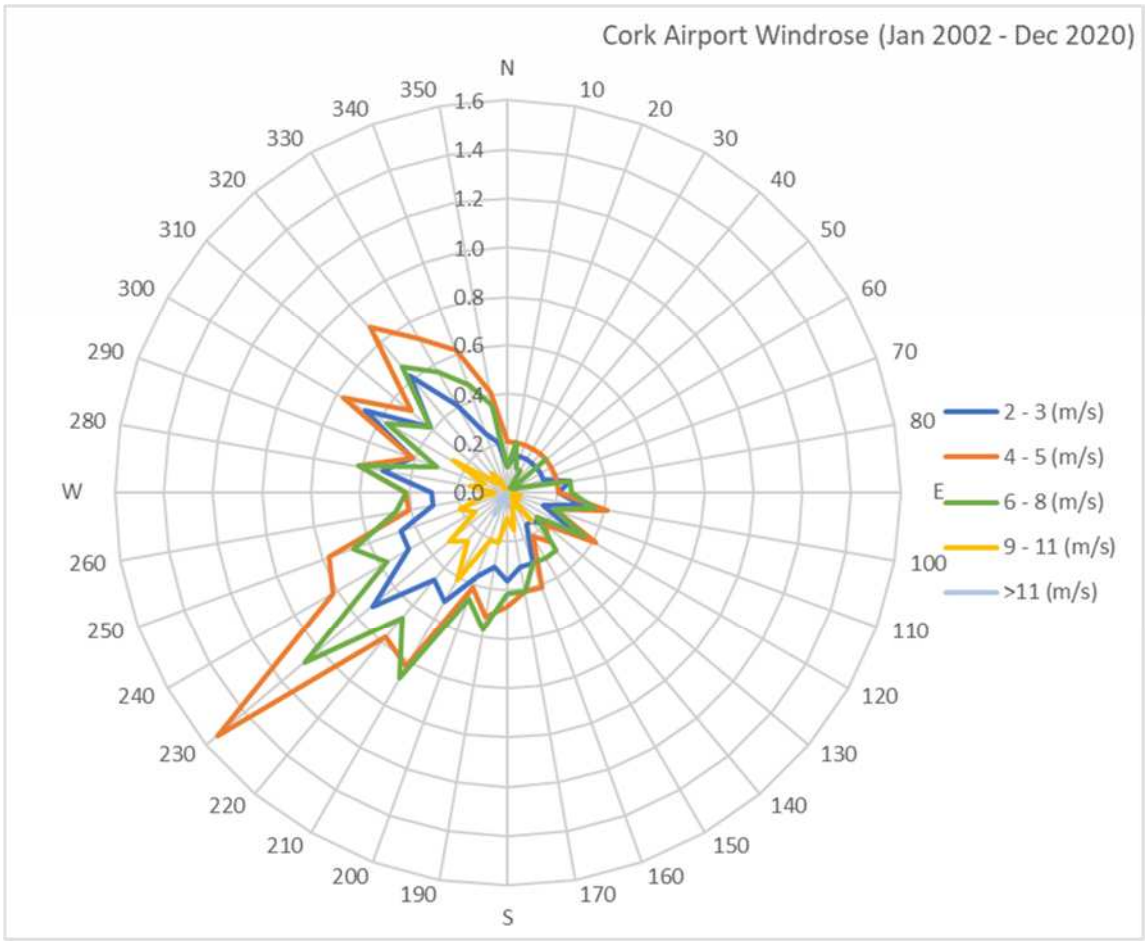
9.55 A framework and set of indicators shall be developed to assess project preparedness for adaptation against climate change. Provision shall be made for a periodic review of plans and the allocation of reporting responsibilities for a regime to measure and evaluate progress on adaptation. This will be documented in the Environmental Management System (EMA).

GHG Emissions

9.56 Monitor, report, and review progress in achieving GHG reductions at the quarry. This will be documented in the EMS.

Figures

Figure 9-1 Windrose for Cork Airport Meteorology Station



Appendices

Appendix 9 A: Legislative Framework/Policy Context

Introduction

9.A.1 In recent years, there has been increasing public awareness about the implications of past, ongoing, and continued future emissions of greenhouse gases on the earth's climate. The implications of such change will potentially have significant impact on local communities and national populations across the world. The ever-increasing awareness and acceptance of this reality has, in recent years, prompted significant public policy development around emissions and climate change.

9.A.2 An overview of the legislative framework and policy context which informs this assessment of the potential climate impacts of the proposed new lateral quarry extension at the proposed Bweeng Quarry is presented herein below.

National Adaptation to Climate Change

9.A.3 The Irish National Policy Position establishes the fundamental national objective of achieving transition to a competitive, low carbon, climate-resilient and environmentally sustainable economy by 2050. It sets out the context for the objective; clarifies the level of GHG mitigation ambition envisaged; and establishes the process to pursue and achieve the overall objective. Specifically, the National Policy Position envisages that policy development will be guided by a long-term vision based on:

9.A.4 an aggregate reduction in carbon dioxide (CO_2) emissions of at least 80% (compared to 1990 levels) by 2050 across the electricity generation, built environment and transport sectors.

9.A.5 in parallel, an approach to carbon neutrality in the agriculture and land-use sector, including forestry, which does not compromise capacity for sustainable food production.

9.A.6 The evolution of climate policy in Ireland will be an iterative process based on the adoption by Government of a series of national plans over the period to 2050. Greenhouse gas mitigation and adaptation to the impacts of climate change are to be addressed in parallel national plans – respectively through National Mitigation Plans and National Climate Change Adaptation Frameworks. The plans will be continually updated, as well as being reviewed on a structured basis at appropriate intervals, and at a minimum, every five years. This will include early identification and ongoing updating of possible transition pathways to 2050 to inform sectoral strategic choices.

9.A.7 The Climate Action and Low Carbon Development Act 20152 was enacted in December 2015. The Act identified and provided for the development and submission to Government of national mitigation and adaptation plans. It also established the institutional and governance framework within which these plans can be developed and implemented on a cyclical basis.

[2] https://www.dccae.gov.ie/en-ie/climate-action/legislation/Pages/Climate-Action-and-Low-Carbon-Development-Act-2015.aspx

9.A.8 The Department of Communications, Climate Action and Environment (DCCAE) published a National Adaptation Framework (NAF) in January 20183. The NAF sets out the national strategy to reduce the vulnerability of the country to the negative effects of climate change and to avail of positive impacts.

9.A.9 The NAF builds on the work already carried out under the National Climate Change Adaptation Network (NCCAF, 2012). Under the NAF several Government Departments will be required to prepare sectoral adaptation plans in relation to a priority area that they are responsible for. Local authorities are required to prepare local adaptation strategies NAF also aims to improve the enabling environment for adaptation through ongoing engagement with civil society, the private sector and the research community.

9.A.10 The Climate Action and Low Carbon Development (Amendment) Act 2021 was signed into law by the President of Ireland on the 23rd of July 2021 enacting the pursuit of a higher level of climate action targets and ambition over the next decades including for the local government sector. The Act provides for approval of plans, by the government, towards achieving the National Climate Objective. The National Climate Objective refers to the transitioning of the country to a climate resilient, biodiversity rich, environmentally sustainable, and climate neutral economy by no later than 2050. The Act introduces the development of carbon budgets and sectoral emission ceilings covering successive five-year periods up to 2050. The Act states that carbon budgets for the purpose of achieving the National Climate Objective shall be proposed by the Climate Change Advisory Council and approved by government for a five-year period with new budgets introduced for each subsequent 5-year period thereafter. The first two carbon budget cycles will be aimed towards achieving a 51% reduction in greenhouse gas emissions by the end of 2030, using 2018 as the baseline year.

9.A.11 The Act also tasks the government with the development of a National Long-Term Climate Action Strategy, covering a minimum period of 30 years, and a National Adaptation Framework. The Long-Term Climate Action Strategy will be updated every 5 years taking account of how the country is progressing towards the National Climate Objective. Additionally, the government is required to update the Climate Action Plan 2019: To Tackle Climate Breakdown on an annual basis.

9.A.12 Within 12 months of the enactment of the Act, local authorities will be requested by the Minister to prepare and make Local Authority Climate Action Plans. These Plans are to highlight the mitigation and adaptation measures that will be adopted during the next 5-year period. Local Authority Climate Action Plans are to be consistent with the most recently approved Climate Action Plan and National Adaptation Framework and have regard for the most recently approved Long-Term Climate Action Strategy, the most recently approved Sectoral Adaptation Plans, the National Planning Framework, and any current Climate Change Policies. Local authorities are to cooperate with adjoining local authorities in the development of their Climate Action Plans. A further provision of the Bill provides that the Minister may issue guidelines in respect of the content and preparation of the local authority climate action plans and that local authorities shall comply with these guidelines.

9.A.13 The Climate Action and Low Carbon Development (Amendment) Act 2021 also included an amendment of Section 10(2) (n) of the Planning and Development Act 2000 whereby, to reduce anthropogenic greenhouse gas emissions as well as addressing adaptation

[3] https://www.dccae.gov.ie/en-ie/climate-action/topics/adapting-to-climate-change/national-adaptation-framework/Pages/default.aspx

requirements, County Development Plans will need to take account of Local Authority Climate Action Plans.

A.1.1 Sectoral Adaptation Plans

9.A.14 Under the National Adaptation Framework (NAF), Government Departments must prepare Sectoral Adaptation Plans. Twelve sectors under 7 Government Departments will prepare plans. The deadline for submitting plans to Government is 30 September 2019. The sectors are:

- Seafood - Department of Agriculture, Food, and the Marine
- Agriculture - Department of Agriculture, Food, and the Marine
- Forestry - Department of Agriculture, Food, and the Marine
- Biodiversity - Department of Culture, Heritage, and the Gaeltacht
- Built and Archaeological Heritage - Department of Culture, Heritage, and the Gaeltacht
- Transport infrastructure - Department of Transport, Tourism and Sport
- Electricity and Gas Networks - Department of Communications, Climate Action, and Environment
- Communications networks - Department of Communications, Climate Action, and Environment
- Flood Risk Management - Office of Public Works
- Water Quality - Department of Housing, Planning and Local Government
- Water Services Infrastructure - Department of Housing, Planning and Local Government
- Health - Department of Health.

9.A.15 The aggregate and extractive industries were not specifically required under the National Adaptation Framework (NAF) to prepare sectoral adaptation plans in line with the requirements of the Climate Action and Low Carbon Development Act.

9.A.16 Under the non-statutory 2012 Framework, four Government Departments prepared draft sectoral plans covering 5 sectors. These plans are:

- Sectoral Adaptation Plan for Flood Risk Management (OPW, 2015)
- Adaptation Planning - Developing Resilience to Climate Change in the Irish Agriculture and Forest Sector (DAFM, 2017)
- Adaptation Planning - Developing Resilience to Climate Change in the Irish Transport Sector (DTTAS, 2017)
- Adaptation Plan for the Electricity and Gas Networks Sector (DCCAE, 2017).

9.A.17 Government Departments must develop statutory sectoral adaptation plans in accordance with the NAF and with a six-step adaptation planning process described in Sectoral Planning Guidelines for Climate Change Adaptation. This Department published the guidelines for the use of the sectors required to prepare statutory sectoral adaptation plans under the Framework. The guidelines aim to ensure that a coherent and consistent approach to adaptation planning will be adopted by the key sectors in Ireland. Completed plans could include actions that:

- Integrate adaptation into key sectoral plans and policies
- identify and understand the key vulnerabilities, risks, and opportunities facing their sectors. This should include major cross cutting risks
- ensure that plans related to emergencies assigned to a sectoral department as lead Government department under the Strategic Emergency Planning Guidelines are climate proofed
- identify and collect information on the costs and benefits of adaptation within their sectors
- build capacity within their sectors to cope with climate change
- identify and address key research gaps within their sectors
- improve co-ordination with the local government sector
- develop appropriate monitoring and verification systems within their sectors.

A.1.2 Local Level Adaptation

9.A.18 The National Adaptation Framework identifies the critical role to be played by local authorities in addressing climate change adaptation. This will effectively build on their existing expertise and experience as first responders in emergency planning scenarios. Under the NAF each local authority will also be developing their own adaptation strategies in line with guidelines developed for the sector. Local authorities had been set a deadline for the completion of local adaptation strategies of 30 September 2019.

9.A.19 The NAF explores how local authorities might adopt a joint or regional approach to adaptation planning. In January 2018 the DCCAE entered into a five-year financial commitment of €10m to establish four Climate Action Regional Offices (CAROs). Building on a business case prepared by the local government sector itself, this commitment recognises the significant obligation which has been placed on local government to develop and implement its own climate action measures, as well as the need to build capacity within the sector to engage effectively with climate change – both in terms of mitigation and adaptation.

9.A.20 The Climate Action Regional Offices are being operated by a lead local authority in four different regions that have be grouped together based on a climate risk assessment with a focus on the predominant risk(s) in each geographical area. The establishment of these offices will enable a more coordinated engagement across the whole of government and will help build on the experience and expertise which exists across the sector.

A.1.3 The Climate Change Action Plan 2021 (CAP 2021)

9.A.21 Published in November 2021 in line with the requirements of the Climate Action and Low Carbon Development (Amendment) Act 2021. This plan sets a roadmap for taking decisive action to halve Irelands emissions by 2030 and reach net zero no later than 2050.

9.A.22 The Plan sets out indicative ranges of emissions reductions targets for each sector of the economy and actions to achieve these. In relation to local authorities, the Plan states:

9.A.23 The Climate Action Regional Offices will continue to play a central role in supporting and coordinating climate action by local authorities including developing capacity through training; supporting behavioural change initiatives; identifying and sourcing funding opportunities; and measuring and recording performance.

- Each local authority will prepare a Climate Action Plan at least once every five years, containing both mitigation and adaptation measures.
- Each local authority will develop a decarbonisation zone within its administrative area that will become the focus for a range of climate mitigation, adaptation, and biodiversity measures.
- This process will include the identification of projects and their associated outcomes that will contribute to achieving our national climate target.

9.A.24 **Table 9 0-1** summarises the adaptation actions to climate change in Ireland.

Table 9 0-1 Summary of Adaptation to Climate Change Actions in Ireland

Item	Status	Programs
National Climate Adaptation Strategy	Legislation enacted. Statutory Framework adopted	Climate Action and Low Carbon Development Act 2015 National Adaptation Framework Climate Action and Low Carbon Development (Amendment) Act 2021
Action Plans	Sectoral Adaptation Plans in development. Local authority plans in development.	Local Authority Adaptation Strategy Development Guidelines (2016) Sectoral Planning Guidelines for Climate Change Adaptation Local Authority Adaptation Support Tool The Climate Change Action Plan 2021
Impacts, Vulnerability and Adaptation Assessments	National Vulnerability Assessment	2012 National Climate Change Vulnerability Scoping Study Climate Change Impacts on Biodiversity in Ireland (2013) Climate change Impacts on Phenology in Ireland (2013) COCOADAPT (2013) 2013 HydroDetect Project Robust Adaptation to Climate Change in the Water Sector in Ireland (2013) Ensemble of Regional Climate Projections for Ireland (2015) Urb-ADAPT Sectoral Adaptation Plan for Flood Risk Management (OPW, 2015) Adaptation Planning - Developing Resilience to Climate Change in the Irish Agriculture and Forest Sector (DAFM, 2017) Adaptation Planning - Developing Resilience to Climate Change in the Irish Transport Sector (DTTAS, 2017) Adaptation Plan for the Electricity and Gas Networks Sector (DCCAE, 2017)
Research Programs	EPA Research Programme (Climate Pillar)	http://www.epa.ie

Item	Status	Programs
Climate services / Met Office	Established	http://www.met.ie
Web Portal	Established	http://www.climateireland.ie
Monitoring, Indicators, Methodologies	In development	
Training, Education	Ongoing / in development	http://www.climateireland.ie

Regulation / Control of Greenhouse Gas Emissions

9.A.25 Ireland is a party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, which together provide an international legal framework for addressing climate change.

9.A.26 In December 2015, an ambitious new legally binding, global agreement on climate change was agreed in Paris. The Paris Agreement aims to restrict global temperature rise to well below 2°C above pre-industrial levels, and to pursue efforts to limit the temperature increase to 1.5°C. It aims to increase global ability to adapt to the adverse impacts of climate change and to foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten sustainable food production. It also seeks to achieve a balance between anthropogenic emissions by sources, and removals by sinks, of greenhouse gases in the second half of this century.

9.A.27 The first Irish National Mitigation Plan[4] represents an initial step to set us on a pathway to achieve the level of decarbonisation required. It is a whole-of-Government Plan, reflecting the central roles of the key Ministers responsible for the sectors covered by the Plan – Electricity Generation, the Built Environment, Transport and Agriculture, as well as drawing on the perspectives and responsibilities of a range of other Government Departments.

9.A.28 The measures that will be implemented through the plan will lay foundations for transitioning Ireland to a low carbon, climate resilient and environmentally sustainable economy by 2050. To support this ongoing work, the Plan also includes over 100 individual actions for various Ministers and public bodies to take forward.

9.A.29 Emissions reduction measures and actions set out in this National Mitigation Plan are aligned with and build upon commitments made in the 2015 Energy White Paper. This paper will be guided by the following strategic objectives:

- policy will contribute to reductions in Ireland's greenhouse gas emissions and enhancement of sinks in a manner that achieves the optimum benefits at least cost
- a stable and predictable policy and regulatory framework will be underpinned by rigorous analysis and appraisal, supported by strong research and analytical capacity
- the Government will pursue investment, innovation, and enterprise opportunities towards building a competitive, low carbon, climate-resilient and environmentally sustainable economy; and

[4] https://www.dccae.gov.ie/en-ie/climate-action/topics/national-mitigation-plan/Pages/default.aspx

- the citizen and communities will be at the centre of the transition.

A.1.4 COP 26

9.A.30 The Glasgow Climate Pact (The Pact), the final agreement document of COP26 that was negotiated by nearly 200 countries. For the first time in a UN climate agreement, there is an explicit reference to coal and fossil fuel subsidies and a promise to increase aid to developing countries, who are bearing the brunt of climate change. The main outcome of COP26 was the agreement of the Glasgow Climate Pact, which includes the following:

- Agreement that the current NDCs, are inadequate to limit temperature rises to 1.5C, and a roadmap for more frequent revisions of NDC's starting at COP27 next year in Egypt,
- Commitment to "phase down" coal-fired power generation. Unfortunately, this text was watered down from "phase-out", at the last minute. Nevertheless, agreement on this was important.
- Commitment to significantly increase funding for developing countries hardest hit by the
- effects of climate change.

A.1.5 Paris Agreement

9.A.31 The Paris Agreement which entered into force on 4 November 2016 aims to tackle 95% of global emissions through 188 Nationally Determined Contributions (NDCs) which will increase in ambition over time. Ireland's contribution to the Paris Agreement will be via the NDC tabled by the EU on behalf of its Member States. This is a binding target for an overall reduction of at least 40% in greenhouse gas emissions by 2030 (relative to 1990 levels). The target will be delivered by the EU by 2030 through reductions in the Emissions Trading Scheme (ETS) and non-ETS sectors of 43% and 30% respectively (relative to 2005).

A.1.6 Kyoto Protocol (2008 – 2012)

9.A.32 The EPA has overall responsibility for the national greenhouse gas inventory in Ireland's national system, which was established in 2007 under Article 5 of the Kyoto Protocol[5]. The EPA's OCLR[6] performs the role of inventory agency in Ireland and undertakes all aspects of inventory preparation and management as well as the reporting of Ireland's submissions annually in accordance with the requirements of Decision 280/2004/EC and the UNFCCC.

9.A.33 Ireland currently accounts for GHG emissions under the Kyoto Protocol. The Kyoto Protocol required Ireland to limit total national greenhouse gas emissions to 314.2 Mtonnes of CO_{2eq} over the five-year period 2008 – 2012 which is equivalent to 62.8 Mtonnes of CO_{2eq} per annum. The Kyoto Protocol limit is calculated as 13% above Ireland's 1990 baseline value which was established and fixed at 55.61Mtonnes of CO_{2eq} following an in-depth review of Ireland's 2006 greenhouse gas inventory submission to the UNFCCC.[7]

[5] http://unfccc.int/kyoto_protocol/items/2830.php

[6] http://www.epa.ie/mobile/about/org/oclr/

[7] http://unfccc.int/files/national_reports/annex_i_natcom/submitted_natcom/application/pdf/nc6_br1_ire.pdf

A.1.7 EU 2021-2030 Targets for non-ETS sector emissions- Effort Sharing Regulations[8]

9.A.34 Under the EU Commission's Climate and Energy Package, sectors of the economy not covered by the EU ETS must reduce emissions by 30% by 2030 compared to 2005 as their contribution to the overall target.

9.A.35 The non-ETS sectors cover those sectors that are outside the EU Emissions Trading Scheme and includes agriculture, transport, built environment (residential, commercial/institutional), waste and non-energy intensive industry.

A.1.8 2015 Energy White Paper

9.A.36 The White Paper on Energy Policy, Ireland's Transition to a Low Carbon Energy Future 2015-2030, published in 2015, sets out a framework to guide energy policy in the period to 2030. The White Paper recognises that a radical transformation of our energy system is required to meet our national, EU and international climate objectives and sets a course for an energy sector where the State will provide the supports that enable consumers to become active energy citizens. It posits a policy approach where our energy system will change from one that is almost exclusively led by Government and utilities to one where individuals and communities are agents of change in the way Ireland generates, transmits, stores, conserves and uses energy. It sets out a vision, a framework and over 90 actions for Irish energy policy up to 2030 as we transition to a low carbon society and economy by 2050.

Future Management of Flood Risk

9.A.37 The Catchment Flood Risk Assessment and Management (CFRAM) Programme[9] (see www.cfram.ie) is the mechanism established to facilitate future adaptation to climate change. It provides for long-term flood risk management in Ireland and the embedment of flood risk assessment in the future development of capital projects. The future scenario flood maps produced under the CFRAM Programme will facilitate this approach, inform other industrial sectors, and provide a valuable resource for local adaptation planning and sustainable land use management and planning.

EIA Directive 2014/52/EU

9.A.38 Directive 2014/52/EU[10] of the European parliament and of the Council of 16 April 2014, amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment had to be transposed into national law by 16 May 2017, necessitating changes in laws, regulations, and administrative provisions across several legislative codes.

9.A.39 Key changes introduced in the 2014 Directive (in Annex IV - Information referred to in Article 5(1) – Information for the Environmental Impact Assessment Report) and the national transposing regulations (the European Union (Planning and Development)(Environmental Impact Assessment) Regulations, S.I. No. 296 of 2018) include a requirement for information on the impact of a project on climate (for example

[8] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex:32018R0842

[9] https://www.cfram.ie/

[10] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32014L0052

the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change to be provided in the Environmental Impact Assessment Report.

Published Guidelines

A.1.9 Guidance on Integrating Climate Change and Biodiversity into EIA (EC, 2012)[11]

9.A.40 EU Guidelines provide recommendations on how to integrate climate change and biodiversity in Environmental Impact Assessment (EIA). The need for action on climate change and biodiversity loss is recognised across Europe and around the world. The guidelines include an explanation as to why climate change and biodiversity are so important in EIA, present the relevant EU-level policy background, provide advice on how to integrate climate change and biodiversity into selected stages of the EIA process. The annexes provide sources of further reading and links to other relevant information, data, and tools.

A.1.10 Assessing Greenhouse Gas Emissions and Evaluating their Significance (IEMA, 2017)[12]

9.A.41 IEMA Guidance provides information to assist practitioners with addressing greenhouse gas (GHG) emissions assessment and mitigation in statutory and non-statutory Environmental Impact Assessment (EIA). It complements IEMA's earlier guide on Climate Change Resilience and Adaptation and builds on the Climate Change Mitigation and EIA overarching principles. The requirement to consider this topic has resulted from the 2014 amendment to the EIA Directive.

A.1.11 Climate Change and Major Projects (EC, 2016)[13]

9.A.42 This publication provides guidance for assessing vulnerability and risk from Climate Change for major projects funded by the European Regional Development Fund (ERDF) and the Cohesion Fund and listed in the concerned operational programmes.

A.1.12 Sectoral Planning Guidelines for Climate Change Adaptation[14]

9.A.43 The guidelines aim to ensure that a coherent and consistent approach to adaptation planning is adopted by the key sectors in Ireland. Sectors preparing sectoral adaptation plans under the NAF are required to prepare their plans in line with the process described in these guidelines while also being aware of the overall requirements regarding the development of sectoral adaptation plans.

[11] http://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf

[12] https://www.iema.net/policy/ghg-in-eia-2017.pdf

[13] https://ec.europa.eu/clima/sites/clima/files/docs/major_projects_en.pdf

[14] https://www.dccae.gov.ie/en-ie/climate-action/topics/adapting-to-climate-change/national-adaptation-framework/Pages/Sectoral.aspx

A.1.13 Local Authority Adaptation Strategy Development Guidelines[15]

9.A.44 Guidance was produced to provide a consistent and coherent process for local authorities in helping them develop local adaptation strategies and contain information on the process of developing an adaptation strategy:

- provide background information on what adaptation entails and provides the rationale behind implementing a local scale adaptation strategy
- outline the initial steps required in launching a strategy development process, describing key roles and who can fulfil them, and setting out important factors to consider in the early stages of strategy development
- explains how to assess the role that weather extremes and periods of climate variability currently play within the local jurisdiction, and it describes why doing so is a fundamental element of working towards a more climate-resilient future
- moves from the present to the identification of future climate risks, describing a staged risk assessment process and positioning the adaptation strategy within more detailed risk assessments undertaken during shorter term decision-making processes such as statutory plan-making
- based on the risk assessment process undertaken determination of adaptation goals and objectives and the types of adaptation actions that are available and outlines how each might be identified, assessed, prioritised and implemented is described
- outlines the steps required to move from a phase of planning to one of implementation, and it explains the importance of monitoring and evaluation in ensuring that the strategy is achieving its anticipated adaptation objectives.

[15] https://www.dccae.gov.ie/en-ie/climate-action/topics/adapting-to-climate-change/national-adaptation-framework/Pages/Localadaptation.aspx

Appendix 9 B: Development Vulnerability Assessment Methodology

DEVELOPMENT VULNERABILITY ASSESSMENT METHODOLOGY

9.B.1 The scale for assessing the likelihood of a climate hazard is presented in Table 9 0-1. The output of the likelihood analysis is an estimation of the likelihood for each of the essential climate variables and hazards.

Table 9 0-1 Scale of Likelihood of Climate Hazard

TERM	QUALITATIVE	QUANTITATIVE
Rare	Highly unlikely to occur	5%
Unlikely	Unlikely to occur	20%
Moderate	As likely to Occur	50%
Likely	Likely to Occur	80%
Almost certain	Very likely to occur	95%

9.B.2 The scale for assessing the potential impact of a climate hazard is presented in Table 9 0-2. The impact analysis provides an assessment of the potential impact of each of the essential climate variables and hazards.

Table 9 0-2 Example Table for Climate Hazard Impact Analysis

RISK AREAS	INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC
Asset damage, engineering, operational					
Safety and Health					
Environment					
Social					
Financial					
Reputation					

9.B.3 The matrix for assessing the sensitivity of project to climate hazards is presented in Table 9 0-3. The sensitivity is summarised, along with the ranking of the relevant climate variables and hazards relating to the project.

Table 9 0-3 Example Table for Sensitivity of Project to Climate Hazards

	Extreme rainfall, flood, flash flood	Heath	Drought	Wildlife Fires	Storms and winds	Landslides	Cold Spells and snow	Freeze –thaw damage	Rising sea levels
On site assets									
Inputs – Water									
Inputs - Energy									
Outputs - product									
Transport links									

9.B.4 The matrix for assessing exposure of a project to climate hazards is presented in Table 9 0-4. The exposure analysis ranks climate variables and hazards as low, medium, or high based on current and future climate.

Table 9 0-4 Example Table of Exposure of the Project to Climate Hazards

	Extreme rainfall, flood, flash flood	Heat	Drought	Wildlife Fires	Storms and winds	Landslides	Cold Spells and snow	Freeze –thaw damage	Rising sea levels
Current Climate									
Future Climate									

9.B.5 An example of the vulnerability of a project to climate hazards is presented in **Table9 0-5**. The vulnerability combines the sensitivity and the exposure analysis.

Table 9 0-5 Example Table for Vulnerability Analysis of Project to Climate Hazards

SENSITIVITY	EXPOSURE (CURRENT & FUTURE CLIMATE)		
	Low	Medium	High
Low			
Medium			
High			

Appendix 9 C: Development Vulnerability Assessment

DEVELOPMENT VULNERABILITY ASSESSMENT

9.C.1 The likelihood analysis of the proposed development to climate hazards is presented in Table 9 0-1.

9.C.2 The proposed development has been assessed to be moderate affected by extreme rainfall, flash (pluvial) flood, storms, and winds. The proposed development would be unlikely affected to cold spells, landslides, and snow. The proposed development would not be affected by heat, drought, wildlife fires and freeze –thaw damage. The proposed development will not be affected by rising sea level.

Table 9 0-1 Analysis of Likelihood of Climate Hazards

	Extreme rainfall, flash flood	Flood	Heat	Drought	Wildlife Fires	Storms and winds	Landslides	Cold Spells and snow	Freeze –thaw damage	Rising sea levels
Rare			□	□	□				□	□
Unlikely		□					□	□		
Moderate	□					□				
Likely										
Almost certain										

9.C.3 **Table 9 0-2** shows the climate hazard impact analysis of the proposed development. It was assessed that climate hazards will have major impacts on health and safety, the environment and financial areas, moderate impacts on asset damage and engineering, operational, social and reputation areas.

Table 9 0-2 Climate Hazard Impact Analysis

RISK AREAS	INSIGNIFICANT	MINOR	MODERATE	MAJOR	CATASTROPHIC
Asset damage, engineering, operational			□		
Safety and Health				□	
Environment				□	
Social			□		
Financial				□	
Reputation			□		

9.C.4 **Table 9 0-3** below assesses the sensitivity of the project to climate hazard. It was assessed that site assets, energy inputs and transport links are of high sensitivity to extreme rainfall, flood, flash floods, storms, and winds; water inputs will be highly sensitive to droughts. On site assets will be medium sensitive to cold spells and snow and freeze – thaw damage. Transport links will be medium sensitive to cold spells and snow.

Table 9 0-3 Sensitivity of Project to Climate Hazards

	Extreme rainfall, flash flood	Flood	Heath	Drought	Wildlife Fires	Storms and winds	Landslides	Cold Spells and snow	Freeze –thaw damage	Rising sea levels
On site Assets	High	Low	Low	Low	Low	High	Low	Medium	Medium	Low
Inputs - Water	Low	Low	Low	High	Low	Low	Low	Low	Low	Low
Inputs - Energy	High	Low	Low	Low	Low	High	Low	Low	Low	Low
Transport Links	High	Low	Low	Low	Low	High	Low	Medium	Low	Low

9.C.5 In Table 9 0-4, the exposure of the planned development to climate hazards was assessed. In the current climate, the exposure of the development to extreme rainfall, flood, flash flood, storms and winds has been assessed to be medium. In the future, the development was assessed to have high exposure to rainfall, flash flood, storms, and winds.

Table 9 0-4 Exposure of the Development to Climate Hazards without Mitigation

	Extreme rainfall, flash flood	Flood	Heat	Drought	Wildlife Fires	Storms and Winds	Landslides	Cold Spells and Snow	Freeze –thaw damage	Rising sea levels
Current Climate	Medium	Low	Low	Low	Low	Medium	Low	Low	Low	Low
Future Climate	High	Low	Low	Low	Low	High	Low	Low	Low	Low

9.C.6 **Table 9 0-5** shows the vulnerability analysis of the project to climate hazards; it combines the sensitivity and the exposure analysis. The project was assessed to be most sensitive to extreme rainfall, flash flood, storms, and winds.

Table 9 0-5 Vulnerability Analysis of Project to Climate Hazards

SENSITIVITY	EXPOSURE (CURRENT & FUTURE CLIMATE)		
	Low	Medium	High
Low	Rising sea levels, Flood, Landslides, Freeze – thaw damage, Drought, Heat, Wildlife Fires		
Medium		Cold Spells and Snow	
High			Extreme Rainfall, Flash Flood, Storms, and Winds

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INTRODUCTION

Background

10.1 This Chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, addresses the potential effects of the proposed development at Bweeng Quarry on noise and vibration. The existing quarry is located at Carrigcleena More, Bweeng, Co. Cork.

10.2 The proposed development being applied for under this current planning application is shown on EIAR Figure 2-2 and will consist of:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c. 3.7 hectares;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Overburden storage;
- Operation landscaping including perimeter screening berms around the proposed extension area; and
- Restoration of the quarry to natural habitat after-uses.

All related ancillary site works within an overall application area of c. 28.8 hectares, and all for a period of 20 years and a further 2 years to complete final restoration of the site.

10.3 Further information on the proposed development, site activities, environmental management systems and controls at the application sites are provided in the Chapter 2 of this EIAR.

10.4 The proposed development will have an annual extraction rate of c. 250,000 – 275,000 tonnes per year, in line with existing output levels. Based on this output level the proposed development will generate a maximum of c. 42 HGV trips per day. The existing concrete plant together with the permitted block yard (not yet constructed) generates a maximum of 23 HGV trips per day. The development will also continue to generate some light vehicular traffic, principally by employees and visitors travelling to and from the quarry. This equates to 26 staff and visitor light trips daily.

10.5 The noise impact assessment presented herein describes and assesses the existing noise baseline characteristics of the local area. The anticipated effects of the proposed quarry extension activities are then applied to these baseline conditions and the resulting noise impacts assessed. Mitigation measures are identified where necessary to eliminate or minimise adverse impacts, insofar as practical.

10.6 An operational vibration assessment has also been undertaken and is largely informed by experience gained in undertaking blasts at the quarry previously and by ground-borne vibrations, measured / recorded at properties near the quarry.

10.7 To assist the understanding of acoustic terminology and the relative change in noise, a glossary of terms and phrases, which specifically relate to this Chapter of the EIAR, is provided in Appendix 10-A: Glossary of Terms.

Scope of Work

10.8 The following sections of this EIAR Chapter describe the potential noise impacts associated with the proposed development. The following issues are addressed separately:

- regulatory control framework for noise and vibration;
- methodology used to assess potential impacts from activities at properties (dwellings and farms) and sensitive ecological receptors;
- baseline conditions pertaining to existing background and ambient noise levels around the project site;
- existing vibration levels;
- noise and vibrations impact evaluation criteria;
- prediction of the noise and vibrations levels and identification of potential impacts;
- assessment of severity of impacts, with reference to the evaluation criteria;
- description of mitigation measures that will be incorporated into the design and operation of the scheme to eliminate or minimise the potential for noise and vibrations impact;
- a summary of any residual impacts; and
- monitoring proposals.

Consultations / Consultees

10.9 Following a review of published development plans and site surveys, it was considered that there was no requirement for any formal external consultations to be carried out in respect of noise for the purposes of this assessment.

Contributors / Author(s)

10.10 The noise impact assessment presented in this Chapter was prepared by SLR Consulting Ireland. The lead consultant for the study was Tim Paul MSc CEng MIEI MRICS MIQ.

Limitations / Difficulties Encountered

10.11 This assessment is compiled based on published guidance documents, and site-specific field surveys. No difficulties were encountered in compiling the required information.

REGULATORY CONTROL FRAMEWORK: NOISE

10.12 The following sections address the statutory planning / policy requirements and regulatory control of noise generated by development activity. Currently, there is no national or regional legislation which specifically addresses noise and vibration generated by mineral extraction and production of aggregates and construction materials. However, there are several guidance documents that are relevant in the context of both noise and vibration action planning.

Planning Policy and Development Control

10.13 The National Planning Framework (NPF) 2040 (published in February 2018) is a national planning framework for Ireland. The framework provides the policies for all regional and local plans. In the framework, the extractive industries are recognised as important for the supply of aggregates and construction materials to a variety of sectors.

10.14 National Planning Framework Objective 65 addresses noise related impact of development and identifies a requirement for Planning Authorities to:

10.15 *"Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans."*

10.16 There are no specific policies in relation to noise emissions in NPF for mineral extraction or production of construction aggregates and materials. The stated general development objective is to facilitate the development while at the same time protect the environment.

Quarries and Ancillary Activities

10.17 The EPA (2006) publication *Environmental Management Guidelines for Environmental Management in the Extractive Industry (Non-Scheduled Minerals)*[1].recommends the following in respect of noise:

In relation to sand and gravel pit developments and ancillary activities, it is recommended that noise from the activities on site shall not exceed the following noise ELVs at the nearest noise-sensitive receptor:

- *Daytime: 08:00–20:00 h L_{Aeq} (1h) = 55 dBA*
- *Night-time: 20:00–08:00 h L_{Aeq} (1h) = 45 dBA*

Note: 95% of all noise levels shall comply with the specified limit value(s). No noise level shall exceed the limit value by more than 2 dBA.)

The DoEHLG (2004) Guidelines for Planning Authorities (*Quarries and Ancillary Activities: Guidelines for Planning Authorities*[2]*)* recommends similar limit values.

Planning Practice Guidance 2014

10.18 The web-based Planning Practice Guidance (PPG) sets out the Government's planning policies for England and has a specific category for mineral developments.

10.19 The guidelines provide advice on noise from temporary activities at mineral extraction sites, the recommended derivation of free-field criteria for normal daytime operations, and the absolute criterion of 70dB LAeq,1hr for temporary operations.

Guidelines for Noise Impact Assessment (IEMA)

10.20 The *Guidelines for Noise Impact Assessment* produced by the Institute of Environmental Management and Assessment (IEMA) are generally recognised as established good practice standards for scope, content, and methodology of noise impact assessment.

These guidelines address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur. These guidelines state that for any assessment, the noise level threshold and significance should be determined by

[1] https://www.epa.ie/pubs/advice/general/EPA_management_extractive_industry.pdf
[2] https://www.epa.ie/pubs/advice/general/EPA_management_extractive_industry.pdf

the assessor, based upon the specific evidence and likely subjective response to noise. An example impact scale offered by the IEMA guidelines is shown in Table 10-1.

Table 10-1 Example Impact Scale from the Change in Sound Levels (IEMA)

Long-Term Impact Classification	**Short-Term Impact Classification**	**Sound Level Change** dB L_{pAeqT} (+ive or -ive) T = either 16hr day or 8hr night
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3.0 dB and < 5 dB
Moderate	Major	≥ 5.0 dB and < 10 dB
Major		≥ 10.0

10.21 The criteria above reflect the key benchmarks that relate to human perception of sound. A change of 3dB is generally considered to be the smallest change in environmental noise that is perceptible to the human ear under most normal conditions. A 10dB change in noise represents a doubling or halving of the noise level. The difference between the minimum perceptible change and the doubling or halving of the noise level is split to provide greater definition to the assessment of changes in noise level.

10.22 To determine the overall noise impact, the magnitude and sensitivity Noise Effects Descriptors are presented in Table 10-2.

Table 10-2 Noise Effects Descriptors (IEMA)

Noise Effect Levels	**Description**
Very Substantial	Greater than 10 dB L_{Aeq} change in sound level perceived at a highly sensitive noise receptor
Substantial	Greater than 5 dB L_{Aeq} change in sound level at a noise-sensitive receptor, or a 5 to 9.9 dB L_{Aeq} change in sound level at a highly sensitive noise receptor
Moderate	A 3 to 4.9 dB L_{Aeq} change in a sound level at a sensitive or highly sensitive noise receptor, or a greater than 5 dB L_{Aeq} change in sound level at a receptor of some sensitivity
Slight	A 3 to 4.9 dB L_{Aeq} change in a sound level at a receptor of some sensitivity
None / Not Significant	Less than 2.9 dB L_{Aeq} change in sound level and/or all receptors of negligible sensitivity to noise or marginal to the zone of the influence of the proposed development

10.23 As recognised in the IEMA guidance, there are however many factors which affect people's perception and their responses to noise. Guidance on assessment of the magnitude of noise impact and the significance of the effects are presented in Table 10-3.

Table 10-3 Relationship between Noise Impact, Effect and Significance (IEMA)

Magnitude (Nature of Impact)	Description of Effect (On a Specific Sensitive Receptor)		Significance
Substantial	Beneficial	Receptor Perception = Marked Change Causes a material change in behaviour and/ or attitude, e.g., individuals begin to engage in activities previously avoided due to preceding environmental noise conditions. Quality of life enhanced due to change in character of the area.	More Likely to be Significant (Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a non-significant effect) ↕ (Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a significant effect) Less Likely to be Significant
Moderate		Receptor Perception = Noticeable Improvement Improved noise climate resulting in small change in behaviour and/or attitude, e.g., turning down volume of television; speaking more quietly; opening windows. Affects the character of the area such that there is a perceived change in the quality of life.	
Slight		Receptor Perception = Just Noticeable Improvement Noise impact can be heard but does not result in any change in behaviour or attitude. Can slightly affect character of the area but not such that there is a perceived change in quality of life.	
Negligible	N/A = no discernible effect on receptor		Not Significant
Slight	Adverse	Receptor perception = non-intrusive Noise impact can be heard, but does not cause change in behaviour or attitude, e.g., turning up volume of television, speaking more loudly; closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Less Likely to be Significant Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a significant effect) ↕ Greater justification needed- based on impact magnitude and receptor sensitivities- to justify a non-significant effect) More Likely to be Significant
Moderate		Receptor Perception = Intrusive Noise impact can be heard and causes small changes in behaviour and/or attitude, e.g., turning up volume of television; speaking more loudly; closing windows. Potential for non-waking sleep disturbance. Affects the character of area such that there is a perceived change in the quality of life.	
Substantial		Receptor perception = Disruptive Causes material change in behaviour and /or attitude, e.g., avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in getting to sleep, premature awakening, and difficulty in getting back to sleep. Quality of life diminished due to change in character of area.	
Severe		Receptor Perception = Physically Harmful Significant Changes in behaviour and/or an inability to mitigate effect of noise leading to psychological	Significant

Magnitude (Nature of Impact)	Description of Effect (On a Specific Sensitive Receptor)		Significance
		stress or psychological effects, e.g., regular sleep deprivation / awakening; loss of appetite, significant, medically definable harm, e.g., auditory and non-auditory.	

British Standard 5228: 2009+A1:2014

10.24 British Standard 5228-1:2009+A:2014 *Noise and Vibration Control on Construction and Open Sites, Part 1: Noise* (BS5228) sets out a methodology for predicting noise levels arising from a wide variety of construction and related activities. It can be used to predict noise levels arising from construction and operational stage activities at extraction sites, including associated earthmoving / restoration operations. BS5228 also sets out tables of sound power levels generated by a wide variety of mobile equipment.

10.25 Noise levels generated by site operations and experienced at local receptors will depend upon several variables, the most significant of which are:

- the amount of noise generated by plant and equipment being used at the development site, generally expressed as a sound power level;
- the periods of operation of the plant at the development site, known as the “on-time”;
- the distance between the noise source and the receptor, known as the “stand-off”;
- the attenuation due to ground absorption or barrier screening effects; and
- any reflections of noise due to the presence of hard vertical faces (i.e., walls).

Design Manual for Roads and Bridges

10.26 The Design Manual for Roads and Bridges DMRB (LA 111) considers the following criterion to understand the need for further assessment:

- is the project likely cause change in the baseline noise levels of 1dB $L_{A10,18hr}$ in the do - minimum year compared to do- something opening year;
- is the project likely cause change in the baseline noise levels of 3 dB $L_{A10,18hr}$ in the do – something future year compared to do- minimum opening year;
- does the project involve construction of new road links within 600m of noise sensitive receptors; and
- would there be a reasonable stakeholder’s expectation that an assessment is undertaken.

AQTAG09 - Guidance on Effects of Industrial Noise on Wildlife

10.27 AQTAG09 (Air Quality Technical Advisory Group 09) guidance provides guidance to assist planning and/or licensing officials handling pollution prevention and control applications for industrial installations on relevant noise emissions and relates these to the requirements of the Habitats Regulations.

10.28 The guidance specifies that, where specific noise from industry, measured at the habitat / nest site is below the levels in Table 10-4, it is considered unlikely that it will have an adverse

impact on designated species. Where noise levels are exceeded, a more detailed noise assessment will be required.

Table 10-4 Specific Noise Levels at Habitat / Nest Site

Parameter	Noise Level, dB
$L_{Amax,F}$	80
$L_{Aeq,1hr}$	55

Noise and Human Health

10.29 Environmental noise exposure response relationships and thresholds for health endpoints for industry are not available at European or Irish level in legislation or guidelines.

WHO Environmental Noise Guidelines

10.30 World Health Organisation (WHO) Europe have produced the WHO Environmental Noise Guidelines 2018 for the European Region as a regional update to the WHO Community Noise Guidelines. The Guidelines include a review of evidence on the health effects of environmental noise to incorporate significant research carried out in recent years. The guidelines provide recommendation for protecting human health from exposure to environmental noise from various sources. The guidelines assess several environmental noise sources such as aircraft, rail, road, wind turbines and leisure noise.

10.31 EU Directive 2002/49/EC on the assessment and management of environmental noise introduced annual average indicators of noise exposure (L_{den} and L_{night}) as long-term exposure indicators, which differ from those used in the earlier WHO Guidelines for Community Noise (1999).

REGULATORY CONTROL FRAMEWORK: VIBRATION

10.32 There is currently no legislation regulating or controlling ground-borne vibration from rock basting and extractive activity more generally. Several guidance documents which are relevant in the context of vibration action planning for the proposed development are referenced below.

Quarries and Ancillary Activities

10.33 The EPA (2006) publication *Environmental Management Guidelines for Environmental Management in the Extractive Industry (Non-Scheduled Minerals)*[3] recommends the following limit values for ground-borne vibrations and air overpressure:

Ground-borne vibration

Peak particle velocity = 12 mm per second, measured in any of the three mutually orthogonal directions at the receiving location (for vibration with a frequency of less than 40 hertz).

Air overpressure

[3] https://www.epa.ie/pubs/advice/general/EPA_management_extractive_industry.pdf

125 dB (Linear maximum peak value), with a 95 % confidence limit. Any blasting will be restricted to normal hours (e.g., 11:00 -17:00 hrs Monday to Friday). Advance notification of blasting will be provided to nearby residents within 600m through use of written notes, signage at site entrance, telephone, or warning sirens or a combination of these methods.

The DoEHLG (2004) Guidelines for Planning Authorities (*Quarries and Ancillary Activities: Guidelines for Planning Authorities*[4]*)* recommends similar limit values.

British Standard 7385-2:1993

10.34 British Standard 7385-2:1993 *Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Ground-borne Vibration* gives guidance on vibration limits to prevent building damage. It is applicable to blasting associated with rock extraction.

10.35 The damage threshold criteria provided in BS7385 are based on systematic studies using a carefully controlled vibration source in the vicinity of buildings. Vibration limits for transient vibrations (such as those associated with blasting operations), above which cosmetic damage could occur, are indicated in Table 10-5 below.

Table 10-5 Transient Vibration Guide Values for Cosmetic Damage

Type of Building	PPV (mm/sec) 4 TO 15 Hz	PPV (mm/sec) 15 Hz AND ABOVE
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/sec	50 mm/sec
Unreinforced or light framed structures Residential or light commercial buildings.	15 mm/sec at 4Hz increasing to 20 mm/sec at 15 Hz	20 mm/sec at 15Hz increasing to 50 mm/sec at 40 Hz and above.

10.36 The definition of “cosmetic damage” is the formation of hairline cracks or the growth of existing cracks in plaster, dry wall surfaces, or mortar joints. BS7385-2 notes that the probability of damage tends towards zero at a peak component particle velocity of 12.5mm/sec.

Site Specific Emission Limits for Vibration

10.37 Condition 54 attached to P. Ref. QR073 (as amended by ABP Ref. 04.QC.2156) states:

All blasting events shall be carried in a manner to ensure compliance with the following requirements:

a) Ground vibration shall not exceed 12 millimetres per second peak particle velocity (when measured in any one of three mutually orthogonal planes) for any blast when measured at the nearest vibration sensitive location, or

b) If blasting occurs more than once per week ground vibration shall not exceed 8 millimetres per second peak particle velocity (when measured in any one of three

[4] https://www.epa.ie/pubs/advice/general/EPA_management_extractive_industry.pdf

mutually orthogonal planes) for any blast when measured at the nearest vibration sensitive location;

c) *Air overpressure from any blast shall not exceed 125 dB (linear) when measured at the nearest air overpressure sensitive location.*

RECEIVING ENVIRONMENT

Study Area

10.38 The application site is located within the townland of Carrigcleena More, Bweeng Co. Cork, approximately 2.5 km northeast of Bweeng village. The application site and the overall site are located within undulating rural agricultural landscape.

10.39 There are isolated private residential property and agriculture farms located throughout the surrounding rural landscape, predominantly along the local road network.

10.40 Two local roads bound the quarry at its southern and eastern boundaries. Access to the quarry is from local road L1214 approximately mid-way at the eastern site boundary. The Reamanagh Stream bounds the quarry to the north and flows in an easterly direction into the Lyre River a tributary of the River Blackwater.

10.41 The lands surrounding and within the application site predominantly comprise farm fields. The application site is not subject to any statutory or non-statutory nature conservation designations. Dwellings in the vicinity of application site are generally located along the local road network comprise farmsteads or isolated on-off residences, with occasional small clusters. The nearest dwellings to the application site boundary are shown in Figure 10-1.

Baseline Study Methodology: Noise Assessment

10.42 Environmental noise surveys were carried out by SLR Consulting Ireland to capture typical background noise levels at the noise-sensitive receptors closest to the application site. The methodology of the surveys and the results are set out below. The weather conditions during the survey periods were acceptable for noise monitoring, being generally dry with little or no wind.

10.43 The baseline noise measurements were taken using a Type 1 sound level meter (Larson Davis 831 SLM). The sound level meter was calibrated before the measurements, and its calibration checked after by the operator. No calibration drifts were found to have occurred during surveys. All noise equipment had been calibrated to a traceable standard by UKAS (United Kingdom Accreditation Service) accredited laboratories within 12 months preceding the surveys.

10.44 At the measurement positions, the following noise level indices were recorded:

- $LA_{eq,T}$ is the A-weighted equivalent continuous noise level over the measurement period, and effectively represents an “average” value.
- $LA_{90,T}$ is the A-weighted noise level exceeded for 90% of the measurement period. This parameter is often used to describe the background noise.
- $LA_{10,T}$ is the A-weighted noise level exceeded for 10% of the measurement period. This parameter is often used to describe traffic noise.

10.45 Environmental baseline noise surveys were undertaken by SLR staff at the nearest noise sensitive receptors to the application site on 13th April 2023. The weather conditions were

favourable, with no winds (<2m/s), between 80% and 100% cloud cover and temperatures of between 7°C - 10°C. Noise measurements were undertaken over four, non-consecutive, 15-minute intervals during the designated daytime period (07:00 to 19:00). The monitoring periods selected are considered to give representative daytime noise levels at each noise sensitive location.

10.46 During the surveys, the sound level meter was in free-field conditions (i.e., at least 3.5m from the nearest vertical reflecting surface, with the microphone approximately 1.5m above ground level).

10.47 All noise levels are recorded in 'A-weighted' decibels, dB(A). A-weighting is the process by which noise levels are corrected to account for the non-linear frequency response of the human ear. All noise levels are quoted in dB(A) relative to a sound pressure of 20 Pa.

Baseline Study: Vibrations

10.48 At the existing quarry, vibration monitoring is carried out at each blasting event. All monitoring results are routine recorded and filed as part of the Environmental Management System (EMS) which is in operation at the quarry.

10.49 During each blasting event at the existing quarry both Ground Vibration and Air Blast (Air Overpressure) are monitored at a minimum at one sensitive location (i.e., the location nearest to the blast).

Sources of Information

10.50 A desk study was carried out to gather all relevant information relating to noise conditions around the application site. Further information was gathered through a site visit and technical assessments consistent with current standard methodologies and published best practice guidelines. This yielded the data required to allow an assessment of likely significant effects of the proposed development on sensitive receptors within its zone of influence.

Noise Monitoring Compliance

10.51 There is a programme of ongoing noise monitoring in place at the quarry, refer to noise monitoring report enclosed in Appendix 10-C. This demonstrates compliance with the noise limit values stated in Condition 52 imposed on the operations of the quarry under Section 261:

'noise levels at the site boundaries shall not exceed 55dB(A) (30 minute LAeq) between 08:00 hours and 18:00 hours Monday to Friday inclusive, and 08:00 hours to 14:00 hours on Saturday, and shall not exceed 45dB(A) at any other time.

Baseline Monitoring: Noise Assessment

10.52 The noise monitoring locations identified for the purposes of the baseline noise survey and noise assessment are shown in Figure 10-1 and comprise the following:

- BN1 at residences closest to the northern boundary, along the public road;
- BN2 at the residences closest to north-western boundary, along the public road;
- BN3 at a residence closest to south – western boundary, along the public road;
- BN4 at a residence closest to southern boundary, along the public road; and

- BN5 at the residences closest to the southeastern Boundary, along the public road.

10.53 Noise monitoring results for the baseline survey on are provided in Table 10-6; logarithmic average ambient (L_{Aeq}) values are provided in Table 10-7 below.

10.54 The following observations are made in respect of the baseline noise monitoring undertaken around the application site:

- Measured baseline noise levels at monitoring point BN1 were mainly dominated by road traffic noise on the adjacent local road (farm machinery), natural noises were audible when other noise abated;
- Measured baseline noise levels at BN2 were mainly dominated by road traffic noise on the adjacent local road (farm machinery), natural noises were audible when traffic abated;
- Measured baseline noise levels at BN3 were mainly dominated by road traffic noise on the adjacent local road, natural noises were audible when traffic abated;
- Measured baseline noise levels at BN4 were mainly dominated by road traffic noise on the adjacent local road, natural noises were audible when traffic abated. Quarry was audible at this location; and
- Measured baseline noise levels at BN5 were mainly dominated by road traffic noise on the adjacent local road, lawnmower cutting grass, natural noises were audible when traffic abated. Quarry was audible at this location.

Table 10-6 Summary of Measured Noise Levels, Free Field dB

Date	Time	Location	$L_{AEQ,T}$(dB)	$L_{A10,T}$(dB)	$L_{A90,T}$(dB)
13/04/2023	10:49-11:04	BN1	54	57	42
13/04/2023	12:36-12:51	BN1	53	57	40
13/04/2023	14:39-14:54	BN1	57	56	33
13/04/2023	16:36-16:51	BN1	53	56	39
13/04/2023	11:10-11:25	BN2	41	45	35
13/04/2023	12:54-13:09	BN2	49	47	35
13/04/2023	14:58-15:13	BN2	44	45	34
13/04/2023	16:57-17:12	BN2	42	44	35
13/04/2023	11:29-11:44	BN3	44	48	37
13/04/2023	13:32-13:47	BN3	41	44	34
13/04/2023	15:25-15:40	BN3	53	53	38
13/04/2023	17:16-17:31	BN3	42	41	34
13/04/2023	11:53-12:08	BN4	59	65	39
13/04/2023	13:55-14:10	BN4	43	42	31

13/04/2023	15:51-16:06	BN4	51	48	36
13/04/2023	17:38-17:53	BN4	49	45	34
13/04/2023	12:13-12:28	BN5	57	54	36
13/04/2023	14:17-14:32	BN5	63	59	37
13/04/2023	16:12-16:27	BN5	61	51	38
13/04/2023	17:58-18:13	BN5	48	48	35

10.55 The ambient and background noise levels (L_{Aeq}) reported in Table 10-6 above include a continuous noise contribution from ongoing activities in and around Bweeng Quarry. Comparison of ambient noise levels with periodic or intermittent noise (L_{A10}) indicates that the averaged ambient noise levels are strongly influenced by intermittent passing traffic along the local road network.

10.56 Table 10-7 below identifies the closest receptors to each of the noise monitoring locations and logarithmic average of the noise levels at each monitoring location.

Table 10-7 Summary of Measured Noise Levels, Free Field dB (Logarithmic Average Values)

Location	Receptors Effected	Period	L_{Aeq} (Log average)
BN1	R1	Daytime	54
BN2	R2, R3, R4, R5	Daytime	44
BN3	R6, R7	Daytime	45
BN4	R8, R9	Daytime	50
BN5	R10	Daytime	57

Blast Monitoring Compliance: Ground Vibration & Air Overpressure

10.57 Historical blasting operations at the Bweeng Quarry have been monitored one of the nearest inhabited dwellings by the blasting and shot firing team. The blast monitoring location is shown on Figure 10-1.

10.58 Blast monitoring results for Bweeng Quarry are provided in Table 10-8 below.

Table 10-8 Blast Monitoring Results

Date	Location – Dwelling B1 (refer to Figure 10-1)			
	Ground Vibration (Peak particle velocity (mm/sec))			Air overpressure dBL(I)
	Horizontal	Transverse	Vertical	
16/03/2022	2.73	6.35	4.70	108
24/05/2022	1.97	2.41	1.90	106
03/10/2022	2.41	4.06	4.70	114
08/02/2023	1.65	2.41	2.03	113
10/05/2023	2.16	2.03	2.79	103
11/07/2023	1.40	2.22	2.10	116
19/09/2023	2.54	3.30	2.92	115
10/11/2023	0.89	2.16	1.14	116

10.59 The ground vibration and air overpressure monitoring results comply with the emission limit values set out in the current quarry planning consent (Ref. QR073) Condition 54.

Sensitive Receptors

Human Receptors

10.60 Sensitive locations are those where people may be exposed to noise from the existing or planned activities. The closest receptors to the application site have been identified and assessed based on their distance from the application site boundary. This is a cautious approach, as noise generating activities are often located at greater distances within the site. The relevant receptors are listed in Table 10-7 and their locations are shown in Figure 10-1.

10.61 There are 10 noise sensitive receptors identified closest to the site area of the application site. A list of the closest sensitive receptors in each direction surrounding the site and their distance from the site boundary at its closest point are outlined in Table 10-9 below.

Table 10-9 Sensitive Receptors

Receptor reference	Receptor	Sensitivity	Distance (m) / from site boundary
R01	Residential	Medium	200
R02	Residential	Medium	300

R03	Residential	Medium	500
R04	Residential	Medium	800
R05	Residential	Medium	800
R06	Residential	Medium	300
R07	Residential	Medium	300
R08	Residential	Medium	200
R09	Residential	Medium	300
R10	Residential	Medium	500

Ecological Receptors

10.62 The application site is not subject to any statutory nature conservation designation. There is one Natura 2000 site designated under the EU Habitats Directive (92/43/EEC) located within a c. 2 km radius of the application site, identified in Table 10-10 below.

Table 10-10 Natura 2000 or Designated Site(s) within a 2 km of Application Site

Natura 2000 site	Site Code	Location at closest point to application site (m)
Blackwater River (Cork/Waterford) SAC	002170	2100

10.63 Based on the nature, size, and scale of the planned development, it is considered that the maximum distance for which the project should be evaluated in terms of Natura 2000 or designated nature sites is up to a maximum radius of 2 km unless there are any potential source-pathway-receptor links between the proposed development at Bweeng and any Natura 2000 or designated site(s) beyond this distance. At a distance greater than 2 km, and in the absence of any potential source-pathway-receptor link, it is generally considered that no Natura 2000 or designated sites would be affected by any direct loss of habitat or otherwise impacted upon.

10.64 At 2.1km from the application site, at its closest point, the Blackwater River SAC lies just within the potential zone of influence of the proposed development at Bweeng Quarry and as such, it is therefore deemed appropriate to screen it in as part of this noise assessment.

NOISE IMPACT ASSESSMENT

10.65 To determine the noise impact generated by the proposed eastern quarry extension and concrete production activities, SLR Consulting Ireland carried out a noise prediction assessment, whereby the levels of noise were calculated at the nearest noise sensitive receptors (residences), as identified in Figure 10-1.

10.66 Operational noise rating ($L_{Ar,\ 1hr}$) predictions at each receptor location are based on the methodology set out in BS5228: Part 1 (2009)+ A1:2014 "*Code of Practice for Noise and Vibration Control on Construction and Open Sites*".

10.67 For the purposes of this impact assessment, no reduction has been applied for noise screening around the application site during the site preparatory works including soil stripping, perimeter berm construction, concrete plant construction and some quarry restoration activities.

10.68 A reduction of -20dB(A) has been adopted for full noise screening by existing quarry faces and existing / proposed perimeter berms around the application site in assessing noise impacts for rock extraction, processing, and concrete production activities. Likely, greater noise attenuation will be provided by the high quarry faces and proposed vegetation planting and the actual reduction will be greater.

10.69 For the purposes of the assessment, it is assumed that all potential operational noise sources are active and arise continuously and simultaneously during assessment hours and that the attenuation distance to the selected receptors is calculated from the application site boundary (as indicated in Figure 10-1) rather than from the noise source.

10.70 Based on the methodology outlined above, it is considered that the noise impact assessment presented herein is sufficiently robust and conservative and represents a worst-case scenario. Detailed noise assessment calculations are provided in Appendix 10-B.

10.71 The EPA (2006) Environmental Management Guidelines for Quarries and Ancillary Activities and the DoEHLG (2004) Guidelines for Planning Authorities both recommend a noise emission limit, applied to the nearest noise-sensitive receptors, of 55 dB $L_{Aeq, 1hr}$ during daytime working hours (defined as 07:00 to 18:00 hours). A limit of 70 dB $L_{Aeq, 1hr}$ is permitted for periods of up to eight weeks in any working year at nearby noise sensitive receptors to facilitate ant necessary construction or temporary site works.

10.72 As set out in Annex D of the updated Environmental Noise Standard, ISO 1996-2:2007(E), a prominent, discrete tonal component may be detected in one-third octave spectra if the level of a one-third octave band exceeds the level of the adjacent bands by some constant level difference (the appropriate level difference varies according to frequency and is greater at lower frequencies).

10.73 The noise characteristics of the plant and equipment which will be deployed in extraction and production activities at Bweeng and considered by this noise assessment are shown in table 10-11 below.

Table 10-11 Noise Sources

Plant	Octave Band Sound Pressure Levels @ 10m, Hz								L_{AEQ} @ 10m
	63	125	250	500	1k	2k	4k	8k	
Excavator	72	71	74	73	69	66	63	58	75
Mobile screener	93	86	79	78	75	71	69	62	81
Mobile crusher	93	86	79	81	75	71	66	59	82
Loading shovel	84	88	81	74	74	71	66	65	80
HGV	80	76	73	70	69	66	63	58	74
Concrete plant	83	74	66	6	70	78	60	55	80
Rock breaker	79	75	73	74	77	77	75	70	83

10.74 Other than the rock breaker, the plant and equipment used at the quarry will not generate impulsive or tonal noise. For all items of plant except the rock breaker, no penalty was therefore applied to the predicted operational $L_{Ar,\ 1hr}$ noise level for presence of tonal or impulsive elements or for prediction of resultant noise level at each receptor.

10.75 A penalty of +5 dB(A) was applied in respect of the tonal noise associated with rock breaking activities at the quarry. Rock breaking is only required occasionally at the quarry to reduce larger ('oversize') blocks of rock which have not been adequately fragmented in blasting and cannot therefore be fed directly to the crushing plant. For noise assessment purposes, it is conservatively assumed that a break operates at the quarry for one half day per week (i.e., one tenth of the overall operational time at the quarry).

Noise Prediction

10.76 The noise prediction / assessment was undertaken to calculate the level of noise generated by proposed site activities at the nearest sensitive receptors, shown on Figure 10-1. Detailed noise assessment calculations are provided in Appendix 10-B: Noise Assessment Calculations.

Construction Stage

10.77 The following noise sources have been considered in the noise assessment for the initial site operations, during the preparatory / construction stage works which will include activities such as soil stripping, perimeter berm construction, construction of the concrete plant and some quarry restoration activities:

- Excavator
- HGV.

10.78 For the purposes of the noise assessment, it is assumed that an excavator will be used continuously to carry out the soil stripping / earthworks, with one HGV in attendance on-site always. Resultant noise levels at nearest receptors are shown in Table 10-12 below.

Table 10-12 Soil Stripping, Berms Construction, Local Road Realignment and Restoration Noise Levels

Receptor	Period	Noise limit $L_{AEQ, 1HR}$ dB(A)	Operational $L_{AEQ, 1HR}$ dB(A)*	Difference
R01	Daytime	70.0	55	-15
R02	Daytime	70.0	51	-19
R03	Daytime	70.0	47	-23
R04	Daytime	70.0	42	-28
R05	Daytime	70.0	42	-28
R06	Daytime	70.0	51	-19
R07	Daytime	70.0	55	-15
R08	Daytime	70.0	55	-15
R09	Daytime	70.0	51	-19
R10	Daytime	70.0	47	-23

10.79 It can be seen from the results in Table 10-12 above that the noise criterion limits for the short-term preparatory / construction works (70dB(A)) are complied with at all sensitive locations assessed.

Operational Stage

10.80 The following noise sources have been considered in undertaking the noise assessment for the operational stage of the proposed development:

- Excavator;
- Rock Breaker;
- Mobile Crusher;
- Mobile Screener;
- Front End Loader;
- HGV; and
- Concrete Plant.

10.81 The operational $L_{Ar, 1hr}$ noise prediction for each receptor location is presented in Table 10-13 below. Table 10-13 also shows the comparison between the predicted operational $L_{Ar, 1hr}$ noise level and the prescribed noise limit of 55 dB(A)at each receptor.

Table 10-13 Operational Noise Levels: Bweeng Quarry

Receptor	Period	Noise limit $L_{AEQ, 1HR}$ dB(A)	Operational $L_{AEQ, 1HR}$ dB(A)*	Difference
R01	Daytime	55.0	49	-6
R02	Daytime	55.0	46	-9
R03	Daytime	55.0	42	-13
R04	Daytime	55.0	37	-18
R05	Daytime	55.0	37	-18
R06	Daytime	55.0	46	-9
R07	Daytime	55.0	49	-6
R08	Daytime	55.0	49	-6
R09	Daytime	55.0	46	-9
R10	Daytime	55.0	42	-13
**Operational Noise Level = Predicted Noise Level with a 5 dB penalty*				

10.82 It can be seen from the results in Table 10-13 above that the noise levels generated solely by proposed extraction and concrete production activities, even in a worst-case scenario, are comfortably below the EPA (2006) and DoEHLG (2004) recommended noise emission limit value of 55 dB(A).at all nearby residential noise sensitive locations.

10.83 To identify the potential impact of ongoing, continuous site activities, predicted specific $L_{Aeq, 1hr}$ dB(A) noise levels have been logarithmically added to existing ambient noise levels. The cumulative levels have been compared to the existing ambient noise levels at each of the noise sensitive locations for each time-period. The cumulative assessment is presented in Table 10-14.

Table 10-14 Cumulative Operational Noise Levels

Receptor	Period	Existing baseline $L_{AEQ,T}$ dB(A)	Operational $L_{AR, 1HR}$ dB(A)*	Cumulative $L_{AEQ, T}$ dB(A)*	Difference	Short term impact	Long term impact
R01	Daytime	54	49	55	+1	Minor	Negligible
R02	Daytime	44	46	48	+4	Moderate	Minor
R03	Daytime	44	42	46	+2	Minor	Negligible
R04	Daytime	44	37	45.	+1	Minor	Negligible
R05	Daytime	44	37	45.	+1	Minor	Negligible
R06	Daytime	45	46	49	+4	Moderate	Minor

Receptor	Period	Existing baseline $L_{AEQ,T}$ dB(A)	Operational $L_{AR,\ 1HR}$ dB(A)*	Cumulative $L_{AEQ,\ T}$ dB(A)*	Difference	Short term impact	Long term impact
R07	Daytime	45	49	50	+5	Moderate	Minor
R08	Daytime	50	49	53	+3	Moderate	Minor
R09	Daytime	50	46	51	+1	Minor	Negligible
R10	Daytime	57	42	57	0	Negligible	Negligible

10.84 With reference to the Guidelines for Noise Impact Assessment published by the Institute of Environmental Management and Assessment (IEMA), the cumulative long-term noise impact from the proposed development, once it is established, is determined to be minor in a worst-case scenario at R02, R06, R07 and R08 and negligible at all other receptors.

10.85 In view of the above findings, it is considered that mitigation measures to reduce the noise impacts of plant associated with the planned development are not strictly required to mitigate long term noise impacts arising at the application site. Notwithstanding this, and in line with accepted best practice, several measures will be implemented at the quarry to minimise the noise levels generated by site operations.

Ecological Receptors

10.86 As previously noted the application site is not subject to any statutory nature conservation designation and the nearest designated nature site (River Blackwater SAC) is located at approximately 2.1 km, at its closest point.

10.87 The operational $L_{Ar,\ 1hr}$ noise prediction for ecological receptor location is presented in Table 10-15 below. It also presents a comparison between the predicted operational $L_{Ar,\ 1hr}$ noise level and the prescribed noise limit for protection of wildlife.

Table 10-15 Operational Noise Levels at Ecological Receptors

Receptors	Period	Noise limit $L_{AEQ,\ 1HR}$ dB(A)	Operational* $L_{AEQ,\ 1HR}$ dB(A)	Difference
Blackwater River SAC	Daytime	55.0	29	-26
*Operational Noise Level = Predicted Noise Level without the 5 dB penalty				

10.88 As can be seen, the noise criterion limits for protection of wildlife arising from the proposed development at Bweeng are comfortably met at the Blackwater Reiver SAC nearest.

Traffic

10.89 For the purposes of assessment, it is assumed that the total volume of traffic generated in the future by the proposed development will not exceed a maximum of c. 42 HGV trips per day. The existing concrete plant and permitted blockyard (not yet constructed) generates a

maximum of 23 HGV trips per day. The development will also continue to generate some light vehicular traffic, principally by employees and visitors travelling to and from the quarry. This equates to 26 staff and visitor light vehicle trips daily.

10.90 In view of the existing development and associated HGV traffic movements across the local road network it is considered that the extent of any change and the likely impact of the quarry extension and ancillary quarry activities can be deemed 'negligible' in terms of traffic and that no further assessment is necessary.

VIBRATION IMPACT ASSESSMENT

10.91 Rock extraction at Bweeng Quarry will continue to be carried out by blasting and blasted rock materials will be removed for further processing (crushing) by mechanical excavators.

10.92 The duration of a blast in terms of noise is of short duration, like a clap of thunder. Blasting-induced vibration is also of short duration and transient in nature. A typical blast comprises several drilled holes into which explosive charges are placed. The charged holes are detonated individually by use of detonators, each with a different micro-second delay.

10.93 The number of blasts carried out at the quarry over a defined period is ultimately dependent on demand for aggregates and other quarry products (including concrete). Drilling of holes for blasting will involve the use of a mobile rig to drill holes through the upper rock surface, parallel to the active / exposed quarry face. The extent and duration of drilling prior to each rock blast will vary with the number and depth of charge holes required. Drilling of holes will only be carried out during permitted operational hours.

10.94 The closest vibration sensitive receptors (within 500 m) to the blasting activities within the application area are identified in Table 10-16. Attenuation of ground-borne vibration increases with distance such that vibration impacts reduce with increased distance from the blast site.

Table 10-16 Vibration Sensitive Receptors

Receptor Reference	Receptor	Distance (m) From site boundary
R01	Residential	200
R02	Residential	300
R03	Residential	500
R04	Residential	800
R05	Residential	800
R06	Residential	300
R07	Residential	300
R08	Residential	200
R09	Residential	300
R10	Residential	500

Residences

10.95 The principal cause of complaints from blast-induced vibration is usually attributed to the fear of damage and/or nuisance rather than actual physical damage or nuisance itself. The human body is very sensitive to vibration, and this can result in concerns being raised at vibration levels well below the threshold of cosmetic damage to buildings, or levels identified in planning conditions.

10.96 In general terms a person will become aware of blast-induced vibration at levels of around 0.3 mm/second peak particle velocity (ppv). However, people are very poor at determining relative magnitudes of vibration, for example, the difference between 4.0 mm/sec ppv and 6.0 mm/sec ppv is unlikely to be distinguishable by an individual person. Even though vibration levels between 0.6 mm/sec ppv and 50.0 mm/sec ppv are routinely experienced in everyday life within a property and are considered wholly safe, when similar levels are experienced through blasting operations, it is not unusual for such levels to give rise to subjective concern.

10.97 Table 10-17 gives examples of vibration levels routinely generated with a conventional residential property.

Table 10-17 Vibration Levels Generated by Everyday Activities

Activity	Vibration level (Peak particle velocity, mm/sec)
Walking, measured on a wooden floor	1.0 to 2.5
Door slam, measured on a wooden floor	2.0 to 5.0
Door slam, measured over the doorway	12.0 to 35.0
Foot stamps, measured on a wooden floor	5.0 to 50.0

10.98 Regarding physical damage to properties, extensive research has been carried out around the world, the most prominent being undertaken by the United States Bureau of Mines (USBM). Damage to a structure could occur if the dynamic stresses induced in a structure exceeds the allowable design stress for the specific building material. Classifications of building damage range from very fine plaster cracking up to major cracking of structural elements.

10.99 When defining damage to buildings, the following classification is applied:

- Cosmetic – the formation of hairline cracks or the growth of existing cracks in plaster, dry wall surfaces, or mortar joints;
- Minor – the formation of large cracks or loosening or falling of plaster on dry wall surfaces, or cracks through bricks / concrete blocks; and
- Major or Structural – damage to structural elements of the building.

10.100 Studies by USBM concluded that vibration levels more than 50 mm/sec ppv are required to cause structural damage. It should be noted that this limit is set for worst-case structural conditions and that it is independent of the number of blasting events and their durations.

10.101 British Standard 7385-2:1993 *Evaluation and Measurement for Vibration in Buildings – Part 2: Guide to Damage Levels from Ground-borne Vibration* gives guidance on vibration limits to prevent building damage. It is applicable to blasting associated with mineral extraction. The damage threshold criteria provided in the standard are based on systematic studies

using carefully controlled vibration sources in the vicinity of buildings. Vibration limits for transient vibrations (such as those associated with blasting operations), above which cosmetic damage could occur, are identified in Table 10-5 of this EIA Chapter. It notes that the probability of damage **tends towards zero** at a peak component particle velocity below 12.5 mm/sec.

10.102 Historical blast monitoring results at Bweeng Quarry confirm that past blasting operations undertaken at the quarry have complied with the DoEHLG (2004) and EPA (2006) recommended threshold limit values both for ground-borne vibration (12 mm/sec peak particle velocity) and air overpressure (125 dBL Linear max peak with a 95% confidence limit).

10.103 The comprehensive environmental monitoring programme implemented at the quarry and the blast monitoring results presented previously in Error! Reference source not found. confirms that it has always operated within the recommended blasting emission limit values set out in the best practice guidelines for the sector and by existing planning conditions.

10.104 Based on the above, it is concluded that any future blasting operations within the extension area at Bweeng Quarry will not have a significant impact on any sensitive receptors.

Ecological Receptors

10.105 The impact from blasting activities for ecological receptors largely comprises disturbance (including noise, vibration, and visual disturbance). Increases in human disturbance, including noise and visual disturbance from human activity, can have a range of impacts on an ecological receptor depending upon its sensitivity and the nature and duration of the disturbance and its timing.

10.106 The response of individual species to increased levels of human disturbance will depend upon several factors including the sensitivity, reproductive status, previous exposure to human disturbance, behaviour during the event, species tolerance to disturbance, location in relation to the source, availability of alternative nearby habitat, and environmental factors (i.e., topography, vegetation and atmospheric conditions which can influence noise levels).

10.107 The level of disturbance will also be dependent upon the existing ambient noise levels and maximum noise levels.

10.108 Any future blasting operations at the eastern extension area will be undertaken subject to the emission limit values set out under condition 54 and recommended by the EPA and DoEHLG guidance and set by existing planning conditions (maximum peak particle velocity of 12 mm/sec and maximum air overpressure of 125 dB with a 95% confidence limit). Ground borne vibration is likely to be limited in extent to the area immediately around the quarry.

10.109 At 2.1km west of the quarry at its closest point, the Blackwater River SAC is sufficiently distant that no changes in baseline disturbance levels are predicted to occur within its boundaries which would affect any of its Annex II qualifying species. Consequently, with no likely vibration exposure, no vibration effects are predicted on any qualifying Annex II species, or on the integrity of the Blackwater River SAC.

CUMULATIVE IMPACTS

10.110 In essence, cumulative impacts are those which result from incremental changes caused by other past, present, or reasonably foreseeable actions together with those generated by the proposed development. Therefore, the potential impacts of the proposed development cannot be considered in isolation but must be considered in addition to impacts already arising from existing or planned development.

10.111 This noise impact assessment indicates that the proposed development will not contribute to a significant increase in noise levels within the surrounding environment nor will it give rise to any damaging ground-borne vibration.

10.112 A planning search undertaken to determine if there were any other planned developments in the vicinity of the application site did not identify any other potentially significant source of noise or ground-borne vibration, either approved or planned within 2km of the application site. As a result, no potential for significant cumulative impacts has been identified. The cumulative impact of the proposed development on local noise and vibration levels is therefore assessed as insignificant.

D0 – NOTHING SCENARIO

10.113 At present, the noise environment within the study area is dominated by road traffic noise generated by cars and occasional HGV traffic along the local road network (some of it from existing operations at Bweeng Quarry). Some natural sounds such as farmyard animals or barking dogs are also audible.

10.114 Over time, it is anticipated that the volume of road traffic in general, will increase as economic activity increases and that this in turn is likely to lead to a gradual increase in ambient and background noise levels.

INTERACTION WITH OTHER IMPACTS

10.115 The potential impact of noise generated by the proposed development on sensitive receptors including residents and sensitive ecological receptors has been assessed in this Chapter of the EIAR. The impact of the proposed development activity on these receptors is further considered in Chapter 4 ‘Population and Human Health’ and Chapter 5 ‘Biodiversity’.

MITIGATION MEASURES

Noise

10.116 Where necessary, the three established strategies for impact mitigation are avoidance, reduction, and remedy. Where it is not possible or practical to mitigate all impacts, then the residual impacts must be clearly described in accordance with the system for impact description set out in the EPA Guidelines. The adoption of Best Practicable Means is generally considered to be the most effective means of controlling noise emissions.

10.117 Notwithstanding the findings of the impact assessment presented above, which determined that the proposed activities at Bweeng Quarry will have negligible noise impact, and in line with best operating practice, the following measures will be implemented wherever practicable across the application site to minimise the potential noise impacts of on-site activities:

Screening

- Screening berms will be constructed along the boundary of the extension area prior to commencement of extraction activities and will act as acoustic barriers;
- Screening berms will be inspected on a regular basis and maintained as necessary.

Plant

- All mobile crushing will take place on the quarry floor, behind newly exposed quarry faces;
- All mobile plant used at the development will have noise emission levels that comply with the limiting levels defined in EC Directive 86/662/EEC and any subsequent amendments;
- All plant items will be properly and regularly maintained and operated according to the manufacturers' recommendations, in such a manner as to avoid causing excessive noise (i.e., all moving parts are kept well lubricated, all cutting edges are kept sharpened, the integrity of silencers and acoustic hoods are maintained); and
- All plant will be fitted with effective exhaust silencers which are maintained in good working order to meet manufacturers' noise rating levels. Any defective silencers will be replaced immediately.

Traffic

- Any deliveries to the quarry will be programmed to arrive during daytime hours only;
- Care will be taken when unloading vehicles to reduce or minimise potential noise disturbance to residents;
- Access / internal haul roads will be kept clean and maintained in a good state of repair, i.e., any potholes are filled, and large bumps removed, to avoid unwanted rattle and "body-slap" from heavy goods vehicles; and
- Vehicles waiting within the quarry will be prohibited from leaving their engines running and there will be no unnecessary revving of engines.

10.118 Experience from other sites has shown that by implementing these measures, ambient noise levels from site activities and operations can be reduced by up to 5 dB(A).

Vibration

10.119 Historical blast monitoring results indicate that the air overpressure levels and the ground-borne vibration levels (i.e., measured peak particle velocity) complied with recognised DoEHLG (2004) / EPA (2006) limit values for the extractive sector.

10.120 The blast design and blasting methodology for the site operations carried out at the quarry have, and will continue to be, optimised to ensure that any resulting ground borne vibration levels are comfortably within the prescribed limits.

10.121 The following measures shall be implemented at the application site to minimise disturbances due to any future blasting operations. These mitigation measures are in accordance with the 'best practice / mitigation' measures described in Section 3.2 of the DoEHLG (2004) guidelines:

- Blasting will be restricted to between 11.00 hours and 15.00 hours Monday to Friday to ensure that it does not clash with milking times for local dairy herds (except in emergencies or for health and safety reasons beyond the control of the operator)
- Blasting shall not be carried out on Saturdays, Sundays, or public holidays.
- The frequency of blasting shall not be more than two blasts per month.
- Notification of each blast shall continue to be given in writing 3 days in advance of each blast to all residences within a 1km radius of the quarry.

- Blast notifications shall be provided by pre-blast siren warnings
- All blasting operations shall be carried out by a certified 'shotfirer' in accordance with the relevant health and safety regulations
- The optimum blast ratio shall be maintained, and the maximum instantaneous charge shall be optimised
- The blast design and blasting methodology uses the monitoring results to optimise and ensure consistent blast designs

10.122 Efficient blasts use as much of the explosive energy as possible for rock fragmentation. By implication therefore, any energy dissipated through ground vibration and air overpressure is inefficient use of energy which would otherwise be used to fragment rock. It is therefore in the Applicant's economic interest to ensure that there is continual, ongoing optimisation of blast design to ensure efficient and effective blasting. The added benefit in optimising blast design is that it also minimises potential environmental impacts.

10.123 To avoid any risk of damage to properties in the vicinity of the application site, the ground-borne vibration levels from blasting will be limited to a peak particle velocity of 12 mm/sec. To minimise impact on local residences a blasting protocol shall be implemented which will include best practice mitigation measures described in Section 3.2 of the DoEHLG (2004) guidelines, and as set out in the Health & Safety Authority (HAS) Safe Quarry Guidelines.

RESIDUAL IMPACT ASSESSMENT

Noise

10.124 The worst-case scenario noise assessment has shown that in accordance with the scale in the Guidelines for Noise Impact Assessment produced by the Institute of Environmental Management and Assessment (IEMA), the cumulative noise impact from plant associated with the development at all receptors is NEGLIGIBLE.

10.125 Table 10-18 summarises the impacts, mitigation measures and residual impact for operational plant noise at each of the noise sensitive receptors considered by this assessment.

Table 10-18 Operational Noise Summary Table

Receptors	Increase in Operational Noise $L_{AEQ, 1HR}$ dB(A)	Impact Without Mitigation Measures		Mitigation	Reduction in Noise from Mitigation $L_{AEQ, 1HR}$ dB(A)	Increase in operational Noise $L_{AEQ, 1HR}$dB(A)	Residual Short-term impact	Residual Long-term impact
		Short Term	Long Term					
R01	+1	Minor	Negligible	Short term Required	-5	0	Negligible	Negligible
R02	+4	Moderate	Minor	Required	-5	0	Negligible	Negligible

Receptors	Increase in Operational Noise $L_{AEQ, 1HR}$ dB(A)	Impact Without Mitigation Measures		Mitigation	Reduction in Noise from Mitigation $L_{AEQ, 1HR}$ dB(A)	Increase in operational Noise $L_{AEQ, 1HR}$dB(A)	Residual Short-term impact	Residual Long-term impact
		Short Term	Long Term					
R03	+2	Minor	Negligible	Short term Required	-5	0	Negligible	Negligible
R04	+1	Minor	Negligible	Short term Required	-5	0	Negligible	Negligible
R05	+1	Minor	Negligible	Short term Required	-5	0	Negligible	Negligible
R06	+4	Moderate	Minor	Short term Required	-5	0	Negligible	Negligible
R07	+5	Moderate	Minor	Required	-5	0	Negligible	Negligible
R08	+3	Moderate	Minor	Short term Required	-5	0	Negligible	Negligible
R09	+1	Minor	Negligible	Short term Required	-5	0	Negligible	Negligible
R10	0	Negligible	Negligible	Not Required	-5	0	Negligible	Negligible

10.126 On the basis of the above the residual noise impacts are assessed to be negligible.

10.127 Based on the proven past performance at the quarry and available historical blasting results, it is concluded that blasting operations carried out within the application site will not have any residual impact on nearby sensitive receptors.

MONITORING

10.128 Noise monitoring will be undertaken around the application site on a six-monthly basis, using a calibrated noise meter. The duration of monitoring at each location will be 1 hour. Noise monitoring locations shall be reviewed and revised where and as / when necessary.

10.129 All blasts carried out at the quarry at Bweeng shall continue to be monitored to confirm compliance with the EPA (2006) / DoEHLG (2004) recommended emission limit values, which are the same as those set out in condition 54 attached to P. Ref. QR073. Ground-borne vibration and air overpressure will be measured utilising portable seismographs, located at nearby inhabited dwellings (subject to the owner's agreement). Air overpressure will be measured utilising a calibrated microphone, incorporated into the seismograph. Each seismograph shall be calibrated in accordance with the manufacture's requirements.

10.130 The results of the noise and blast monitoring shall be submitted to Cork County Council on a regular basis for review and record purposes.

Figures

Figure 10-1: Noise / Blast Monitoring Locations & Receptors

Ballybanartla
180
190
164
Tobergal
Br
Ahaneboy
Stream
175
Barrir
Stream
N
Reamanagh
164
lannoge
ross Rds
Knockdrislagh
R1
BN1
R2
Standing
Stone
BN2
R3
R4
Carrigcleena More
233
tanding
Stones
Carrigcleena Beg
R5
BN3
B1
R7
R6
BN5
R10
Blackwater
Way
Avondhu
Way
R9
R8
BN4
186
Glashaboy
River
Standing
Stone
Kilquan
89
0
200
400
600
800
1000m
Scale 1:10,000

Notes:

1. Extract from Ordnance Survey 2500 Digital Mapping - Map No. 6052, 6053, 6097 & 6098.

Legend:

- LAND INTEREST BOUNDARY (c.28.8 Hectares)
- APPLICATION AREA (c.28.8 Hectares)
- QUARRY EXTENSION (c.3.7 Hectares)
- 500m OFFSET FROM PLANNING APPLICATION BOUNDARY
- BN2 — BASELINE NOISE MONITORING LOCATION
- R2 — RECEPTOR LOCATION
- B1 — BLAST MONITORING LOCATION

Rev	Amendments	Date	By	Chk	Auth

SLR

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Drawing Status & Suitability Code: **FINAL**

Client: BREEDON IRELAND

Project: CONTINUED USE & EXTENSION TO EXISTING QUARRY AT BWEENG, MALLOW, CO. CORK.

Drawing Title: NOISE MONITORING LOCATIONS & RECEPTORS

Scale		SLR Project No.
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Designed	Drawn	Checked	Authorised
EW	EW	TP	TP
Date	Date	Date	Date
12/24	12/24	12/24	12/24

Drawing Number: **FIGURE 10-1** Rev. **1**

12/12/2024

\\slr.local\eu\Offices\IE\Dublin\SLR DATA\SLR Projects\00584 Lagan Materials Ltd\00023 Bweeng EIAR and Planning Application\EIAR\Volume-2 EIAR Report Figs Appendix\10 Noise\Dwgs\CAD\Wking\00584.00023.0.FIG_10-1 Noise Monitoring Locations & Receptors.dwg

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Appendices

Appendix 10-A: Glossary of Terms

GLOSSARY OF TERMINOLOGY

To assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. To express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale, is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 10 A-1 Noise Levels Commonly Found in the Environment

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at one metre away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

Acoustic Terminology

dB (decibel) The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2x10^{-5}$ Pa).

dB(A) A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e., 'A' weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

L_{Aeq} is defined as the notional steady sound level which, over a stated period, would contain the same amount of acoustical energy as the A-weighted fluctuating sound measured over that period.

L_{10} & L_{90} If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence, L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise.

L_{Amax} is the maximum A-weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may

have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.

Appendix 10-B: Noise Assessment Calculations

Figure 10 B- 1 Construction Stage: Soil Stripping, Berms Construction, Local Road Realignment and Restoration Activities

Activity	Receptor	Activity LAeq (dB) at 10m Distance		Reflection	Screening	Activity Distance (m)	Noise Attenuated with Distance dB(A)	Activity LAeq (dB) at Distance		Operational Noise Levels dB(A) at Receptors
		Excavator	HDV	dB(A)	dB(A)			Excavator	Dumper	
Soil Stripping, Berms Construction and Restoration	**R01**	75	74	3	0	200	-26	52	51	55
	R02	75	74	3	0	300	-30	48	47	51
	R03	75	74	3	0	500	-34	44	43	47
	R04	75	74	3	0	800	-38	40	39	42
	R05	75	74	3	0	800	-38	40	39	42
	R06	75	74	3	0	300	-30	48	47	51
	R07	75	74	3	0	200	-26	52	51	55
	R08	75	74	3	0	200	-26	52	51	55
	R09	75	74	3	0	300	-30	48	47	51
	R10	75	74	3	0	500	-34	44	43	47
	SAC	75	74	3	0	2100	-46	32	31	34

Figure 10 B- 2 Operational Stage: Rock Extraction

Activity	Receptor	Activity L_{Aeq} (dB) at 10m Distance							Reflection dB(A)	Screening dB(A)	Activity Distance (m)							Noise Attenuated with Distance dB(A)							Activity L_{Aeq} (dB)							Duration Activity Correction	Penalty	Operational Noise Levels dB(A) at Receptors
		Excavator	Mobile Crusher	Mobile Screener	Loading Shovel	HGV	Concrete Plant	Rock Breaker			Excavator	Mobile Crusher	Mobile Screener	Loading Shovel	HGV	Concrete Plant	Rock Breaker	Excavator	Mobile Crusher	Mobile Screener	Loading Shovel	HGV	Concrete Plant	Rock Breaker	Excavator	Mobile Crusher	Mobile Screener	Loading Shovel	HGV	Concrete Plant	Rock Breaker			
Quarry Processing Activities	**R01**	75	81	82	80	74	80	83	3	-20	200	200	200	200	200	200	200	-26	-26	-26	-26	-26	-26	-26	32	38	39	37	31	37	30	-10	5	49
	R02	75	81	82	80	74	80	83	3	-20	300	300	300	300	300	300	300	-30	-30	-30	-30	-30	-30	-30	28	34	35	33	27	33	26	-10	5	46
	R03	75	81	82	80	74	80	83	3	-20	500	500	500	500	500	500	500	-34	-34	-34	-34	-34	-34	-34	24	30	31	29	23	29	22	-10	5	42
	R04	75	81	82	80	74	80	83	3	-20	800	800	800	800	800	800	800	-38	-38	-38	-38	-38	-38	-38	20	26	27	25	19	25	18	-10	5	37
	R05	75	81	82	80	74	80	83	3	-20	800	800	800	800	800	800	800	-38	-38	-38	-38	-38	-38	-38	20	26	27	25	19	25	18	-10	5	37
	R06	75	81	82	80	74	80	83	3	-20	300	300	300	300	300	300	300	-30	-30	-30	-30	-30	-30	-30	28	34	35	33	27	33	26	-10	5	46
	R07	75	81	82	80	74	80	83	3	-20	200	200	200	200	200	200	200	-26	-26	-26	-26	-26	-26	-26	32	38	39	37	31	37	30	-10	5	49
	R08	75	81	82	80	74	80	83	3	-20	200	200	200	200	200	200	200	-26	-26	-26	-26	-26	-26	-26	32	38	39	37	31	37	30	-10	5	49
	R09	75	81	82	80	74	80	83	3	-20	300	300	300	300	300	300	300	-30	-30	-30	-30	-30	-30	-30	28	34	35	33	27	33	26	-10	5	46
	R10	75	81	82	80	74	80	83	3	-20	500	500	500	500	500	500	500	-34	-34	-34	-34	-34	-34	-34	24	30	31	29	23	29	22	-10	5	42
	SAC	75	81	82	80	74	80	83	3	-20	2100	2100	2100	2100	2100	2100	2100	-46	-46	-46	-46	-46	-46	-46	12	18	19	17	11	17	10	-10	5	29

Appendix 10-C: Noise Monitoring Compliance

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NOISE MONITORING SURVEY

AT

BREEDON IRELAND, BWEENG, CO. CORK

Biannual#1, 2024

Tadgh O'Connor

Report Ref 32908
Issued: 12 March 2024

Prepared by: Richard Cole
Environmental Scientist

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12 March 2024

Dr Imelda Shanahan
Technical Manager

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4.0	**MEASUREMENT RESULTS**	**4**
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APPENDIX I Monitoring locations

1.0 Scope and Introduction

This report presents the results of an environmental noise monitoring survey carried out at the Breedon Ireland site that is located in Carrigcleena, Bweeng, Co. Cork. This survey involved monitoring the noise levels at four selected positions (N1, N2, N3 and N4) and in close proximity to noise sensitive receptors.

The site of the existing quarry development is located in the townland of Carrigcleena approximately 8km southwest of the town of Mallow, Co. Cork. The area in the vicinity of the site is free from any other industrial activities and the surrounding lands are predominantly used for mixed agricultural purposes.

2.0 Survey Protocol

2.1 Monitoring Locations

There are a number of one-off houses located in the vicinity of the site, the nearest of which are located to the north and southwest of the site. Other local residences are further removed from the quarry. A map showing the noise monitoring locations surrounding the site is presented in Appendix I of this report.

The locations chosen for this survey are in close proximity to the nearest noise sensitive receptor locations (N1 to N4) as shown on the map of the site presented in Appendix I of this report. The purpose of selecting these locations is to assess the impact of noise generated at the site on local receptors and the local receiving environment.

Noise monitoring was carried out where possible at the boundary of the private residence closest to the quarry location. This resulted in ensuring all audible noise emissions from the quarry were picked up thereby giving a more accurate reflection of the impact of the quarry on the noise climate in the area. Where access to a private residence was not possible, the nearest suitable location between the residence and the quarry site boundary was used. This methodology ensured that the worst-case noise impact was measured as the noise monitoring in these instances was carried out at a position closer to the quarry than the private residence.

2.2 Instrumentation and Methodology

The survey was conducted in the vicinity of the site in accordance with ISO 1996 *Acoustics - Description and Measurement of Environmental Noise* and with reference to the EPA publication; *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4), 2016*. These results are an accurate representation of the existing baseline noise climate in the vicinity of the site.

The measurements were made using a Bruel & Kjaer 2250 integrating sound level meter fitted with 1:1 and 1:3 Octave Band Filter. The instrument was calibrated *in situ* at 94 dB prior to and after use. The sound level meter was orientated towards the noise source and mounted on a tripod at 1.5m above ground level. This instrument is a Type 1 instrument in accordance with IEC 61672-1 regulations. The Time Weighting used was Fast and the Frequency Weighting was A-weighted as per IEC 61672-1.

2.3 Survey implementation

TMS Environment Ltd personnel conducted the daytime survey on the 06th of March 2024 between 11:00 and 14:00, in accordance with the requirements set out in the EPA Environmental Noise Survey Guidance document which require that: "*Day time noise survey should be carried out between the stipulated times of 08:00 – 22:00*".

The measurement parameters included meteorological observations of prevailing conditions at the time of the survey. All sources of noise were noted, recorded and where possible, identified. The primary measurement parameter was the equivalent continuous A-Weighted Sound Pressure Level, $L_{Aeq,\ T}$, over 30-minute measurement intervals at the nominated noise sensitive locations. A statistical analysis of the measurement results was also completed so that the percentile levels, $L_{AN,\ T}$, for N = 90% and 10% over the measurement intervals were also recorded. The percentile levels represent the noise level in dB(A) exceeded for N% of the measurement time.

In addition, a $^1/_3$ octave band frequency analysis was conducted at each noise monitoring position to determine the presence of any tonal or impulsive component of noise generated at the quarry site.

3.0 Weather Conditions

The weather conditions at the time of the survey were overcast with some periods of drizzle, and with a moderate south-easterly breeze. This remained consistent throughout the monitoring survey.

4.0 Measurement Results

The measurement results of the noise monitoring survey are presented below in Table 4.1.

Table 4.1 Noise Monitoring Details at Local Noise Sensitive Receptors

Monitoring Location	Time	dB $L_{Aeq, 30min}$	dB $L_{A90, 30min}$	dB $L_{A10, 30min}$
N1	11:05-11:35	49	43	51
N2	12:23-12:53	50	45	52
N3	12:57-13:27	49	44	51
N4	11:43-12:13	50	44	48

Key to noise measurement indices:

$L_{Aeq, T}$: the equivalent continuous sound level measured over a specified period of time.

$L_{A90,T}$: the sound level exceeded for 90% of the measurement time. This is commonly used to estimate background noise levels.

$L_{A10, T}$: the sound level exceeded for 10% of the time. This is commonly used to describe high energy, short duration noise events such as road traffic noise.

5.0 Evaluation of Results

Condition 52 of the Planning Permission specifies *'noise levels at the site boundaries shall not exceed 55dB(A) (30 minute LAeq) between 08:00 hours and 18:00 hours Monday to Friday inclusive, and 08:00 hours to 14:00 hours on Saturday, and shall not exceed 45dB(A) at any other time.*

The condition also states: '*at no time shall the noise generated on site result in an increase in noise level of more than 10dB(A) above background level at the boundaries of the adjoining premises.'*

The noise measurement result recorded at N1 was 49dB $L_{Aeq,30mins}$. The main noise sources at this location were passing traffic on local roads and agricultural activity in the surrounding farms. Occasional wind gusts and drizzling rain also contributed to the noise levels during the monitoring period.

The noise measurement result recorded at N2 was 50dB $L_{Aeq, 30mins}$. The main noise source here was traffic passing on the adjacent road along with activity in the nearby farms. Site noise from trucks/machinery could be faintly heard. Occasional wind gusts and drizzling rain also contributed to the noise levels during the monitoring period.

The noise measurement result recorded at N3 was 49dB $L_{Aeq, 30mins.}$ The main sources of noise audible at this monitoring location were agricultural activity in the surrounding farms and passing traffic on local roads. Site noise was not audible at this location. Occasional wind gusts and drizzling rain also contributed to the noise levels during the monitoring period.

The noise measurement result recorded at N4 was 50dB $L_{Aeq,\ 30mins}$. The main source of noise at this monitoring location was an onsite pump located adjacent to the noise monitoring location. Other noise sources included faint onsite noise from trucks moving around the site and distant traffic noise. Occasional wind gusts and drizzling rain also contributed to the noise levels during the monitoring period.

Condition 52 of the Quarry Registration for the operation of the former Eurostone Quarry site Registration Index Number QR073 states "noise *levels emanating from the proposed development when measured at the site boundaries shall not exceed 55dB(A)* L_{Aeq} *(30-min) between 08.00 hours and 18.00 hours Monday to Friday inclusive and between 08.00 hours and 14.00 hours on Saturday. Noise emissions shall not exceed 45dB(A)* L_{Aeq} *(15 mins) at any other time.*"

The noise levels recorded at all noise monitoring locations are within the prescribed limit of 55dB $L_{Aeq,30mins}$. N2 represents the worst-case boundary noise emanating from quarry activities and the recorded measurement result of 50dB $L_{Aeq,30mins}$ is within the prescribed limit of 55dB $L_{Aeq,30mins}$. It is clear from the baseline noise data presented above in Table 4.1 that the Breedon site is operating within the noise limits imposed on site operations.

In general, a significant contributor to noise levels in the vicinity was the passing traffic on the surrounding road network. Some of this traffic is related to activities at the Breedon Ireland site but for the most part it is related to other activities in the area including agricultural activities and general passing roadside traffic. Quarry noise activity that was audible at the noise sensitive receptor locations in the vicinity of the site was within the prescribed limits in all cases.

6.0 Conclusion

As seen from the noise study undertaken in the vicinity of the Breedon site noise emissions from the site are not negatively impacting on the noise climate in the area. The planning condition limit of 55dB $L_{Aeq,\ 30mins}$ during daytime hours is not being exceeded at any location.

It is therefore clear that the Breedon Ireland facility is operating within the Planning conditions and is not a source of noise nuisance at local sensitive areas.

APPENDIX I

MONITORING LOCATIONS

Client Lagan Quarry Bweeng	
Project Ref	
Drawing Title Noise Monitoring Locations	
Notes	
Scale:	
Date: January 2016	Drawn: TR

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INTRODUCTION

11.1 This Chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, addresses the potential effects of a proposed development at Bweeng Quarry on material assets. The existing quarry is located at Carrigcleena More, Bweeng, Co. Cork.

11.2 The proposed development being applied for under this current planning application is shown on EIAR Figure 2-2 and will consist of:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c. 3.7 hectares;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Overburden storage;
- Operation landscaping including perimeter screening berms around the proposed extension area;
- Restoration of the quarry to natural habitat after-uses;

All related ancillary site works within an overall application area of c. 28.8 hectares, and all for a period of 20 years and a further 2 years to complete final restoration of the site.

11.3 Further information on the proposed development, site activities, environmental management systems and controls at the application sites are provided in the Chapter 2 of this EIAR.

Scope of Work

11.4 Under Schedule 6 of the Planning and Development Regulations (2001) as amended, material assets also refers to architectural and archaeological heritage and cultural heritage.

11.5 The EPA guidelines in relation to the preparation of EIAR[1] note the following in respect of material assets:

> *"Material assets can now be taken to mean built services and infrastructure. Traffic is included because in effect traffic consumes roads infrastructure."*

11.6 The specific headings in the guidelines in relation to material assets refer to built services, roads and traffic and waste management.

11.7 Chapter 14 of this EIAR addresses roads and traffic impacts arising from the proposed development (including the proposed realignment of a section of local road) and Chapter

[1] Environmental Protection Agency (2022) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports*.

12 addresses architectural heritage, archaeological heritage and cultural heritage issues, separately to this chapter.

11.8 This chapter comprises the consideration of existing assets pertinent to the proposed development and the application area that are not addressed elsewhere in the EIAR, and the likely development impacts on those assets. On this basis, this chapter addresses built services and waste management. Built services are understood to refer to electricity, telecommunications, gas, water supply infrastructure and sewerage.

Consultations

11.9 No specific consultation was undertaken in relation to this chapter of the EIAR.

Contributors / Authors

11.10 This chapter of the EIAR was prepared by Tim Paul, Director, SLR Consulting Ireland. Tim is a chartered mineral surveyor and chartered engineer with over 25 years' experience in providing strategic development advice, mineral reserve valuation, minerals planning & EIA; mine waste management; and transactional due diligence services for mining and minerals developments in Ireland and internationally.

Limitations / Difficulties Encountered

11.11 No limitations or difficulties were encountered in the preparation of this chapter of the EIAR.

REGULATORY BACKGROUND

Guidelines

11.12 As outlined above, this chapter of the EIAR has been prepared in accordance with the Guidelines on the Information to be contained in Environmental Impact Assessment Reports by the EPA (2022).

RECEIVING ENVIRONMENT

Study Area

11.13 The study area relates to the built services and waste management infrastructure in the vicinity of the application area.

Baseline Study Methodology

11.14 The baseline study comprises a desk-top review of online and published resources, information provided by the applicant and information contained in the other chapters of this EIAR. Ordnance Survey maps and aerial photography were also examined.

Sources of Information

11.15 Baseline information was obtained from the following sources:

Myplan.ie (http://myplan.ie);
Cork County Development Plan 2022 - 2028;
Specialist environmental topic chapters of this EIAR;
Ordnance Survey maps;
Aerial photographs;

Site Location

11.16 The application site is located within the townland of Carrigcleena More, Bweeng Co. Cork, approximately 2.5 km northeast of Bweeng village, refer to EIAR Figure 1-1. The application site and the overall site are located within undulating rural agricultural landscape.

Site Description

11.17 The existing high polished stone value (PSV) rock quarry commenced operations in c. 1978. The existing operations comprise extraction of stone using conventional blasting techniques; processing (crushing, screening and washing) of the fragmented rock to produce high PSV aggregates for use in the production of value added products, surface dressing of roads, road construction and site development works. There is an existing readymix concrete plant located within the existing quarry, which commenced operation in c. 2021

11.18 Two local roads bound the quarry at its southern and eastern boundaries. Access to the quarry is from local road L1214 approximately mid-way at the eastern site boundary. The Reamanagh Stream bounds the quarry to the north and flows in an easterly direction into the Lyre River a tributary of the River Blackwater.

11.19 The lands surrounding and within the application site predominantly comprise farm fields. The application site is not subject to any statutory or non-statutory nature conservation designations. Dwellings in the vicinity of application site are generally located along the local road network comprise farmsteads or isolated on-off residences, with occasional small clusters. The nearest dwellings to the application site boundary are shown in **Error! Reference source not found.**.

Built Services / Utilities

11.20 Bweeng Quarry is served by mains electricity, which feeds directly into the overall site.

11.21 Potable water is supplied by bottled water. Water for welfare facilities is provided from an onsite well.

11.22 Effluent from the existing toilet facilities is treated using on-site treatment system.

11.23 There are no built services or utilities located within the proposed extension area and it is not proposed to provide any as part of the proposed development.

Waste Management

General Waste Management

11.24 General waste produced by the office / canteen within the existing quarry is transported to local designated waste storage areas, where it is collected in bins and removed for recycling or disposal by a licensed waste contractor.

11.25 Waste oils are collected periodically by a licensed company. Any light bulbs, batteries, rubber tyres and scrap metal arising on the site are stored within local designated scrap storage areas prior to collection by a licensed collector.

11.26 The Environmental Management System (EMS) for Bweeng Quarry provides details of waste management procedures and details on the reuse/recycling/disposal route for non-hazardous and hazardous waste that may arise on the overall site.

11.27 Existing waste management procedures will continue to be implemented and no general waste will be produced within the proposed extension area.

Extractive Waste Management

11.28 Any extractive waste arising within the site is managed in accordance with the requirements of the Waste Management (Management of Waste from the Extractive Industries) Regulations 2009.

IMPACT ASSESSMENT

Evaluation Methodology

11.29 The evaluation of effects on built services and waste management comprises an assessment based on the quantitative and qualitative analysis of potential effects on the environment undertaken in other chapters of this EIAR.

Built Services / Utilities

Construction and Operational Stage Impacts

11.30 During the construction and operational stages the proposed development will not require the installation of electricity, water supply, telecommunications or wastewater infrastructure. All of the necessary infrastructure is already provided within the overall site.

11.31 Given that the proposed development does not require the provision of any additional built services and the overall site currently operates without significant adverse effects on built services, it is considered that the proposed development would not have any significant, adverse, direct or indirect effects on water supply, gas supply, wastewater, telecommunications or electricity supply.

Post-Operational Stage Impacts

11.32 The post-operational stage relates to the application area following the cessation of extraction operations and the completion of any restoration works.

11.33 No activities that would have the potential to affect any built services in the vicinity would be undertaken during this stage. It is not anticipated that there would be any significant direct or indirect effects on built services / utilities during this stage of the development.

Waste

Construction and Operational Stage Impacts

11.34 There are existing waste management arrangements in place in relation to general waste that would be generated by the staff working at the overall site. These arrangements will remain in place for the duration of the construction and operational stages. Any waste generated will be handled and stored in an appropriate manner and will be removed off site by an appropriately licenced waste collector.

11.35 Extractive waste, if any arising, will be handled in accordance with the requirements set out in the Waste Management (Management of Waste from the Extractive Industries) Regulations 2009.

11.36 The volume of waste generated on site is and will be limited in volume. It is considered, therefore, that the impact of waste generation during these stages will be medium-term, temporary and insignificant.

Post-Operational Stage Impacts

11.37 By the post-operational stage, the extraction area will be restored. Any waste generated on the site will be limited to general waste produced by any employees that engaged in aftercare on an intermittent basis over a two to three year period. Any such limited volumes of waste will be handled in accordance with the established practices on the overall site and will be removed by a licenced contractor.

11.38 It is considered, therefore, that the generation of waste during this period will be short-term, temporary and insignificant in its effects.

Unplanned Events

11.39 According to the EPA guidelines, unplanned events, such as accidents, can include *"spill from traffic accidents, floods or land-slides affecting the site, fire, collapse or equipment failure on the site"*. The 2014 EIA directive refers to *"major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes)"*.

11.40 In this instance, the vulnerability of the proposed development to accidents, unplanned events or natural disasters is relatively limited owing to the relatively simple nature of the development works, the established nature of the techniques, regulations and procedures to be followed, the material to be handled on site and the relatively rural location of the proposed works.

11.41 Unplanned events in relation to the proposed development could potentially relate to:

- Instability during the extraction process;

- Spills from traffic accidents;

11.42 The HSA Safe Quarry Guidelines to the Safety Health and Welfare at Work (Quarries) Regulations 2008 As Amended are implemented at the quarry and will limit the potential for unplanned events in the form of instability during extraction. The final restoration will provide for a stable landform restored to natural habitat.

11.43 Chapter 7 (Water) notes that accidental spillages or leaks of fuels or chemicals during site activities could happen without proper control and supervision. Appropriate mitigation measures and monitoring are and will continue to be implemented to ensure that there are no potential impacts on the water environment as a result of unplanned events at the site.

11.44 The traffic and transport assessment, carried out as part of the EIAR (Chapter 14), indicates that existing road network can accommodate the proposed development. It is considered that the risk of an accident resulting in a spillage from traffic associated with the development would be no greater in relation to this development than it is for any other form of development that relies on the transportation of goods and materials by HGVs. The potential for significant impacts on employment, human health in the wider population or amenity as a result of a road spillage is likely to be very low and any such effects would be temporary.

11.45 In light of these factors, it is considered that no material assets identified in this chapter are particularly vulnerable to unplanned or unforeseen events and that any unplanned events, were they to occur, would be unlikely to cause significant, sudden environmental effects in respect of existing built services; rail infrastructure or the management of wastes.

Cumulative / Synergistic Impacts

11.46 A search of the Cork County Council online planning search facility indicates that there is no other planned development in the vicinity of the application site which were granted planning permission in the last five years and have the potential to have any significant adverse cumulative impacts on material assets.

Transboundary Impacts

11.47 It is not anticipated that the impacts of the proposed development would have any significant transboundary effects on material assets.

Interaction with Other Impacts

11.48 It is not anticipated that the effects of the proposed development on material assets would interact significantly with other impacts.

'Do-nothing Scenario'

11.49 If planning permission is not approved for the proposed development, the existing quarry would continue operations and the existing site would be restored to natural habitat.

11.50 A 'do-nothing scenario' would not result in any significant adverse impact in relation to built services and waste management, and the effect of a 'do-nothing scenario' would be neutral in relation to these factors.

MITIGATION MEASURES

Construction Stage

11.51 No construction stage impacts on material assets arise, and no mitigation measures are therefore required during this stage of the development.

Operational Stage

Built Services

11.52 No operational stage impacts on material assets arise, and no mitigation measures are therefore required during this stage of the development.

Waste Management

11.53 Aside from the continued implementation of established good practice and housekeeping, no additional mitigation measures are required in relation to waste management.

Post – Operational Stage

11.54 There are no built services / utilities within the application site that would be directly affected during the post-operational stage of the proposed development. No mitigation measures are required in relation to built services / utilities.

11.55 It is not expected that any significant volumes of waste would be generated during the post-operation stage. Any such waste will be handled in accordance with the established practices on site and will be removed by a licenced contractor. No additional mitigation measures are proposed in relation to waste management.

RESIDUAL IMPACT ASSESSMENT

Construction Stage

11.56 There will be no residual impacts on material assets arising during the construction stage.

Operational Stage

11.57 There will be no significant residual impacts on material assets arising during the operational stage.

Post – Operational Stage

11.58 There will be no residual impacts on material assets arising during the post-operational stage.

MONITORING

11.59 There is no monitoring required or proposed in relation to material assets.

REFERENCES

Environmental Protection Agency (2022) 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports'.

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INTRODUCTION

Background

12.1 This Chapter of the Environmental Impact Assessment Report (EIAR), commissioned by SLR Consulting Ireland on behalf of Breedon Materials Ltd., trading as Breedon Ireland addresses the impacts on the archaeological, architectural and cultural heritage of the application site and the surrounding area of a proposal for the continued use and lateral extension (c. 3.7ha) to an existing quarry within an overall application area of c. 28.8ha at Carrigcleena More, Bweeng in Co. Cork. The site location and study area are indicated in Figure 12-1.

12.2 The proposed development will consist of the continued use and extension of an existing rock quarry within an overall application area of c. 28.8ha

12.3 The proposed development is described in detail in EIAR Chapter 2 – Project Description.

Scope of Work / Methodology

12.4 This study which complies with the requirements of Directive EIA 2014/52/EU is an assessment of the known or potential cultural heritage resource within a specified area and includes the information that may reasonably be required for reaching a reasoned conclusion on the significant effects of the project on the environment, taking into account current knowledge and methods of assessment. It consists of a collation of existing written and graphic information in order to identify the likely context, character, significance and sensitivity of the known or potential cultural heritage, archaeological and structural resource using an appropriate methodology (EPA 2002, 2003 and 2022).

12.5 The criteria and definitions for describing effects set out below is drawn from the 2022 EPA Guidelines.

Quality of Effects	Positive A change which improves the quality of the environment.
	Neutral No effects or effects that are imperceptible, within normal bounds or variation or within the margin of forecasting error.
	Negative/adverse Effects A change which reduces the quality of the environment.
Significance of effects	Imperceptible An effect capable of measurement but without noticeable consequences.
	Not significant An effect which causes noticeable changes in the character of the environment but without noticeable consequences.
	Slight effects An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
	Moderate effects An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends.
	Significant effects

	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
	Very Significant effects An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
	Profound effects An effect which obliterates sensitive characteristics
Describing the extent and context of effects	Extent Describe the size of the area, the number of sites, and the proportion of population affected by an effect.
	Context Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions.
Describing the Probability of effects	Likely effects The effects can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented.
	Unlikely effects The effects can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Describing the duration and frequency of effects	Momentary effects Effects lasting from seconds to minutes.
	Brief effects Effects lasting less than a day.
	Temporary effects Effects lasting less than a year.
	Short-term effects Effects lasting one to seven years.
	Short-term effects Effects lasting seven to fifteen years.
	Long term-term effects Effects lasting fifteen to sixty years.
	Permanent effects Effects lasting over sixty years.
	Reversible effects Effects that can be undone, for example through remediation or restoration.
	Frequency of effects Describe how the effect will occur.
Describing the types of effects	Indirect effects Impacts on the environment which are not a direct result of the project.
	Cumulative effects The addition of minor or significant effects, including effects of other projects, to create a larger more significant effect.
	'Do-Nothing Effects' The environment as it would be in the future should the project not be carried out.
	'Worst case' effects The effects arising from a project in the case where mitigation measures substantially fail.
	Indeterminable effects When the full consequences of a change in the environment cannot be described.
	Irreversible effects

	When the character distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
	Residual effects The degree of environmental change that will, occur after the proposed mitigation measures take effect.
	Synergistic effects Where the resultant effect is of greater significance than the sum of its constituents.

12.6 The study involved detailed investigation of the archaeological and historical background of the development site, the landholding and the surrounding area extending 1km from the development boundary (Fig. 12-1). This area was examined using information from the Record of Monuments and Places of County Cork, the Sites and Monuments Record, the Cork County Development Plan, the National Inventory of Architectural Heritage, lists of excavations and cartographic and documentary sources. The application area was the subject ot an archaeological geophysical survey and an archaeological test excavation.

12.7 An impact assessment and mitigation strategy have been prepared. An impact assessment is undertaken to outline potential adverse impacts that the proposed development may have on the cultural resource, while a mitigation strategy is designed to avoid, reduce or offset such adverse impacts.

12.8 The application site is located in the Townland of Carrigcleena More, Co. Cork on OS Six Inch sheet No. 41, to the east of the R619 Coachford to Drommahane road, c.2.6km northeast of Bweeng, Co. Cork.

12.9 Extracts from the Record of Monuments and Places for County Cork are presented on a map of the local area around the site in Figure 12-1. RMP sites included on the Records of Monuments and Places statutory mapping are identified by black circles. The application area is shown in red.

Contributors / Author(s)

12.10 The assessment was prepared by Dr. Charles Mount who is a member of the Institute of Archaeologists of Ireland and has more than thirty years of cultural heritage assessment experience. He holds M.A. and Ph.D. degrees in archaeology as well as a professional diploma in EIA and SEA Management.

Limitations / Difficulties Encountered

12.11 No difficulties were encountered during the desktop study, field survey or in the preparation of this report.

REGULATORY BACKGROUND

12.12 The following paragraphs set out the regulatory background with regard to cultural impact assessments in Ireland in general and the site-specific planning background relevant to this cultural impact assessment, in particular.

Legislation

12.13 No specific Irish legislation exists governing cultural heritage assessments.

Planning Policy and Development Control

12.14 The Cork County Development Plan 2022-2028 (CDP) is the statutory plan detailing the development objectives/policies of the local authority. The plan includes objectives and policies, relevant to this assessment, i.e. regarding cultural heritage.

Built and Cultural Heritage

12.15 Volume 1, Chapter 16 of the Cork County Development Plan sets out the policies on built and cultural heritage within the county. The Plan recognises the importance of identifying, valuing and safeguarding our archaeological, architectural and cultural heritage for future generations through appropriate protection, management and enhancement measures or via the sensitive development of this resource.

12.16 The Council's objectives regarding archaeological heritage are to:

HE 16-2 Protection of Archaeological Sites and Monuments

Secure the preservation (i.e. preservation in situ or in exceptional cases preservation by record) of all archaeological monuments and their setting included in the Sites and Monuments Record (SMR) (see www.archaeology.ie) and the Record of Monuments and Places (RMP) and of sites, features and objects of archaeological and historical interest generally. In securing such preservation, the planning authority will have regard to the advice and recommendations of the Development Applications Unit of the Department of Housing, Local Government and Heritage as outlined in the Frameworks and Principles for the Protection of the Archaeological Heritage policy document or any changes to the policy within the lifetime of the Plan.

HE 16-3: Underwater Archaeology

Protect and preserve the archaeological value of underwater archaeological sites and associated underwater and terrestrial features. In assessing proposals for development, the development will take account of the potential underwater archaeology of rivers, lakes, wetlands, intertidal and sub-tidal environments through appropriate archaeological assessment by a suitably qualified archaeologist.

HE 16-4: Zones of Archaeological Potential in Historic Towns and Settlements

Proposed development works in Historic Towns and settlements, Zones of Archaeological Potential, Zones of Notification and the general historic environs in proximity to the zones, should take cognisance of the impact potential of the works, and all appropriate archaeological assessments employed to identify and mitigate the potential impacts.

HE 16-5: Zones of Archaeological Potential

Protect the Zones of Archaeological Potential (ZAPs) located within historic towns, urban areas and around archaeological monuments generally. Any development within the ZAPs will need to take

cognisance of the upstanding and potential for subsurface archaeology, through appropriate archaeological assessment.

HE 16-6: Industrial and Post Medieval Archaeology

Protect and preserve industrial and post-medieval archaeology and long-term management of heritage features such as mills, limekilns, forges, bridges, piers and harbours, water-related engineering works and buildings, penal chapels, dwellings, walls and boundaries, farm buildings, estate features, military and coastal installations. There is a general presumption for retention of these structures and features. Proposals for appropriate redevelopment including conversion should be subject to an appropriate assessment and record by a suitably qualified specialist/s.

HE 16-7: Battlefield, Ambush and Siege Sites and Defensive Archaeology

Protect and preserve the defensive archaeological record of County Cork including strategic battlefield, ambush and siege sites, and coastal fortifications and their associated landscape due to their historical and cultural value. Any development within or adjoining these areas shall undertake a historic assessment by a suitably qualified specialist to ensure development does not negatively impact on this historic landscape.

HE 16-8: Burial Places

Protect all historical burial places and their setting in County Cork and encourage their maintenance and care in accordance with appropriate conservation principles.

HE 16-9: Archaeology and Infrastructure Schemes

All large scale planning applications (i.e. development of lands on 0.5 ha or more in area or 1km or more in length) and Infrastructure schemes and proposed roadworks are subjected to an archaeological assessment as part of the planning application process which should comply with the Department of Arts, Heritage and the Gaeltacht's codes of practice. It is recommended that the assessment is carried out following pre planning consultation with the County Archaeologist, by an appropriately experienced archaeologist to guide the design and layout of the proposed scheme/development, safeguarding the archaeological heritage in line with Development Management Guidelines.

HE 16-10: Management of Monuments within Development Sites

Where archaeological sites are accommodated within a development it shall be appropriately conservation/ protection with provision for a suitable buffer zone and long-term management plan put in place all to be agreed in advance with the County Archaeologist.

HE 16-11: Archaeological Landscapes

To protect archaeological landscapes and their setting where the number and extent of archaeological monuments are significant and as a collective are considered an important archaeological landscape of heritage value.

HE 16-12: Raising Archaeological Awareness

As part of the Heritage Plan it is an objective to develop a management plan, if resources allow, for the archaeology of County Cork, which could include an evaluation of the Historic Character Assessment of Cork County helping to identify areas for tourism potential, and strategic research while also promoting best practice in archaeology and encouraging the interpretation, publication and dissemination of archaeological findings from the development application process.

HE 16-13: Undiscovered Archaeological Sites

To protect and preserve previously unrecorded archaeological sites within County Cork as part of any development proposals. The Council will require preservation in situ to protect archaeological monuments discovered. Preservation by record will only be considered in exceptional circumstances.

12.17 The Council's objectives regarding architectural heritage are to:

HE 16-14: Record of Protected Structures

a) The identification of structures for inclusion in the Record will be based on criteria set out in the Architectural Heritage Protection Guidelines for Planning Authorities (2011).

b) Extend the Record of Protected Structures in order to provide a comprehensive schedule for the protection of structures of special importance in the County during the lifetime of the Plan as resources allow.

c) Seek the protection of all structures within the County, which are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. In accordance with this objective,

a Record of Protected Structures has been established and is set out in Volume Two Heritage and Amenity, Chapter 1 Record of Protected Structures.

d) Ensure the protection of all structures (or parts of structures) contained in the Record of Protected Structures.

e) Protect the curtilage and attendant grounds of all structures included in the Record of Protected Structures.

f) Ensure that development proposals are appropriate in terms of architectural treatment, character, scale and form to the existing protected structure and not detrimental to the special character and integrity of the protected structure and its setting.

g) Ensure high quality architectural design of all new developments relating to or which may impact on structures (and their settings) included in the Record of Protected Structures.

h) Promote and ensure best conservation practice through the use of specialist conservation professionals and craft persons.

i) In the event of a planning application being granted for development within the curtilage of a protected structure, that the repair of a protected structure is prioritised in the first instance i.e. the proposed works to the protected structure should occur, where appropriate, in the first phase of the development to prevent endangerment, abandonment and dereliction of the structure.

HE 16-15: Protection of Structures on the NIAH

Protect where possible all structures which are included in the NIAH for County Cork, that are not currently included in the Record of Protected Structures, from adverse impacts as part of the development management functions of the County.

HE 16-16: Protection of Non- Structural Elements of Built Heritage

Protect non-structural elements of the built heritage. These can include designed gardens/garden features, masonry walls, railings, follies, gates, bridges, shopfronts and street furniture. The Council will promote awareness and best practice in relation to these elements.

HE 16-17: Areas of Special Planning Control

Establish areas of special planning control within Architectural Conservation Areas where appropriate. These areas will include a scheme setting out objectives for the conservation and enhancement of the special character of the area, and will be based on an Architectural Appraisal of each town.

HE 16-18: Architectural Conservation Areas

Conserve and enhance the special character of the Architectural Conservation Areas included in this Plan. The special character of an area includes its traditional building stock, material finishes, spaces, streetscape, shopfronts, landscape and setting. This will be achieved by;

(a) Protecting all buildings, structures, groups of structures, sites, landscapes and all other features considered to be intrinsic elements to the special character of the ACA from demolition and non-sympathetic alterations.

(b) Promoting appropriate and sensitive reuse and rehabilitation of buildings and sites within the ACA and securing appropriate infill development.

(c) Ensure new development within or adjacent to an ACA respects the established character of the area and contributes positively in terms of design, scale, setting and material finishes to the ACA.

(d) Protect structures from demolition and non sympathetic alterations.

(e) Promoting high quality architectural design within ACAs.

(f) Seek the repair and re-use of traditional shopfronts and where appropriate, encourage new shopfronts of a high quality architectural design.

(g) Ensure all new signage, lighting advertising and utilities to buildings within ACAs are designed, constructed and located in such a manner they do not detract from the character of the ACA.

(h) Protect and enhance the character and quality of the public realm within ACAs. All projects which involve works within the public realm of an ACA shall undertake a character assessment of the said area which will inform a sensitive and appropriate approach to any proposed project in terms of design and material specifications. All projects shall provide for the use of suitably qualified conservation architects/ designers.

(i) Protect and enhance the character of the ACA and the open spaces contained therein. This shall be achieved through the careful and considered strategic management of all signage, lighting, utilities, art works/pieces/paintings, facilities etc to protect the integrity and quality of the structures and spaces within each ACA.

(j) Ensure the protection and reuse of historic street finishes, furniture and features which contribute to the character of the ACA.

HE 16-19:Vernacular Heritage

a) Protect, maintain and enhance the established character, forms, features and setting of vernacular buildings, farmyards and settlements and the contribution they make to our architectural, archaeological, historical, social and cultural heritage and to local character and sense of place.

b) Cork County Council encourages best conservation practice in the renovation and maintenance of vernacular buildings including thatched structures through the use of specialist conservation professionals and craft persons. Development proposals shall be accompanied by appropriate documentation compiled by experienced conservation consultant.

c) There will generally be a presumption in favour of the retention of vernacular buildings and encouragement of the retention and re-use of vernacular buildings subject to normal planning considerations, while ensuring that the re-use is compatible with environmental and heritage protection.

HE 16-20: Historic Landscapes

a) Recognise the contribution and importance of historic landscapes and their contribution to the appearance of the countryside, their significance as archaeological, architectural, historical and ecological resources.

b) Protect the archaeological, architectural, historic and cultural element of the historic/heritage landscapes of the County of Cork.

c) All new development within historic landscapes should be assessed in accordance with and giving due regard to Cork County Councils 'Guidance Notes for the Appraisal of Historic Gardens, Demesnes, Estates and their Settings' or any other relevant guidance notes or documents issued during the lifetime of the Plan.

HE 16-21: Design and Landscaping of New Buildings

a) Encourage new buildings that respect the character, pattern and tradition of existing places, materials and built forms and that fit appropriately into the landscape.

b) Promote sustainable approaches to housing development by encouraging new building projects to be energy efficient in their design and layout.

c) Foster an innovative approach to design that acknowledges the diversity of suitable design solutions in most cases, safeguards the potential for exceptional innovative design in appropriate locations and promotes the added economic, amenity and environmental value of good design.

d) Require the appropriate landscaping and screen planting of proposed developments by using predominantly indigenous/local species and groupings and protecting existing hedgerows and historic boundaries in rural areas. Protection of historical/commemorative trees will also be provided for.

HE 16-22: Village Design Statements

Facilitate the preparation and implementation of village design statements and other community led projects and plans to enhance village environments whilst ensuring that such initiatives are consistent with other Plan policies.

12.18 The Council's objectives regarding cultural heritage are to:

HE 16-23: Cultural Heritage

Protect and promote the cultural heritage of County Cork as an important economic asset and for its intrinsic value to identity of place and the well being of people within the County.

HE 16-24: Naming of New Developments

Promote and preserve local place names, local heritage and the Irish language by ensuring the use of local place names or geographical or cultural names which reflect the history and landscape of their setting in the naming of new residential and other developments. Such an approach will be a requirement of planning permissions for new developments.

HE 16-25: Gaeltacht Areas

Protect the linguistic and cultural heritage of the Gaeltacht areas of Cork by:

a) Encouraging development within the Gaeltacht and in the Gaeltacht Service Town of Macroom, which promotes, facilitates or complements the cultural heritage, including Irish language use;

b) Encouraging development within the Gaeltacht and the Gaeltacht Service Town of Macroom, which provides employment or social facilities, especially, but not exclusively, where these are of relevance to local young people;

c) Resisting development within the Gaeltacht, which would be likely to erode the cultural heritage (including the community use of Irish language), unless there are over-riding benefits for the long-term sustainability of the local community or for the proper planning and sustainable development of a wider area;

d) Ensuring that where the County Council erects signs within the Gaeltacht, these have Irish as their primary language, unless there are positive and over-riding reasons for doing otherwise;

e) Discouraging the exhibition of advertisements within the Gaeltacht which do not use Irish as their primary language;

f) Consider the requirement for the use of demanding linguistic impact analyses with planning applications for particular major developments. These would be cases where the potential impact of the development on the use of Irish as the community language is not immediately apparent and pivotal in the determination of the application.

g) Facilitate the preparation and implementation of local Gaeltacht Plans, Programmes and Initiatives, including Language Plans and Conservation Plans such as the Múscraí Heritage Plan, in the interests of the proper planning and sustainable development of Cork's Gaeltachts, provided that such plans are in keeping with Council policy.

h) Encourage the use of the Irish language, not just in Gaeltacht areas but throughout the County, particularly with regard to service provision, planning and development and Council initiatives/activities.

i) The use of the Irish language is promoted in the design of developments e.g. business advertising, recreational and community facilities are clearly identified and provided and shop-front signage should be in the Irish language;

j) The Plan encourages collaboration between Gaeltacht stakeholders, Gaeltacht communities and State agencies in the future planning and development projects to ensure the protection and promotion of the Irish language as the community language.

Guidelines

12.19 The report format and some of the descriptions of effects are based on the **Guidelines on the Information to be contained in Environmental Impact Assessment Reports**, published by the Environmental Protection Agency (EPA) in 2022.

Significant Risks

12.20 There are no known significant risks to human health or environmental effects, which may occur in relation to this cultural heritage assessment.

RECEIVING ENVIRONMENT

Study Area

12.21 The overall study area is shown in Figure 12-1.

Baseline Study Methodology

12.22 Research has been undertaken in two phases. The first phase comprised a paper survey of all available archaeological, historical and cartographic sources. The second phase involved the archaeological assessment of the proposed development area. This involved a field inspection of the application area followed by an archaeological geophysical survey and an archaeological test excavation.

Paper Study

12.23 This comprises a document search. The following sources were examined and a list of sites and areas of archaeological potential compiled:

- Record of Monuments and Places County Cork
- The Sites and Monuments Record
- Available aerial photography
- Cartographic and written sources relating to the study area
- Cork Development Plan 2022-2028
- The National Inventory of Architectural Heritage

The Record of Monuments and Places

12.24 This was established under section 12 (1) of the 1994 National Monuments (Amendment) Act and provides that the Minister shall establish and maintain a record of monuments and places where the Minister believes there are monuments, such record to be comprised of a list of monuments and relevant places and a map or maps showing each monument and relevant place in respect of each county in the State. The associated files contain information of documentary sources and field inspections where these have taken place. Note that although the Historic and Archaeological Heritage and Miscellaneous Provisions Act 2023 was signed into law by the President on October 13, 2023, the act had not been commenced at the time this assessment was prepared. This assessment uses the National Monuments Acts 1930-2014, which were still in force at the time the assessment was completed. Several Recorded monuments were noted within the study area. All available information on these sites is provided in Appendix 12-1.

Cartographic Sources

12.25 This included seventeenth century mapping as well the 1st and 2nd editions of the Ordnance Survey six-inch maps and Documentary sources provide more general historical and archaeological background.

The County Development Plan

12.26 This notes structures listed for preservation.

Field Inspection

12.27 A field inspection was carried out on 9th of January 2024 to determine the location, extent and ascertain the significance of any archaeological sites and to identify any previously unrecorded or suspected sites and portable finds.

Geophysical Survey

12.28 A high-resolution magnetometry survey was conducted by AOC in February 2024 (NMS Licence No. 24R0175), refer to Appendix 12-2.

Archaeological testing

12.29 Following the assessment of the results of the geophysical survey it was decided to commission a test excavation. This was carried out from 26 June to 1 July 2024 by Ewelina Rondelez for Rubicon Heritage (Licence No: 24E0539), refer to Appendix 12-3.

RECEIVING ENVIRONMENT, HISTORICAL AND ARCHAEOLOGICAL LANDSCAPE

The Landscape

12.30 The application site is located in the Townland of Carrigcleena More, Co. Cork on OS Six Inch sheet No. 41, to the east of the R619 Coachford to Drommahane road, c.2.6km northeast of Bweeng, Co. Cork. The application site is located in agricultural lands. The soil is a Kilrush series fine loamy drift with siliceous stones overlying drift with siliceous stone.

Historical and Archaeological Background

12.31 The following is a brief summation of the main types of sites and monuments that are known from the county along with the historical development of the study area. It is intended as a guide to the types of sites and monuments that might be encountered in the study area.

12.32 The site is situated in the Townland of Carrigcleena More, in the Barony of Duhallow, and the civil parish of Kilshannig.

The Prehistoric Period

12.33 The evidence of prehistoric activity in the study area consists of a standing stone (RMP CO041-103----) townland and a Fulacht fia (RMP CO041-105----) in Carrigcleena More townland.

The Early Medieval Period

12.34 In the Early Medieval period (500 AD-1170 AD) the study area formed part of the trícha of Muscrimittine that was ruled by the Múscraige Mittíne, Uí Bercháin, Uí Blaithmeic, and the Ua Donducáin and Ua Fhlainn kings (MacCotter 2008, 157-8). Classically settlement at this period is indicated by the presence of enclosed farmsteads known as ringforts, when

enclosed with earthen banks, and cashels when enclosed by stone walls. There are six ringforts in the study area that date to this period in Carrigcleena More (RMP CO041-099----, CO041-100001-, CO041-104----, and CO041-106001), Carrigcleena Beg (RMP CO041-120----), and Glashaboy West (RMP CO041-118001-) that indicate settlement in the study area during the Early Medieval period. Several of the ringforts have underground chambers known as souterains (RMP CO041-100002-, CO041-102----, CO041-106002, CO041-118002-).

The Later Medieval Period

12.35 Following the Anglo-Norman invasion of Ireland and the submission of Dermot MacCarthy, King of Desmond, to King Henry II in 1172, the city of Cork was by occupied Robert fitz Stephen and Milo de Cogan who used the city as a base to occupy the Kingdom of Desmond. After defeating Dermot MacCarthy he granted them 7 cantreds of Desmond, but retained 24 cantreds including East Carbury and the study area (Otway-Ruthven 1980, 62-3). In the Later Medieval period the parish of Kilshannig, in which the study area is located, was part of the cantred of Muscry Omittone, later called Moyscrilyn that was held by the Cogans (Mac Cotter 2008, 157-8).

12.36 The process of Anglo-Norman settlement or sub-infeudation was often associated with the construction of timber castles, known as mottes. These earthwork fortifications were used to house and defend the Norman lords and their retinues while they set about the process of pacifying and organizing their new fiefs. However, there are no mottes in the study area or in this part of Cork.

12.37 Manorialism describes the organisation of the feudal rural economy and society characterised by the vesting of legal and economic power in a lord supported economically from his own direct landholding and from the obligatory contributions of a legally subject part of the peasant population under his jurisdiction. In Ireland the Lord's manor house was also sometimes enclosed by a rectangular moat and these sites are referred to as moated sites. They are a useful indicator of Anglo-Norman settlement. However, there are no moated sites in the study area. The closest example is in Ballyfilibeen townland (CO042-066----) 2.5km to the east.

12.38 The fifteenth century was characterised by the decline of Anglo-Norman power in Ireland which had been ebbing since the early fourteenth century. Part of the response to this was the construction of masonry tower houses which commenced in the early fifteenth century AD and lasted until the end of the sixteenth century. Tower Houses were built by both the English and the Irish. There are no Tower Houses in the study area and the closest example is at Castlebarrett (RMP CO042-009001-) 4km to the north-east.

The Post-Medieval Period

12.39 The Down Survey records that in 1640 the application site, called Bogra, was described as a bog, unprofitable. Griffith's primary valuation of 1847-64 records that the entire application site was held by Eugene O'Callaghan and let to Denis Kelly, John Connell and William Kelly.

BUILDINGS

Protected Structures

12.40 The Cork Development Plan 2022-2028 and the Record of Protected Structures was examined as part of the baseline study for this chapter of the EIAR. The review established that there are no structures within the application area, or the study area listed as Protected Structures.

National Inventory of Architectural Heritage

12.41 The National Inventory of Architectural Heritage (NIAH) which is maintained by the Dept. of Housing, Local Government and Heritage was examined as part of the baseline study for this chapter of the EIAR on the 3rd of January 2024. The review established that there are no structures included in the NIAH located within the application area or the study area.

Field Survey

12.42 A field survey was carried out on the 9th of January 2024. This involved visiting and photographing all additional structures indicated on the 1938 Edition of the six-inch Ordnance Survey mapping within 300m of the proposed extension area. The locations of the structures are indicated on Fig. 12.1. There is one structure located in this area that is not of special architectural significance (see below).

No.	1
Structure type	House
Townland	Carrigcleena More
Designation	None
Data source	1938 edition 6-inch Ordnance Survey map
Perceived Significance:	No special architectural significance.
Type of effect:	Neutral
Significance of impact	Imperceptible
Description	Three-bay two storey house with slate roof, two chimneys and replace uPVC windows.
Illustration	Plate 12-1

ARCHAEOLOGY

Archaeological Assessment

Recorded Monuments

12.43 Note that in accordance with the Historic and Archaeological Heritage and Miscellaneous Provisions Bill 2023 the RMP will be replaced by the Register of Monuments, but the RMP was still legally in force when this assessment was prepared. Examination of the Record of Monuments and Places for Co. Cork indicated that the locations of three Recorded Monuments are located within the application site (see Fig. 12-1 and Appendix 12-1). These are described in the RMP as:

CO041-105---- Carrigcleena More Fulacht fia

In stone quarry at Carrigcleena. According to local information, formerly in scrubland but now covered by rubble from quarry; inaccessible. Shown on 1938 OS 6-inch map as mound. Possibly this is fulacht fiadh investigated in 1853 by South Munster Antiquarian Society led by John Windele (Coleman 1893, 262-3). Investigation revealed wooden trough 'composed of planks, eight in number, four of which formed the sides and ends and four the bottom. Its dimensions were six feet long, four wide and two deep and the workmanship such as might have been effected with stone-axes, with no nails of any kind. A rude groove at each end of both sides received the cross planks which formed the ends, and through the middle of the bottom, a rough wooden bar, somewhat rounded, penetrated into the marl beneath. The outside of the planks were nearly as rough as when felled from their native oak-forest.'

CO041-106001 Carrigcleena More Ringfort - rath

Depicted as hachured circular enclosure (diam. c. 28m) on 1842 OS 6-inch map, c. 150m to NW of 'Carrigcleena' rock. Named 'Lisheenacarriga, little fort of the rock' in OS Field Books (Berry 1905, 33). Destroyed by quarrying. Described by Berry (ibid.) as a 'lisheen, or small round lios'. Recorded by Bowman (1934, 569) as a levelled single-ramparted fort (diam. c. 35yd) on R. Barrett's land. Souterrain (CO041-10602-) in interior. Carrigcleena, 'a wild and romantic spot...a rude elevation, surrounded by a rampart of huge rocks, towering over the country round, and enclosing about two acres of very green ground', is said locally to have a passage leading from it to the fort (Berry 1905, 33).

CO041-106002 Carrigcleena More Souterrain

In levelled ringfort (CO041-10601-). According to OS Field Books, Lisheenacarriga, little fort of the rock, has a cave which is said to contain three large apartments (Berry 1905, 33). Bowman (1934, 569) noted that 'a souterrain was here, but is now closed'. Area of fort and souterrain now destroyed by quarrying.

RMP CO041-106001 and CO041-106002 are located in the area of existing extraction and have been removed by quarrying. RMP CO041-105---- was not visible when the existing quarry was assessed by McCarthy (2006) in 2006 and may be covered by quarry rubble. There are no proposals to remove the rubble covering RMP CO041-105---- in this application and the location of the monument will not be effected.

12.44 The closest Recorded Monument to the proposed extension area externally is the site of a potential enclosure indicated by band of lighter-coloured vegetation in Carrigcleena Beg townland CO041-198----. This potential monument is described in the RMP as:

CO041-198---- Carrigcleena Beg Enclosure

In rough grazing, on gentle S-facing slope. Cropmark of roughly circular area (diam. c. 40m) enclosed by band of lighter-coloured vegetation, probably indicating a levelled bank, visible in aerial photograph (GSIAP, W386, July 1975). No visible surface trace.

This potential monument is located c.480m to the east of application area. The potential monument will not be directly or indirectly impacted by the proposal.

12.45 The remaining Recorded Monuments in the study area are situated further from the application area and are considered too far distant to be directly or indirectly impacted by the proposed development.

Sites and Monuments Record

12.46 Examination of the Sites and Monuments Record (SMR) which is maintained by the Dept. of Housing, Local Government and Heritage on 3rd of January 2024 indicated that there are no SMRs included within the application site or the study area.

Cartographic Sources

12.47 The Ordnance Survey 1st and 3rd edition six-inch maps and the 1st edition 25-inch maps of the area were examined (Figs. 12-2 and 12-3). The analysis did not indicate any previously unrecorded archaeological sites in the application area or vicinity.

Aerial Photographs

12.48 Assessment of the Ordnance Survey 1995, 1996-2000, 2001-2005, 2006-12, 2011-13 and 2013-18 aerial imagery as well as Google Earth imagery from, 2012, 2013, 2015, 2018, 2020 and 2022, Bing imagery did not indicate any additional archaeological, architectural or cultural heritage sites in the application area or vicinity.

Place Name Evidence

12.49 The place names were extracted from the cartography in order to facilitate the search for structures and monuments and small finds, to help identify any unrecorded monuments or structures, to search for any published papers and documents related to the study area and to assist in the study of the historical development of the area. The English translations of the townland names of the study presented above below are based on Logainm.ie. The

placenames refer mainly to topographical, and ground cover features. There is a church in Kilquane in townland RMP CO042-068004-.

Beennamweel east ben or pinnacle of the hornless cows

Carrigcleena Beg and More Cleena's Rock

Glashaboy East and West yellow stream

Kilquane Cuán's church

Knockdrislagh hill of the brambles

Nursetown Beg originally Ballibonartle, the town of the nurse

Previous assessment and planning permission

12.50 In 2006 in response to a request for further information in relation to a quarry registration (No. QR073) the existing quarry was the subject of an archaeological impact assessment (McCarthy 2006). The assessment concluded that:

The existing quarry at Carrigcleena More does not impact directly on the surviving archaeological heritage of the area.

Archaeological investigations in the study area

12.51 Examination of the excavations database at excavations.ie indicated that have been no archaeological excavations carried out within the application area or the study area.

Cork Co. Development Plan

12.52 No sites of archaeological importance, National Monuments, or protected structures listed in the Cork County Development Plan 2022-2028 are located within the proposed development area.

Field Inspection

12.53 A field assessment was carried out on the 9th of January 2024 to identify any previously unknown archaeological or cultural heritage sites within the application area. See plate 12-2 for the numbered fieldwork areas.

12.54 Area 1

This is the existing quarry that has already been assessed in relation to a quarry registration (No. QR073) (McCarthy 2006).

12.55 Area 2

This is the northern part of a large field of west-sloping pasture, enclosed by stoney banks with some gorse and trees. There was no visible surface indication of any archaeological or cultural heritage material (see Plate 12-3).

Archaeological Geophysical Survey

12.56 A high-resolution magnetometry survey was conducted by AOC in February 2024 (NMS Licence No. 24R0175) on 5 Ha. There are 20 anomalies identified and numbered in the report (see Table 12-1 below, Fig 12-4 and Appendix 12-2). Apart from a small amount of ubiquitous pit-type features, possible areas of burning and plough furrows, a number of field boundaries represented on historic mapping were identified, as were several anomalies which may represent the remains of field boundaries or field systems which predate historic maps. These were difficult to determine however and may be the result of agricultural activity or underlying geology. Similarly, several curvilinear anomalies which may represent enclosing elements were identified, although an agricultural or geological source may also be possible. All the identified anomalies appear to represent relict agricultural divisions either indicated on OS mapping or pre-mapping and no features of archaeological significance were identified.

No.	Description	Interpretation	Significance	Impact	Recommendation
1-01	negative linear anomaly	historic field boundary present on the 1837 six-inch, 1897 25-inch OS and the 1940 six-inch Cassini historical maps	Low	High	Testing
1-02	negative linear anomaly	historic field boundary present on the 1940 six-inch Cassini historical maps	Low	High	Testing
1-03	negative linear anomaly	historic field boundary present on the 1940 six-inch Cassini historical maps	Low	High	Testing
1-04	negative linear anomaly	historic field boundary present on the 1837 six-inch, 1897 25-inch OS and the 1940 six-inch Cassini historical maps	Low	High	Testing
1-05	negative curvilinear anomaly	historic field boundary present on the 1837 six-inch, 1897 25-inch OS and the 1940 six-inch Cassini historical maps	Low	High	Testing
1-06	negative curvilinear anomaly	historic field boundary present on the 1837 six-inch, 1897 25-inch OS and the 1940 six-inch Cassini historical maps	Low	High	Testing
1-07	negative curvilinear anomaly	may represent a historic field boundary, but not indicated on OS mapping	Low	High	Testing

No.	Description	Interpretation	Significance	Impact	Recommendation
1-08	positive curvilinear anomaly	possible ditch 31m in length and 2.2m in width.	Low	High	Testing
1-09	positive curvilinear anomaly	possible ditch 76.2m in length and 2.7m in width.	Low	High	Testing
1-10	positive curvilinear anomaly	possible ditch 12.5m in length and 2.2m in width.	Low	High	Testing
1-11	positive curvilinear anomaly	possible ditch 20m in length and 2.6m in width.	Low	High	Testing
1-12	positive curvilinear anomaly	possible ditch U-shaped in plan 76.5m in length and 3m in width.	Low	High	Testing
1-13	positive linear anomaly	possible ditch 13.8m in length and 2.1m in width.	Low	High	Testing
1-14	positive linear anomaly	possible ditch 17.2m in length and 1.6m in width. This and 1-16, 1-15, 1-19 and 1-20 are parallel and aligned east-west. Possible agricultural.	Low	High	Testing
1-15	positive linear anomaly	possible ditch 22.5m in length and 1.5m in width. This and 1-16, 1-14, 1-19 and 1-20 are parallel and aligned east-west. Possible agricultural.	Low	High	Testing
1-16	positive linear anomaly	possible ditch 50.5m in length and 1.7m in width. This and 1-15, 1-14, 1-19 and 1-20 are parallel and aligned east-west. Possible agricultural.	Low	High	Testing
1-17	positive linear anomaly	possible ditch 5.2m in length and 1.8m in width	Low	High	Testing
1-18	positive linear anomaly	possible ditch 7m in length and 1.5m in width	Low	High	Testing
1-19	positive curvilinear anomaly	may represent elements of a possible relict field system beneath cultivation furrows	Low	High	Testing
1-20	positive curvilinear anomaly	may represent elements of a possible relict field system beneath cultivation furrows	Low	High	Testing

Table 12-1. Summary of the archaeological geophysics results with potential impacts and recommendations.

Archaeological Test Excavation

12.57 Following the assessment of the results of the geophysical survey it was decided to commission a test excavation. This was carried out from 26 June to 1 July 2024 by Ewelina Rondelez for Rubicon Heritage (Licence No: 24E0539). The objective of the archaeological testing was to test all of the identified anomalies and excavate additional trenches to test the reliability of the geophysical survey. A total of 46 trenches 1,388 linear m long in total were mechanically excavated across the site under constant archaeological supervision to test the geophysical results (see Fig. 12-5 and Appendix 12-3).

12.58 No archaeological features or finds were found during the testing investigation. The report recommended no further archaeological works.

ASSESSMENT OF POTENTIAL IMPACTS

Direct Impacts

12.59 There will be no direct effects on any known items of archaeological, architectural or cultural heritage in the application area or the vicinity.

Indirect Impacts

12.60 There will be no indirect effects on any known items of archaeological, architectural or cultural heritage in the application area or the vicinity.

Interactions with Other Impacts

12.61 No interaction with other impacts has been identified.

Do Nothing Impacts

12.62 If the proposed development were not to proceed there would be no impact on archaeological, architectural or cultural heritage.

Worst Case Impact

12.63 No worst case has been identified.

Unplanned Events

12.64 No unplanned events arising from the proposal capable of impacting known archaeological, architectural or cultural heritage within the application area has been identified by the assessment.

Cumulative Impacts

12.65 There is no known archaeological, architectural or cultural heritage material present in the application area and the application is not considered to have any cumulative effects.

RECOMMENDATIONS / PROPOSED MITIGATION MEASURES

Direct Impacts

12.66 No direct effects warranting specific mitigation were identified during the cultural heritage assessment. No mitigation or monitoring measures are required.

Indirect Impacts

12.67 No indirect effects on any items of archaeological, architectural or cultural heritage warranting specific mitigation were identified during the course of the cultural heritage assessment. No mitigation or monitoring measures are required.

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PLATES

Plate 12-1 Structure 1.

Plate 12-2 Ordnance Survey MapGenie Orthophoto of the application area taken in 2013-18. The application area is indicated with the red line, the proposed extraction area with the dashed black line and the fieldwork areas are numbered.

Plate 12-3 Panoramic view of area 2 looking northeast.

FIGURES

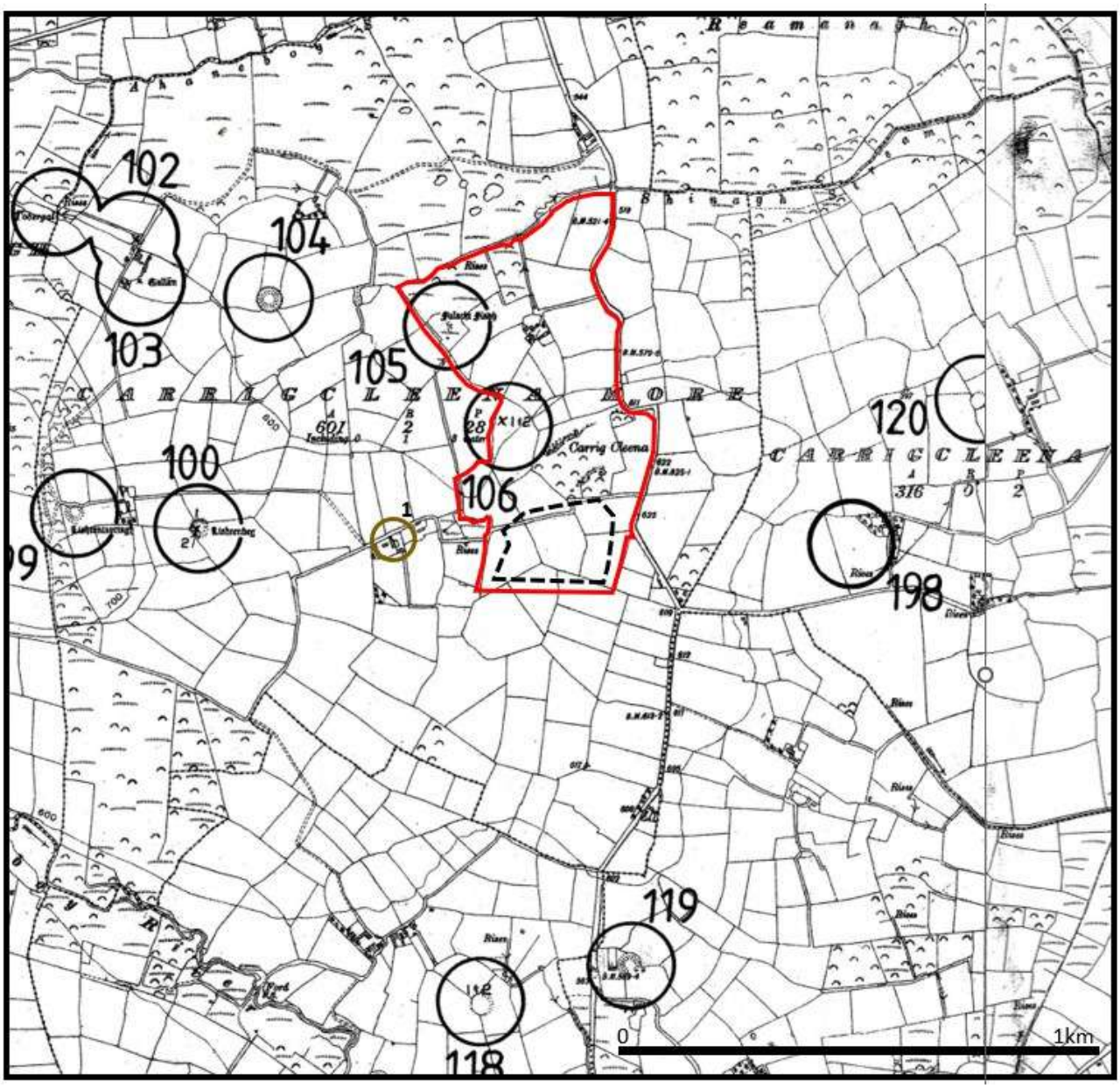

Figure 12-1 The study area. The red line is the application area, the dashed black line is the proposed extraction area. RMPs are indicated with black circles, and structures within 300m of the application area with brown circles.

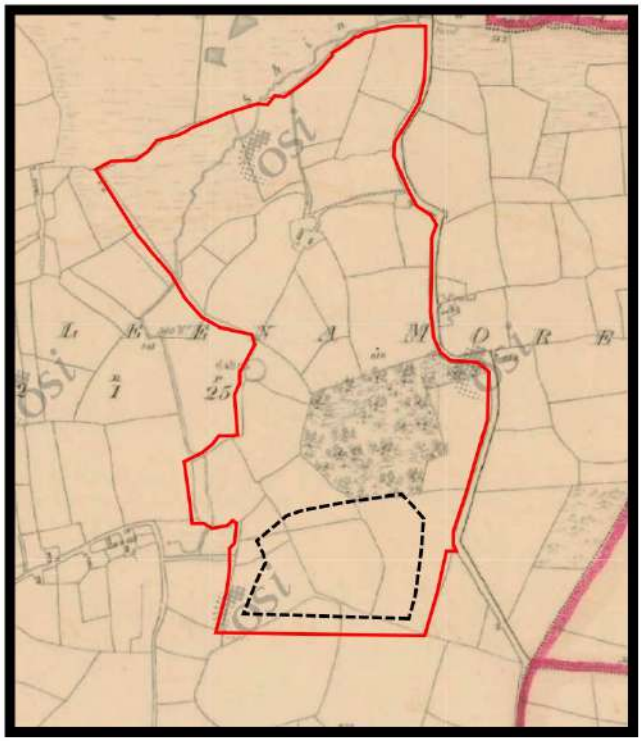

Figure 12-2 The OS 1st edition map indicating the application area (red line).

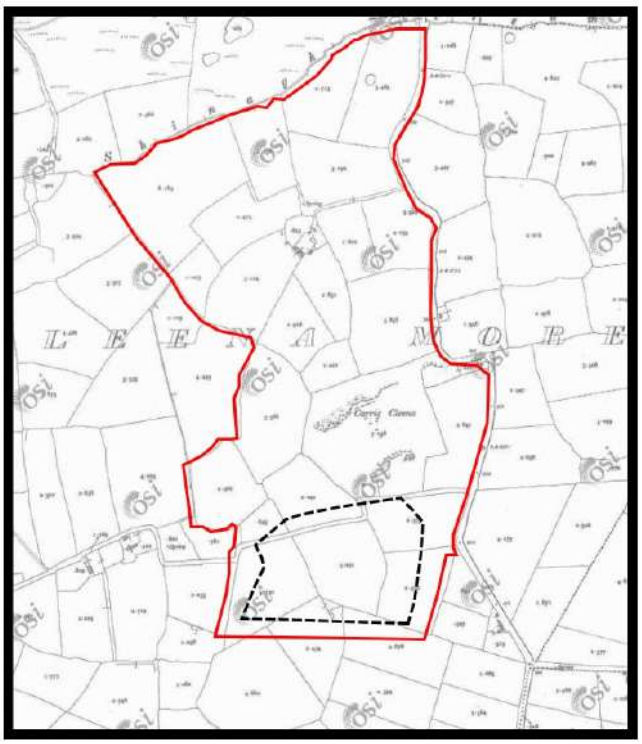

Figure 12-3 The OS 1st edition twenty-five map indicating the application area (red line).

Figure 12-4 Detailed view of the geophysical survey interpretation.

Figure 12-5 Excavated test trench array with geophysical survey interpretation.

APPENDICES

Appendix 12-1
Sites in the Record of Monuments and Places in the study area

CO041-099---- Carrigcleena More Ringfort - rath
In pasture. Circular area (30m N-S; 30m E-W) enclosed by heavily overgrown, earthen bank (int. H 1.4m; ext. H 1.5m); external fosse (D 0.8m) SSE->NNW. Laneway skirts bank to NNE. Entrance (Wth 3.2m) to ESE; cattle gap to SSW. Coniferous trees planted outside fosse to S and SSW, with smaller concentration to W. According to Bowman (1934, 569), called Lisinteamhrach - Little fort of the Royal Palace.

CO041-100001- Carrigcleena More Ringfort - rath
In pasture, on NE-facing slope. Circular area (34m N-S; 33m E-W) enclosed by heavily overgrown, earthen bank (int. H 1.5m; ext. H 1.75m). External fosse survives as slight slope down to base of bank. Bank incorporated into field fence system SSW->NE; entrance (Wth 2m) to E; cattle gaps to S and WSW. Highest point of interior is W half, sloping down towards entrance to E and more gently to N and S. Souterrain (CO041-10002-) in W half of interior.

CO041-100002- Carrigcleena More Souterrain
In ringfort (CO041-10001-). Slab (1m x 0.5m), 8m in from bank on WSW side of interior, covers opening and may be lintel of souterrain; three small depressions (diam. 0.2m - 0.3m) also noted in W half of interior.

CO041-101---- Carrigcleena More Ritual site - holy well
Recorded by Bowman (1934, 569) as 'Tobar Geal - Bright Well...c. four and a half ft. in diam. It had a special cure for sore eyes, teeth and fingers. Rounds have been discontinued for the past 40 years. The Whitethorn tree, for the usual votive offerings, was cut down c. 25 years ago.' Well destroyed c. 1966 but spring still rises here.

CO041-102---- Carrigcleena More Souterrain
In pasture, on N-facing slope. According to local information, stone-built chamber now covered by stone slab and soil.

CO041-103---- Carrigcleena More Standing stone
Not marked on 1842 and 1904 OS 6-inch maps. In overgrowth, on gentle N-facing slope. Stone (H 1.4m; 1m x 0.25m) is irregular in shape, long axis NW-SE. Possibly stone referred to by Bowman (1934, 569) on E. Butler's land in this townland.

CO041-104---- Carrigcleena More Ringfort - rath
In pasture, on gentle E-facing slope. Circular area (38m N-S; 38m E-W) enclosed by two earthen banks with intervening fosse. Break (Wth 2m) in inner bank (int. H 1.35m; ext. H 1.2m) to SE leading down into fosse; outer bank at this point rebuilt for short section. Intervening fosse (D 0.5m) partially overgrown and dry. Outer bank (H 1.2m) incorporated into field fence system to E and S; external stone facing noted to NE; narrower in section to S; break (Wth c. 2m) to NE with N side faced by large stone. Interior slopes gently down to SE.

CO041-105---- Carrigcleena More Fulacht fia
In stone quarry at Carrigcleena. According to local information, formerly in scrubland but now covered by rubble from quarry; inaccessible. Shown on 1938 OS 6-inch map as mound. Possibly this is fulacht fiadh investigated in 1853 by South Munster Antiquarian Society led by John Windele (Coleman 1893, 262-3). Investigation revealed wooden trough 'composed of planks, eight in number, four of which formed the sides and ends and four the bottom. Its dimensions were six feet long, four wide and two deep and the workmanship such as might have been effected with stone-axes, with no nails of any kind. A rude groove at each end of both sides received the cross planks which formed the ends, and through the middle of the bottom, a rough wooden bar, somewhat rounded, penetrated into the marl beneath. The outside of the planks were nearly as rough as when felled from their native oak-forest.'

CO041-106001 Carrigcleena More Ringfort - rath
Depicted as hachured circular enclosure (diam. c. 28m) on 1842 OS 6-inch map, c. 150m to NW of 'Carrigcleena' rock. Named 'Lisheenacarriga, little fort of the rock' in OS Field Books (Berry 1905, 33). Destroyed by quarrying. Described by Berry (ibid.) as a 'lisheen, or small round lios'. Recorded by Bowman (1934, 569) as a levelled single-ramparted fort (diam. c. 35yd) on R. Barrett's land. Souterrain (CO041-10602-) in interior. Carrigcleena, 'a wild and romantic spot...a rude elevation, surrounded by a rampart of huge rocks, towering over the country round, and enclosing about two acres of very green ground', is said locally to have a passage leading from it to the fort (Berry 1905, 33).

CO041-106002 Carrigcleena More Souterrain
In levelled ringfort (CO041-10601-). According to OS Field Books, Lisheenacarriga, little fort of the rock, has a cave which is said to contain three large apartments (Berry 1905, 33). Bowman (1934, 569) noted that 'a souterrain was here, but is now closed'. Area of fort and souterrain now destroyed by quarrying.

CO041-118001- Glashaboy West Ringfort – rath
In pasture, on gentle S-facing slope. Circular area (45.5m N-S; 43.5m E-W) enclosed by earthen bank (int. H 1.4m; ext. H 1.65m); external fosse (D 0.15m) NNE->SE. Bank stone-faced internally, partially hidden due to slippage and overgrowth. Entrance (Wth 3m) to SSE; modern gap (Wth 2m) in bank to NNE. Fosse survives as slight slope down to base of bank. Interior slopes down very gently to S; souterrain (CO041-11802-) in N quadrant; low ridge (L 26m N-S; Wth 5m E-W) extends from c. 10m S of N bank through centre towards entrance to SSE.

CO041-118002- Glashaboy West Souterrain
In N half of ringfort (CO041-11801-), c. 10m inside bank. Discovered in 1975 when roof collapsed during ploughing; investigated by Ann Lynch and Mary Cahill (UCC). Opening (1m x 0.52m) through roof allowed access to part of chamber (L c. 2.5m; Wth c. 1.5m; long axis NW-SE); chamber rock-cut at SE end, earth-cut elsewhere; appeared to extend in NNE direction, possibly extending under bank of ringfort. Collapsed earth prevented further investigation. Subsequently backfilled. (McCarthy 1977, 250).

CO041-120---- Carrigcleena Beg Ringfort – rath
In pasture, on E-facing slope. Depicted as hachured circular enclosure on 1842 OS 6-inch map; W half indicated on 1904 OS 6-inch map; circular area defined by hachured scarp NNW->S and by solid line elsewhere on 1938 OS 6-inch map. Circular area (34m E-W; 30m N-S) defined by low rise NW->SSW; earthen bank (int. H 2.05m; ext. H 1.5m) incorporated into field boundary system SSW->NW. Bank heavily overgrown; stone facing on inner face similar to surrounding field fences. Interior grass-covered; W half level; E half

slopes down to E. Fosse, NW->SSW, visible as cropmark in aerial photograph (GSIAP, W1). Probably ringfort recorded by Bowman (1934, 600) as single-ramparted (diam. c. 33yd; bank H 4 to 7ft) with 'half the circuit levelled' and named 'Lisin na Cairrge - Little fort of the Rock - so-called from being near a large rock'.

CO041-198---- Carrigcleena Beg Enclosure
In rough grazing, on gentle S-facing slope. Cropmark of roughly circular area (diam. c. 40m) enclosed by band of lighter-coloured vegetation, probably indicating a levelled bank, visible in aerial photograph (GSIAP, W386, July 1975). No visible surface trace.

Appendix 12-2
Archaeological Geophysical Survey

Archaeological Geophysical Survey at Carrigcleena More, Bweeng, Co. Cork

Prepared for Breedon Ireland

By Liamóg Roche and Dr James Bonsall

March 2024

TITLE PAGE

AMS Job No.:	J3478
Project Name:	Archaeological Geophysical Survey at Carrigcleena More, Bweeng, Co. Cork
Client Name:	Breedon Ireland
Townland Name:	Carrigcleena More
Grid Reference (ITM):	552456, 590117
Date of Survey:	19 February 2024
Detection Device Number:	24R0175
Detection Device Licence Holder:	Dr James Bonsall
Geophysical Surveyors:	Liamóg Roche BSc (Hons) (Archaeological Geophysical and Remote Sensing Director), Jeff O'Neill (Archaeological Geophysical Supervisor) and Finn Melia (Archaeological Geophysical Survey Assistant)
Data Processing:	Liamóg Roche
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Report Status/Revision:	FINAL
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Technical Reviewer:	Jeff O'Neill
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Disclaimer

The results and conclusions contained within this report are based on information available at the time of its preparation. Whilst every effort has been made to ensure that all relevant data have been collated, the authors and AMS accept no responsibility for omissions and/or inconsistencies that may result from information becoming available subsequent to the report's completion.

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Summary

This report describes the results of an Archaeological Geophysical Survey undertaken in the townland of Carrigcleena More, Bweeng, Co. Cork (Detection No.: 24R0175). The survey was undertaken by Archaeological Management Solutions (AMS) for Breedon Ireland on 19 February 2024 as part of an archaeological assessment within Lands Made Available (LMA) for a proposed quarry extension. The Proposed Development spans approximately 5ha, within a single greenfield area, directly to the south of the existing quarry.

The magnetometry survey of the site successfully characterised the extent of potential archaeological deposits. The northeastern portion of the survey area was more poorly drained and therefore magnetic contrasts were seen to be more subtle in this area. The responses were generally good, revealing a small number of possible archaeological features.

Apart from a small amount of ubiquitous pit-type features, possible areas of burning and plough furrows, a number of field boundaries represented on historical mapping were identified, as were several anomalies which may represent the remains of field boundaries or field systems which predate historical maps. These were difficult to determine however and may be the result of agricultural activity or underlying geology. Similarly, several curvilinear anomalies which may represent enclosing elements were identified, although an agricultural or geological source may also be possible.

Please note that the National Monuments Service of the Department of Housing, Local Government and Heritage, the National Museum of Ireland and the local planning authority may issue recommendations/conditions.

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Abbreviations and Definitions

Abbreviation	Definition
AMS	Archaeological Management Solutions
DIER	Database of Irish Excavation Reports
GIS	Geographical Information System
GSI	Geological Survey of Ireland
ITM	Irish Transverse Mercator
LMA	Lands made Available
NIAH	National Inventory of Architectural Heritage
NMI	National Museum of Ireland
NMS	National Monuments Service
OS	Ordnance Survey
SMR	Sites and Monuments Record
WMS	Web Map Service

Coordinate System

All grid coordinates in this report use the Irish Transverse Mercator (ITM) coordinate reference system unless otherwise stated.

1 Introduction

1.1 Project Background

This report describes the results of an Archaeological Geophysical Survey undertaken by Archaeological Management Solutions (AMS) for Breedon Ireland on 19 February 2024, within in the townland of Carrigcleena More, Co. Cork (Detection No.: 24R0175). The survey was carried out as part of an archaeological assessment within Lands Made Available (LMA) for a proposed quarry extension at Carrigcleena More, Co. Cork. The proposed development spans approximately 5ha within a single greenfield area, directly to the south of the existing quarry.

The proposed quarry extension is located within the townland of Carrigcleena More, within the civil parish of Kilshannig and barony of Duhallow, Co. Cork.[1] Access to the lands for the purposes of the works was by agreement between the Archaeological Consultant and Breedon Ireland. The survey area is approximately 5ha in total.

1.2 The Survey Area

The proposed quarry extension is situated at Carrigcleena More, Co. Cork. The Study Area encompassed the northern portion of a single, large pasture field located directly to the south of the existing quarry (Figure 1). The topography comprised an area of pasture grassland divided centrally, from north to south, by an electric fence. The area was reasonably well drained and sloped downwards gradually to the north-west, where drainage became poor. The targeted archaeological geophysical survey covered a total area of 5ha and was carried out using detailed magnetometry.

1.3 Purpose and Scope of this Assessment

The purpose of the geophysical survey was to determine whether the proposed quarry extension and related works would impact any potential subsurface archaeology that may exist. The survey comprised high-resolution magnetometry, undertaken by Liamóg Roche (Archaeological Geophysical and Remote Sensing Director), Jeff O'Neill (Archaeological Geophysical Supervisor) and Finn Melia (Archaeological Geophysical Survey Assistant) on 19 February 2024. The methodology was approved by the Archaeological Licensing Section of the National Monuments Service (NMS) and Consent to use a Detection Device under Section 2 (2) of the National Monuments (Amendment) Act, 1987 was issued to Dr James Bonsall by the Minister for Housing, Local Government and Heritage: Detection Device No.: 24R0175.

[1] https://www.logainm.ie/en/11819 [Accessed 16 February 2024]

1.4 Topography, Soils and Geology

The Study Area comprises the northern portion of a pasture field, covered by short grassland and gradually sloping to the northeast where it was more poorly drained. The local soils comprise a fine loamy drift with siliceous stones, overlain by quaternary deposits comprising till derived from Devonian sandstones (GSI 2024). The bedrock across the survey area consists of purple mudstone and sandstone (Ballytrasna Formation) (GSI 2024). These soils and geology are suitable for a magnetometry survey, which was chosen as the most appropriate method of assessment.

1.5 Aims and Objectives

The aim of the archaeological geophysical survey was to identify potential archaeological remains. This aim was achieved using the following objectives:

- Identify any geophysical anomalies of possible archaeological origin within the specified survey area.
- Accurately locate these anomalies and present the findings in map form.
- Describe the anomalies and discuss their likely provenance in a written report.
- Incorporate all the above into a report for the Client.
- Preparation and submission of archives of the project data and reports.

2 Archaeological and Historical Background

2.1 Recorded Monuments and a Recorded Archaeological Site

There are no Recorded Monuments within the footprint of the area to be surveyed (Figure 2). However, the site of a Ringfort – Rath CO041-106001- and Souterrain CO041-106002- are located 250m northwest of the survey area, on/in the edge of the existing quarry. Similarly, a *fulacht fiadh* CO041-105---- is located 450m northwest of the survey area, within the existing quarry (see Table 1 below). A number of archaeological records and sites are present within the wider landscape; however, these were located further than 500m from the site.

Table 1: SMR Sites located within 500m of the geophysical survey area.

Ref. No.	Description	Townland
CO041-106001-	Ringfort – Rath	Carrigcleena More
CO041-106002-	Souterrain	Carrigcleena More
CO041-105----	*Fulacht fia*	Carrigcleena More

2.2 Previous Archaeological Investigations

2.2.1 Excavations

According to the Database of Irish Excavation Reports (DIER), no previous investigations have occurred within the current site. but a number of areas in the vicinity have been assessed.

2.3 NMI Topographical Finds

There are no stray finds recorded in the National Museum of Ireland's (NMI) online Finds Database, as available on Heritage Maps, within the immediate area of the development, although this dataset is limited.[2]

[2] https://heritagemaps.ie/WebApps/HeritageMaps/index.html this database only includes finds recorded in the National Museum of Ireland's (NMI) topographical files up to 2010 and is often found to be inaccurate and unreliable. [Accessed: 19 February 2024].

2.4 Placenames

The townland name of Carrigcleena More is derived from the Irish *Carraig Chlíona Mhór*, with *carraig* meaning 'rock' and *mór* being 'great' or 'big'. It is located within the civil parish of Kilshannig and barony of Duhallow.[3]

2.5 OS Mapping

The survey area has seen a small amount of change from depictions on historical mapping. The 1837 six-inch, 1897 25-inch OS and the 1940 six-inch Cassini historical maps show the area as being divided between a number of smaller land parcels through several linear and curvilinear field boundaries (Figure 3). These have since been removed, with the smaller land parcels being amalgamated into a single, large pasture field.

[3] https://www.logainm.ie/en/11819 [Accessed: 19 February 2024].

3 Methodology

3.1 Personnel

The Geophysical Survey was directed by Dr James Bonsall under licence from the NMS. The survey was carried out by Liamóg Roche (Archaeological Geophysical and Remote Sensing Director), Jeff O'Neill (Archaeological Geophysical Supervisor) and Finn Melia (Archaeological Geophysical Assistant). The report has been written by Liamóg Roche and Dr James Bonsall. The investigation focused on a Study Area of *c.*5ha.

3.2 Magnetometry Survey

The survey employed a detailed magnetometer survey, recording the vertical magnetic gradient i.e., a fluxgate gradiometer. This technique measures variations in the magnetic properties of the soils. It is widely used in archaeological geophysical prospection due to its ability to detect and map a broad range of subsurface archaeological remains, including ditches and pits and burnt or fired features associated with metalworking and pottery production (Aspinall *et al*. 2008).

3.2.1 Data Capture

The survey recorded the vertical magnetic gradient, i.e., a fluxgate magnetometer. A Sensys MAGNETO MX PDA 5 Channel cart system was towed by a 2023 CFMOTO CFORCE 450 quad bike. Five Sensys FGM650 fluxgate gradiometer probes were mounted on a Sensys MAGNETO MX PDA 5 Channel cart system; each probe was spaced 0.5m apart. The magnetometer data were acquired gridlessly with Sensys MonMX Lite Software, connected to a Carlson BRX7 GNSS Smart Antenna RTK GPS, achieving a spatial resolution of 0.1m accuracy. Data were collected at ten times per second along the lines.

3.2.2 Data Processing

The magnetometry and GPS data were processed through Geoserver followed by DLMGPS 4.01-12 and finalised in Sensys MAGNETO 3.01-14. MAGNETO software was used for trace correction and equalisation.

3.2.3 Data Visualisation

The data were brought in to QGIS as a GeoTIFF for display and interpretation as greyscale images.

3.3 Data Management, Processing, and Interpretation

This project used QGIS (Version 3.22.14) as a Geographical Information System (GIS) to manage the project. QGIS is an open-source GIS which can be used to create, edit, visualise, analyse and publish

geospatial information.[4] This project used the long-term release version of the software (3.22.14) as the basic platform to access, view and analyse the geophysical visualisations produced in Magneto. QGIS also allowed us to compare the visualisations with other relevant geospatial databases, record the analysis through digitising the morphology and magnitude of anomalies identified, and output a table catalogue of this analysis and corresponding maps.

For the purposes of this project, the following datasets were also accessed and/or downloaded:

- Tailte Éireann historical maps and orthographic photographs of the Study Areas, viewed online;[5]
- Sites and Monuments Record (SMR) point and polygon vectors as a Web Map Service (WMS);[6]
- National Inventory of Architectural Heritage (NIAH) point vector (downloaded from www.archaeology.ie)
- Rivers and lakes as a WMS (downloaded from https://gis.epa.ie/GetData);
- National soils database as a vector layer (downloaded from https://gis.epa.ie/GetData/Download);
- Townlands vector layer.[7]

The following vector layers were generated for the project:

- A polygon for the Study Area;
- Polygons for each identified geophysical anomaly.

The dimensions of individual anomalies were calculated in QGIS using the measure tools. All anomalies are defined by polygons.

3.4 Standards

The geophysical survey and report follow the recommendations outlined by relevant best practice guidance documents as a minimum standard (Bonsall *et al*. 2014; David *et al*. 2008; Gaffney *et al*. 2002; Schmidt *et al*. 2015). Geophysical data, shapefiles, figures and the text have been archived following the recommendations of the Archaeology Data Service (Schmidt & Ernenwein 2011). Raw geophysical data and GIS shapefiles are available in the archive.

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[4] QGIS. Quantum GIS v3.22.14. https://www.qgis.org/en/site/

[5] Accessed from: https://maps.archaeology.ie/HistoricEnvironment/

[6] SMR data accessed from:

https://data.gov.ie/dataset/national-monuments-service-archaeological-survey-of-ireland

[7] Vector layer downloaded from: www.townlands.ie; townland names confirmed against the OS townlands list from https://data.gov.ie/dataset/townland.

4 Results and Interpretation

4.1 Magnetometry Interpretation

The magnetometry data and magnetometry interpretation (Figure 4 and Figure 5) should be cross-referenced with the descriptions (below) for a discussion of the anomalies.

The magnetometry survey of the site successfully characterised the extent of potential archaeological deposits. The northeastern portion of the survey area was more poorly drained and therefore magnetic contrasts were seen to be more subtle in this area. The responses were generally good, revealing a small number of possible archaeological features.

Apart from a small amount of ubiquitous pit-type features, possible areas of burning and plough furrows, a number of field boundaries represented on historical mapping were identified [01-01 to 01-06], as were several anomalies which may represent the remains of field boundaries or field systems which predate historical maps [01-08, 01-09 and 01-13 to 01-20]. This is difficult to determine however as these anomalies lie beneath an overprint of cultivation furrows and may be the result of agricultural activity, or underlying geology. Similarly, several curvilinear anomalies which may represent enclosing elements were identified [01-07, 01-10, 01-11 and 01-12] although an agricultural or geological source may also be possible.

4.1.1 Magnetometry anomalies

[01-01] – This is a negative linear anomaly which represents a historic field boundary present on the 1837 six-inch, 1897 25-inch OS and the 1940 six-inch Cassini historical maps.

[01-02] –This is a negative linear anomaly which represents a historic field boundary present on the 1837 six-inch, 1897 25-inch OS and the 1940 six-inch Cassini historical maps. It measures 21.2m in length and 5m in width.

[01-03] –This is a negative linear anomaly which represents a historic field boundary present on the 1837 six-inch, 1897 25-inch OS and the 1940 six-inch Cassini historical maps. It measures 67.6m in length and 2.6m in width.

[01-04] – This is a negative linear anomaly. This may represent a historic field boundary present on the 1837 six-inch, 1897 25-inch OS and the 1940 six-inch Cassini historical maps. It measures 165.2m in length and 4.7m in width.

[01-05] – This is a negative curvilinear anomaly which may represent a historic field boundary present on the 1837 six-inch, 1897 25-inch OS and the 1940 six-inch Cassini historical maps. It measures 134m in length and 3.6m in width.

[01-06] - This is a negative curvilinear anomaly which may represent a ditch with a stoney infill or a possible wall. It measures 31m in length and 2.6m in width.

[01-07] - This is a negative curvilinear anomaly which may represent a historic field boundary present on the 1837 six-inch, 1897 25-inch OS and the 1940 six-inch Cassini historical maps. It measures 40m in length and 4.4m in width.

[01-08] – This is a positive curvilinear anomaly which may represent a possible ditch. It measures 31m in length and 2.2m in width.

[01-09] – This is a positive curvilinear anomaly which may represent a possible ditch. It measures 76.2m in length and 2.7m in width.

[01-10] – This is a positive curvilinear anomaly which may represent a possible ditch. It measures 12.5m in length and 2.2m in width.

[01-11] – This is a positive curvilinear anomaly which may represent a possible ditch. It measures 20m in length and 2.6m in width.

[01-12]– This is a positive curvilinear anomaly which may represent a possible ditch. It measures 76.5m in length and 3m in width.

[01-13] – This is a positive linear anomaly which may represent a possible ditch. It measures 13.8m in length and 2.1m in width.

[01-14] – This is a positive linear anomaly which may represent a possible ditch. It measures 17.2m in length and 1.6m in width. This is located beneath an overprint of cultivation furrows and may similarly be representative of further agricultural activity.

[01-15] – This is a positive linear anomaly which may represent a possible ditch. It measures 22.5m in length and 1.5m in width. This is located beneath an overprint of cultivation furrows and may similarly be representative of further agricultural activity.

[01-16] – This is a positive linear anomaly which may represent a possible ditch. It measures 50.5m in length and 1.7m in width. This is located beneath an overprint of cultivation furrows and may similarly be representative of further agricultural activity.

[01-17] – This is a positive linear anomaly which may represent a possible ditch. It measures 5.2m in length and 1.8m in width.

[01-18] – This is a positive linear anomaly which may represent a possible ditch. It measures 7m in length and 1.5m in width.

[01-19] – This is a positive curvilinear anomaly which may represent elements of a possible field system pre-dating historical mapping. This is located beneath an overprint of cultivation furrows and may similarly be representative of further agricultural activity.

[01-20] – This is a positive curvilinear anomaly which may represent elements of a possible field system pre-dating historical mapping. This is located beneath an overprint of cultivation furrows and may similarly be representative of further agricultural activity.

5 Conclusions

The magnetometry survey of the site successfully characterised the extent of potential archaeological deposits. The northeastern portion of the survey area was more poorly drained and therefore magnetic contrasts were seen to be more subtle in this area. The responses were generally good, revealing a small number of possible archaeological features.

Apart from a small amount of ubiquitous pit-type features, possible areas of burning and plough furrows, a number of field boundaries represented on historic mapping were identified, as were several anomalies which may represent the remains of field boundaries or field systems which predate historic maps. These were difficult to determine however and may be the result of agricultural activity or underlying geology. Similarly, several curvilinear anomalies which may represent enclosing elements were identified, although an agricultural or geological source may also be possible.

5.1 Statement of Indemnity

The geophysical properties of subsurface features must contrast sufficiently with the surrounding soils/background variation and 'noise' to enable them to be detected and mapped using geophysical methods. As such, the clarity and definition of buried features can vary considerably, with some having well-defined signatures while others, lying on the threshold of background noise, are only barely visible or not visible at all, in geophysical imagery. A lack of geophysical anomalies cannot be taken to imply a lack of archaeological features.

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7 Figures

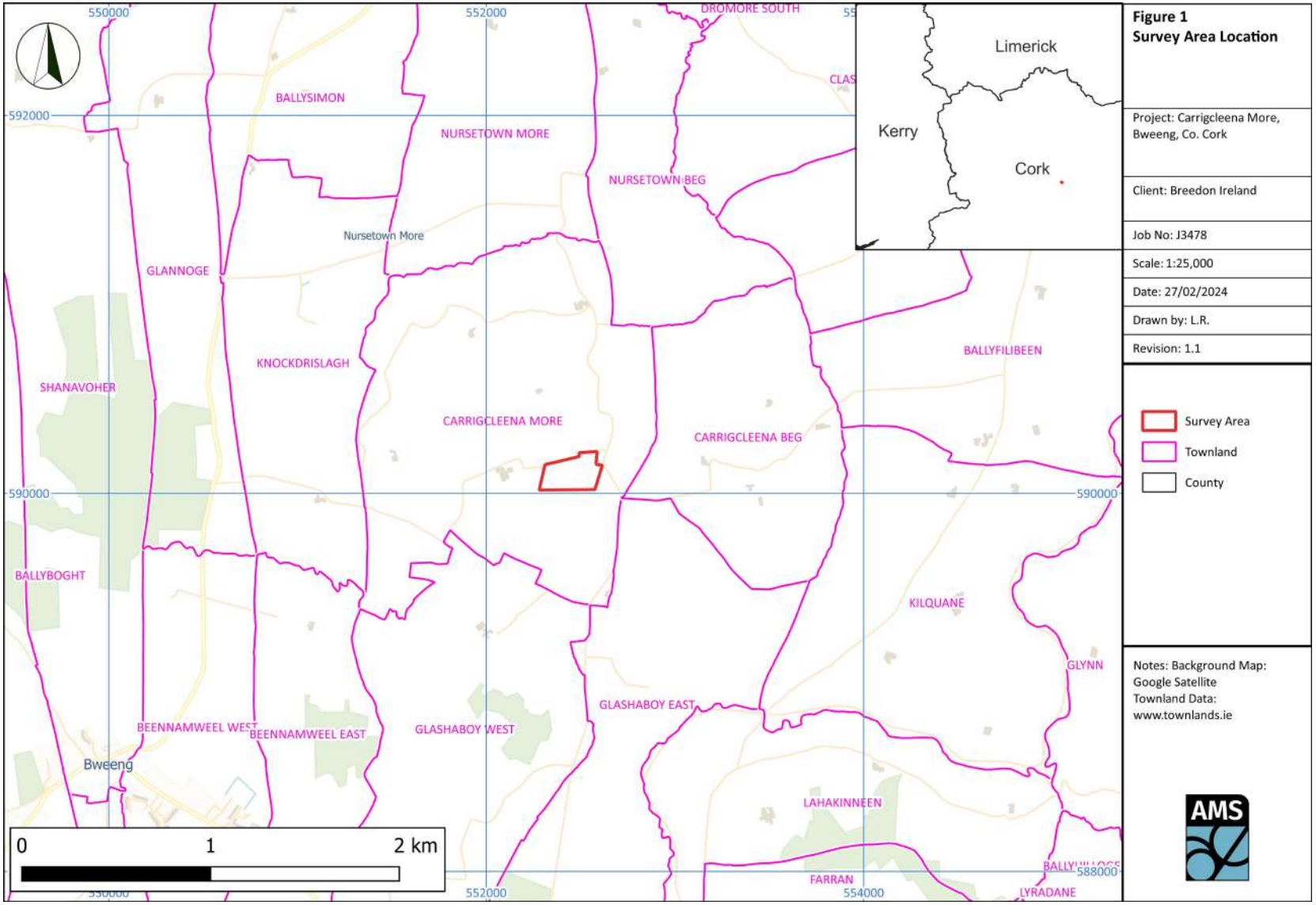

Figure 1. Survey Area Location

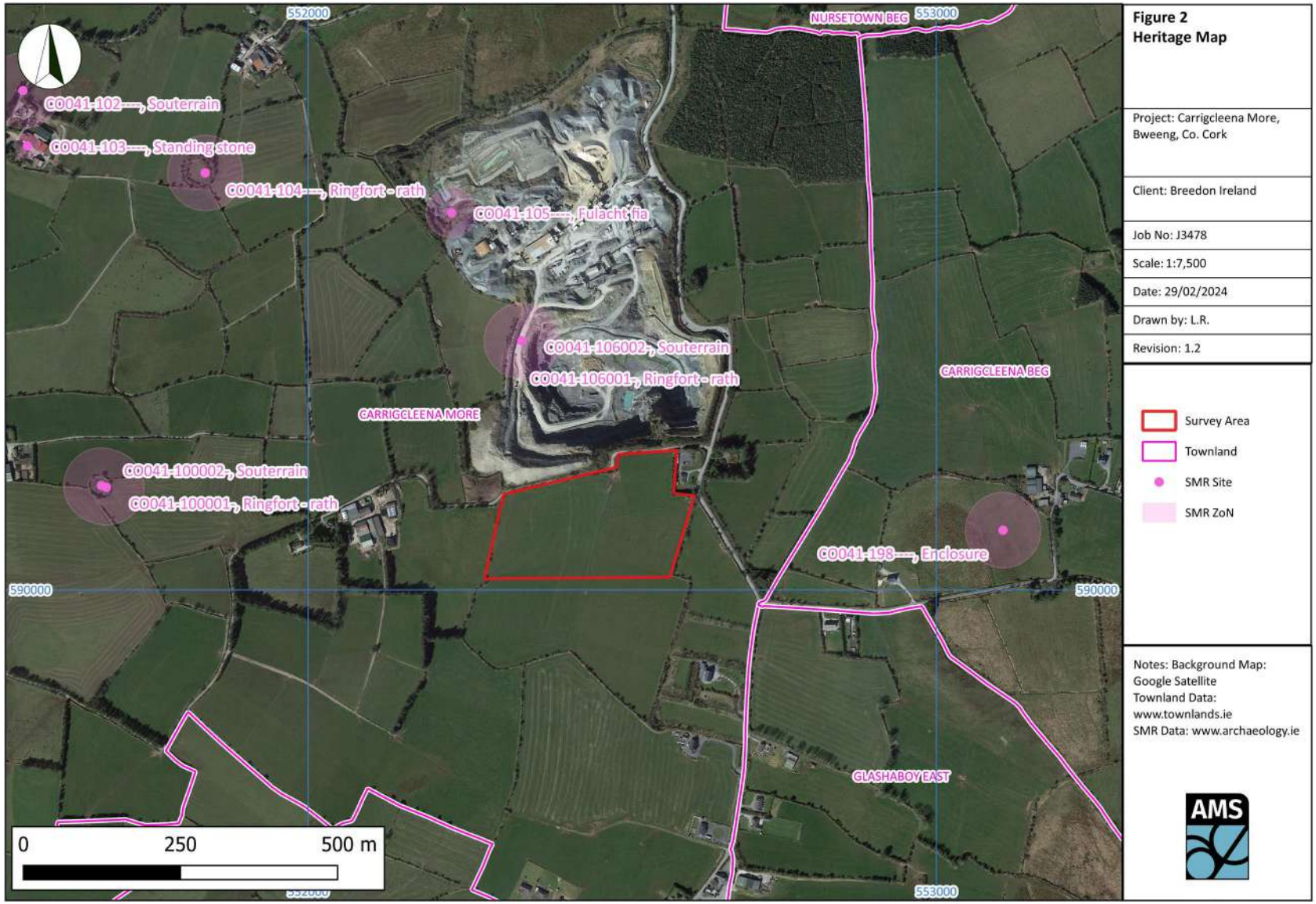

Figure 2. Heritage Map

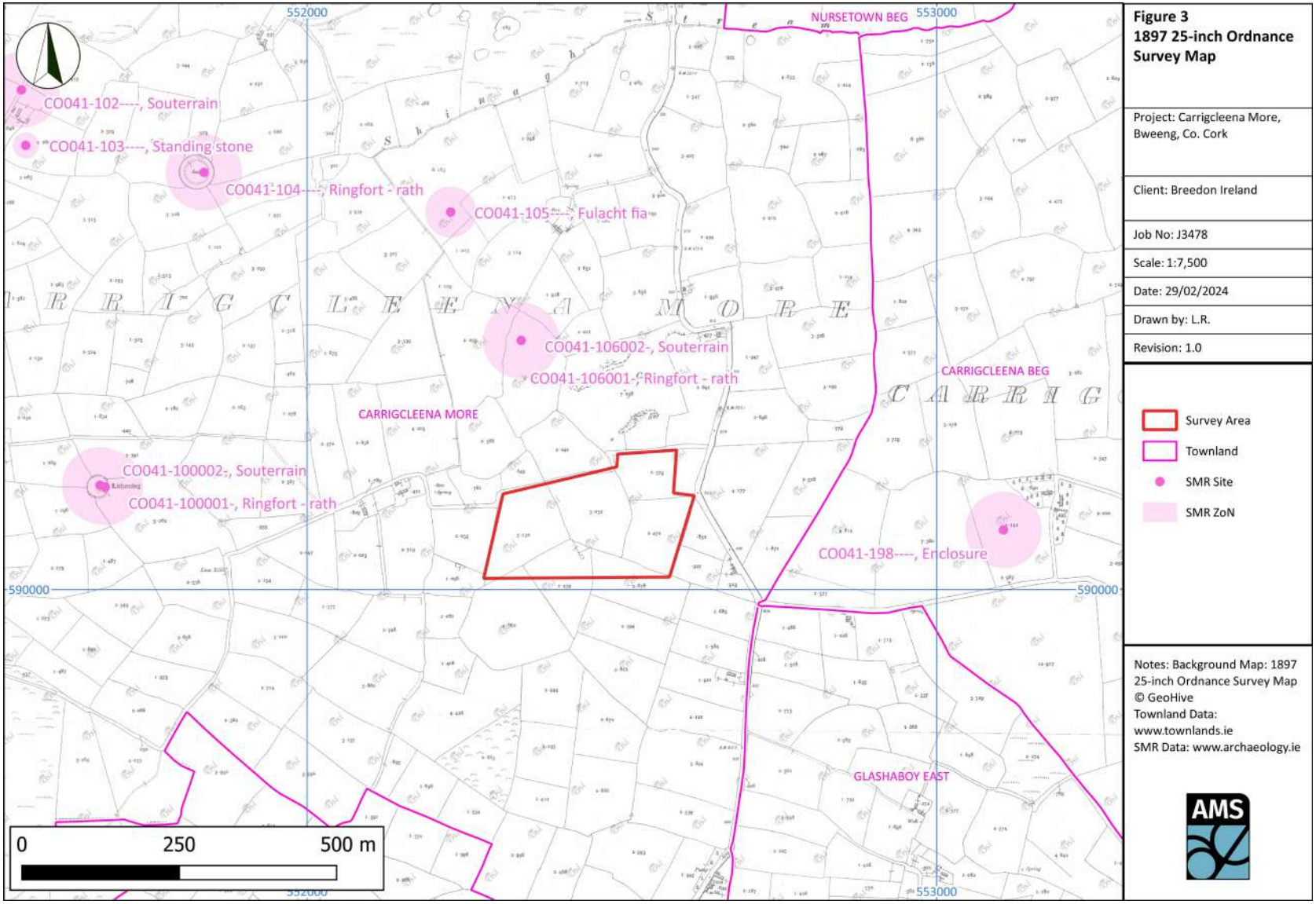

Figure 3. 1897 25-inch Ordnance Survey Map

Figure 4. Magnetometry Data

Figure 5. Magnetometry Interpretation

Appendix 12-3
Archaeological Test Excavation

Final Report on the Results of Archaeological Test–Trenching at Carrigcleena More, Co. Cork

Project Code: RH1249
Client: Lagans Materials Ltd.
Date: 3 September 2024
Excavation Licence: 24E0539
Licensee: Ewelina Rondelez
Report Author: Ewelina Rondelez
Archaeological Consultant: Rubicon Heritage Services Ltd
ITM coordinates: 552456, 590124

Rubicon Heritage

VERSION CONTROL

Version	Date	Description	By	Approved By
1	30/08/2024	Draft of report	ER	

NON-ARCHAEOLOGICAL INFORMATION [CONDITION 11]

Licence: 24E0539X

Site Owner: Lagans Materials Ltd.
Address: Rosemount Business Park
Ballycoolin Road
Dublin 11, D11 K2TP

Planning Reg. No.: N/A **Excavation Type:** Testing

Contractor/Developer: Lagans Materials Ltd.
Address: Rosemount Business Park
Ballycoolin Road
Dublin 11, D11 K2TP

Background to investigation:

A programme of archaeological test–trenching was undertaken at Carrigcleena More, Bweeng, Co. Cork, from 26 June to 1 July 2024, in accordance with Licence No. 24E0539. The local planning authority was the Cork County Council. The proposed development was approximately 5 hectares, covering an agricultural greenfield east of the R619 Coachford to Drommahane road, C2.6 km northeast of Bweeng, Co. Cork. No archaeological features or deposits were encountered during the programme of archaeological testing. No further measures in relation to archaeology are necessary.

Please note that all recommendations are subject to the approval of An Bord Pleanála and the National Monuments Service, Department of Housing, Local Government, and Heritage.

Signed: Raudelez **Date:** 30-08-24

DISCLAIMER

This report was produced by Rubicon Heritage Services Ltd under the criteria set out by its Integrated Management System, which is ISO certified in Quality (ISO 9001:2015), Environmental (ISO 14001:2015), Occupational Health and Safety (ISO 45001:2018) by external auditor – DQS GmbH. The report itself was not audited or certified.

Please note that the archaeological recommendations, mitigation proposals and methodology followed in this report are like those used on previous similar projects approved by the Archaeological Planning and Licencing Unit, National Monuments Service, Room G50, Custom House, Dublin 1. The National Monuments Acts 1930–2014, The Planning and Development Act 2000 (plus any amendments) and the most recent EPA guidelines were consulted. Guidelines and Plans issued from time–to–time by the statutory bodies have also been consulted. These are listed in the reference section of this report (DAHGI 1999a; 1999b; EPA 2003; 2017; IAI 2006; NMS 2006).

The archaeological test–trenching has been undertaken under licence, which required an approved method statement. Every effort has been taken in the preparation and submission of this report to provide as complete an assessment as possible within the terms of the brief, and all statements and opinions are offered in good faith. However, Rubicon cannot accept responsibility for errors of fact or opinion resulting from the data supplied by any third party, for any loss or other consequences arising from decisions made or actions taken on the basis of facts and opinions expressed in this report, (and any supplementary information), howsoever such facts and opinions may have been derived, or as the result of unknown and undiscovered sites or artefacts.

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ABBREVIATIONS AND TERMS USED

Barony, Parish, Townland	These terms refer to land divisions in Ireland. The barony is the largest land division in a county, which is formed from a number of parishes. These parishes are, in turn, made up of several townlands, which are the smallest land division in the county. The origins of these divisions are believed to be in the early medieval/Christian period (AD 500–1000) or may date earlier in the Iron Age (500 BC–AD 500).
DHLGH	Department of Housing, Local Government and Heritage
E	East
First Edition	This relates to the OS 6–inch maps for each county. The first edition map completed for the area dates to the early 1840s, and this is referred to in the text as the '6–inch map.
GA	Geophysical anomaly
km	Kilometre
m	Metres, all dimensions are given in metres or part of a metre, unless otherwise stated
N	North
NGR	National Grid Reference
NIAH	National Inventory of Architectural Heritage, see www.buildingsofireland.ie
NMS	National Monuments Service. Regulatory body with the DHLGH with responsibility for archaeological heritage.
OS	Ordnance Survey
OSI	Ordnance Survey of Ireland
RMP	Record of Monuments and Places. An update of the older SMR, (sites and monuments record), on which all known archaeological sites are marked and listed in an accompanying list. The sites marked afford legal protection under the National Monuments Acts 1930–2004. The record is based on the 6–inch map series for the country and is recorded on a county basis. Each archaeological monument on the RMP has a unique code known as the RMP number prefixed by LI for Limerick.
RMP Number	This code is the number of the site on the RMP constraint map. It begins with the county code, for example LI for Limerick, the 6–inch sheet number, followed by the number of the archaeological monument on that sheet.
RPS	Record of Protected Structures
S	South
Second Edition	This relates to the OS 25–inch maps for each county. The second edition map completed for the area dates to the early 1900s and this is referred to in the text as the '25–inch map'.
Sheet	This relates to the 6–inch map for each county, which is divided into sheets
SMR	Sites and Monuments Record. The precursor of the RMP, the SMR now commonly relates to the archive paper files of known archaeological monuments maintained by the Archaeological Survey of Ireland (ASI). These files are arranged according to RMP number
W	West
TR	Trench

EXECUTIVE SUMMARY

A programme of archaeological test–trenching was undertaken at Carrigcleena More, Bweeng, Co. Cork, from 26 June to 1 July 2024, in accordance with Licence No. 24E0539. The local planning authority is the Cork County Council. The proposed development is centred on ITM coordinates E552456 and N590124 (Figure 1).

The project is covered by a Code of Practice agreed between the then Department of the Environment, Heritage and Local Government and the Irish Concrete Federation in 2009. The project archaeologist assigned was Dr Charles Mount.

A high–resolution magnetometry survey was conducted by Archaeological Management Solutions (AMS) in February 2024 (NMS Licence No. 24R0175) on 5 ha of land at Carrigcleena More (Roche and Bonsall (2024). Twenty geophysical anomalies (GAs) of possible archaeological significance were identified and numbered in the report. The GAs were interpreted as possible pit–type features, areas of burning, plough furrows, field boundaries and possible curvilinear enclosing elements. Some of the possible field boundaries aligned with boundaries identifiable on the 1st edition OS historic mapping, and others did not, suggesting that they might predate the mapping. However, it was noted that many of the GAs noted might result from relatively recent agricultural activity or underlying geology. A programme of archaeological test–trenching was designed to test the nature of the GAs and the reliability of the geophysical survey.

The archaeological testing programme comprised the excavation of 45 test trenches. No remains of archaeological significance were discovered.

The current policy of the Minister for Housing, Local Government and Heritage is that preservation *in situ* of archaeological sites is the preferred option. Where possible, every reasonable effort should be made to preserve *in situ* or reduce the impact on any identified archaeological material through design. Further, where preservation *in situ* is not the option chosen, there must be preservation by record (i.e. archaeological excavation and recording must take place)[1]. Following the results of the geophysical survey and test–trenching, the following recommendations are proposed:

1. A detailed archaeological mitigation strategy should be submitted to, and agreed with, the Local Authority and National Monuments Service for the development as part of the requested AIA update, to include geophysical survey and test–trenching results. This should clearly define the 'preservation *in–situ*' and 'preservation by record' strategy for identified archaeological features and deposits.

2. Where feasible archaeological features and deposits should be preserved *in–situ* by the use of Exclusion Buffer Zones and No–Dig Buffer Zones, informed by the results of the geophysical survey and/or archaeological testing.

3. Where preservation *in–situ* is not a viable option, either in whole or in part, then a programme of full archaeological excavation should be undertaken, to ensure preservation by record of the identified archaeological features/deposits that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under licence and in accordance with the provisions of the National Monuments Acts 1930–2014.

[1] https://www.archaeology.ie/sites/default/files/media/publications/archaeology–planning–process–pl13.pdf

4. A suitably qualified archaeologist should monitor all ground disturbance areas within the development. This will be completed under a licence from the National Monuments Service (NMS). Ground works shall be carried under the direction of the appointed archaeologist; no removal of topsoil is to take place in the absence of the archaeologist.

5. Should additional archaeological material be uncovered during monitoring then a mitigation strategy will be submitted proposing a 'preservation *in–situ*' and 'preservation by record' strategy for identified archaeological features and deposits, as per items 2–3 above.

6. The results of any archaeological test trenching, monitoring, surveys and/or excavation should be submitted in a report to the Local Authority, the Heritage and Planning Division, Department of Housing, Local Government and Heritage and the National Museum of Ireland.

Please note all the recommendations in this report are subject to approval of the Local Authority and the National Monuments Service, Department of Housing, Local Government and Heritage.

1. INTRODUCTION

1.1 Site location and description

The site was located in Carrigcleena More townland, Bweeng, Co. Cork (Figure 1). The proposed development was approximately 5 hectares, covering an agricultural greenfield (OS Six Inch sheet No. 41) east of the R619 Coachford to Drommahane road, C2.6 km northeast of Bweeng, Co. Cork.

1.2 The proposed development

The proposed development comprises the extension of quarrying activity into the subject site.

2. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1 Record of Monuments and Places (RMPs)

Section 12 (1) of the National Monuments Act 1994 made provision for the establishment and maintenance of a Record of Monuments & Places (RMP). Under this Act, each site recorded in the Record of Monuments and Places is granted statutory protection. When the owner or occupier of a property, or any other person proposes to carry out, or to cause, or to permit the carrying out of any work at or in relation to a recorded archaeological monument, they are required to give notice in writing to the Minister for Culture, Heritage and the Gaeltacht two months before commencing that work. Examination of the Record of Monuments and Places for Co. Cork indicated no Recorded Monuments located within the proposed development area. (Figure 2).

The nearest RMP is CO041–106002, a souterrain, approx. 240 m to the northwest.

2.2 Record of Protected Structures

The Cork Development Plan 2022–2028 and the Record of Protected Structures were examined as part of the baseline study for the proposed development.

The review established that no structures within the study area are listed as Protected Structures.

2.3 National Inventory of Architectural Heritage (NIAH)

The National Inventory of Architectural Heritage (hereinafter the 'NIAH') is a state initiative under the administration of the Department of Culture, Heritage and the Gaeltacht (DoCHG) and was established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999. Its purpose is to identify, record and evaluate the post–1700 architectural heritage of Ireland, uniformly and consistently, as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for Culture, Heritage and the Gaeltacht to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS).

There are no sites listed in the NIAH within the proposed development area.

2.4 Previous Archaeological Excavations

An examination of previous excavations carried out within and around the area proposed for development provides a useful framework for assessment of the study area in terms of its archaeological significance as well as its archaeological potential. The Archaeological Excavations Bulletin is an annual fieldwork gazetteer for Irish Archaeology; it was checked for a record of any licensed archaeological investigations carried out in the vicinity of the development area between 1970 and 2023. Examination of the excavations database at excavations.ie indicated that no previous

archaeological excavations had been carried out within the application area of the townland of Carrigcleena More.

A high-resolution magnetometry survey was conducted by AOC in February 2024 (NMS Licence No. 24R0175) on five hectares. That survey identified 20 geophysical anomalies. Apart from a small amount of ubiquitous pit–type features and possible areas of burning and plough furrows, several field boundaries represented on the first edition historic map were identified, as were several anomalies which may represent the remains of field boundaries or field systems which predate historic maps.

3. OBJECTIVES AND METHODOLOGY

3.1 Objectives

The archaeological testing programme aims to identify the presence or absence of archaeological remains within the proposed development area and establish the nature, character, extent and significance of any archaeological features or deposits the development will potentially impact.

3.2 Methodology

When features of archaeological potential were uncovered the area was cleaned to establish the nature of the features. If features could not be confirmed as archaeological, limited exploratory work was undertaken to determine that they were archaeological in nature and not geological or the result of other non-archaeological activity (such as stone sockets, plough furrows, agricultural drainage, modern field clearance, etc).

If any artefacts were retrieved during the investigation, their treatment would comply with the National Museum of Irelands *Standards for the care and treatment of archaeological objects from excavations* (2022) regarding care, numbering, and storage.

46 trenches, totalling 1,388 linear meters, were opened and checked for archaeological features (Figure 2). Test trenches were excavated at locations chosen following consultation with the site drawings and the results of the Archaeological Geophysical Survey (Roache and Bonsall 2024).

3.3 Constraints on the archaeological methods

A total of 46 test trenches were proposed based on desk–based assessment and the geophysical survey results. All planned trenches were excavated; however, due to an overhead cables two trenches were slightly adjusted (Figures 3 and 4).

- TR 40 was shortened by 15m.
- TR 15 was moved 10m to the south.

3.4 Recording

All recording was in line with the standard operating procedures (SOP) and work instructions (WI) set out in Rubicon's Integrated Management System (IMS) (in compliance with ISO 9001:2015, ISO 14001:2015, and ISO 45001:2018) and was undertaken on pro forma record sheets (standard forms – SF). All contexts, small finds, and environmental samples were given unique numbers. Should waterlogged wood, bone, or metallurgical samples have been taken they would also have received unique numbers in line with recent NMI guidelines and been logged in one master *Sample Register (SF–105–PM)*. Rubicon's IMS is saved on our company SharePoint web–based platform for ease of on–site access.

Photographs, plans, and sectional drawings of individual trenches, features, and deposits (at an appropriate scale) were included as appropriate, as well as more general photographs of the work in progress and the sites in their landscape setting. Detailed site drawings were undertaken at appropriate archaeological recording scales (1:20 plan and 1:10 section). Photographic recording was also carried out and comprised digital photographs. All photographs are date stamped and collated in digital folders that are labelled appropriately.

All primary survey data was gathered using RTK (Real Time Kinematic) GPS survey instruments connected to Trimble's VRS Now network, giving consistent accuracy of <1 cm using satellites and terrestrial base–stations to triangulate 3D coordinates. All coordinates are provided in Irish Transverse Mercator (ITM). The location of any identified archaeological features, deposits and find spots were surveyed.

3.5 Samples retrieval strategy

A sampling strategy in accordance with Rubicon Heritage Services Ltd.'s standard environmental sampling practice was included in the method statement; however, since no archaeological remains were uncovered, it was not necessary to retrieve any samples.

3.6 Artefact retrieval strategy

An artefact retrieval strategy in accordance with Rubicon's Archaeological Recording Manual (WI–146–PM), the NMI's Standards for the care and treatment of archaeological objects from excavations (2022) and the IAI's (2006) Code of Conduct for the Treatment of Archaeological Objects was included in the method statement; however, no archaeological artefacts were retrieved.

4. RESULTS

The test trenches revealed several historic field boundaries and agricultural furrows but did not reveal any features deemed of archaeological significance.

46 trenches, 1.8 m wide and 1,388 linear m long in total, were excavated across the development area (Figure 2–4). All trenches were assigned a unique identifier, and full descriptions of the trenches and the remains observed in them are provided in Appendix 1.

The locations of the trenches were largely determined based on the results of a geophysical survey by Roache and Bonsall (2024), but also comprehensively tested the areas between these (Figures 2–4). The geophysical survey identified 20 anomalies. Six of these corresponded to historic field boundaries (GA1–6); seven to agricultural furrows (GA 14–20), six were not observable during the archaeological investigation (GA 8–13), and one was attributed to a linear feature C19 (GA 7).

Archaeological features
No archaeological features or finds were found during the testing investigation.

Agricultural features
Six field boundaries were revealed in ten trenches. These were 2.2–4.06 m wide and 0.11–0.22m deep. Field boundaries corresponding with GA1, GA5, and GA6 revealed in TR 21, 41; 8, 11; 24, 25, respectively, align with field boundaries depicted on the first edition 6–inch Ordinance Survey map (1844). Field boundaries corresponding with GA2 and GA3, revealed in TR27 and TR1, respectively, are not on the first edition 6–inch map but are marked on the 25–inch Ordinance Survey map (1904).

The linear feature C19 (GA 7) in trench 27 didn't curve and was only 0.12 m deep with one fill (C20) same as fills of furrows on the site. Orientation of the linear C19 follow direction of the surrounding furrows and as such was deemed to be of the agricultural origin.

The agricultural furrows were found across all parts of the site and were aligned to the orientations of the field boundaries (C21, C25 and C29). Furrows located north of the field boundary–C33 were aligned in the east–west direction. The furrows ranged from 0.7–0.46 m in width and were 0.08–0.12 m deep.

Several ditches that corresponded with field boundaries depicted on historic mapping were uncovered. The general layout of these was largely established prior to 1840, when the first edition 6–inch Ordinance Survey map (1844) survey was carried out; however, some were added after that and before the 1902 survey for the 25–inch Ordinance Survey map (1904). The plough furrows largely aligned with the ditches added between the two maps and are, therefore, also of that date.

No features deemed archaeological were found during the test–trenching.

5. RECOMMENDATIONS

The current policy of the Minister for Housing, Local Government and Heritage is that preservation *in situ* of archaeological sites is the preferred option. Where possible, every reasonable effort should be made to preserve *in situ* or reduce the impact on any identified archaeological material through design. Further, where preservation *in situ* is not the option chosen, there must be preservation by record (i.e.

archaeological excavation and recording must take place)[2]. Following the results of the geophysical survey and test–trenching, the following recommendations are proposed:

7. A detailed archaeological mitigation strategy should be submitted to, and agreed with, the Local Authority and National Monuments Service for the development as part of the requested AIA update, to include geophysical survey and test–trenching results. This should clearly define the 'preservation *in–situ*' and 'preservation by record' strategy for identified archaeological features and deposits.

8. Where feasible archaeological features and deposits should be preserved *in–situ* by the use of Exclusion Buffer Zones and No–Dig Buffer Zones, informed by the results of the geophysical survey and/or archaeological testing.

9. Where preservation *in–situ* is not a viable option, either in whole or in part, then a programme of full archaeological excavation should be undertaken, to ensure preservation by record of the identified archaeological features/deposits that will be directly impacted upon. This work should be carried out by a suitably qualified archaeologist under licence and in accordance with the provisions of the National Monuments Acts 1930–2014.

10. A suitably qualified archaeologist should monitor all ground disturbance areas within the development. This will be completed under a licence from the National Monuments Service (NMS). Ground works shall be carried under the direction of the appointed archaeologist; no removal of topsoil is to take place in the absence of the archaeologist.

11. Should additional archaeological material be uncovered during monitoring then a mitigation strategy will be submitted proposing a 'preservation *in–situ*' and 'preservation by record' strategy for identified archaeological features and deposits, as per items 2–3 above.

12. The results of any archaeological test trenching, monitoring, surveys and/or excavation should be submitted in a report to the Local Authority, the Heritage and Planning Division, Department of Housing, Local Government and Heritage and the National Museum of Ireland.

Please note all the recommendations in this report are subject to approval of the Local Authority and the National Monuments Service, Department of Housing, Local Government and Heritage. The wording of these recommendations is not intended to be used as a condition of planning.

[2] https://www.archaeology.ie/sites/default/files/media/publications/archaeology–planning–process–pl13.pdf

6. ARCHIVE QUANTITIES

The site archive is comprised of the following materials:

Item	Quantity
Photographs	78
Registers	2
Trench record sheets	9

Table 1 Site archive

The archive material is contained within one box.

Storage of the archive in a suitable format and location is required to provide for any future archaeological research. It is proposed that in addition to the paper archive a digital copy is prepared. The archive is currently stored in the offices of Rubicon Heritage Services Ltd, Unit 2, Europa Enterprise Park, Midleton, Co. Cork P25 TV25. It is proposed that following completion of post–excavation the archive will be deposited with the National Monuments Service, Department of the Arts, Heritage and the Gaeltacht and the National Museum of Ireland.

7. REFERENCES

Cork County Council 2014 Cork County Development Plan 2014. Available online @ https://www.corkcoco.ie/en/resident/planning–and–development/cork–county–development–plan–2014. Accessed 30 July 2024.

Department of Arts, Heritage, Gaeltacht and the Islands (DAHGI) 1999 *Policy and Guidelines on Archaeological Excavation*, DAHGI, Ireland.

National Monument Service (NMS) 2016 Solar Farm developments– Internal guidance document. DAERRG, Dublin.

National Museum of Ireland (NMI) 2022 *Standards for the care and treatment of archaeological objects from excavations*. NMI. Dublin, Ireland.

Roche, L and Bonsall, J 2024 Archaeological Geophysical Survey at Carrigcleena More, Bweeng, Co. Cork, 24R0175. Archaeological Management Solutions for Breedon Ireland.

Cartographic sources

Ordnance Survey of Ireland. First Edition. 6–inch: 1 mile. Ordnance Survey of Ireland, Dublin. (Carrigcleena More – surveyed 1840, published 1844)

Ordnance Survey of Ireland. First Edition. 25–inch series: 1 mile. Ordnance Survey of Ireland, Dublin. (Carrigcleena More – surveyed 1902, published 1904)

Online sources

www.excavations.ie
http://webgis.archaeology.ie/historicenvironment/

Figure 1 - Location of the proposed development site.

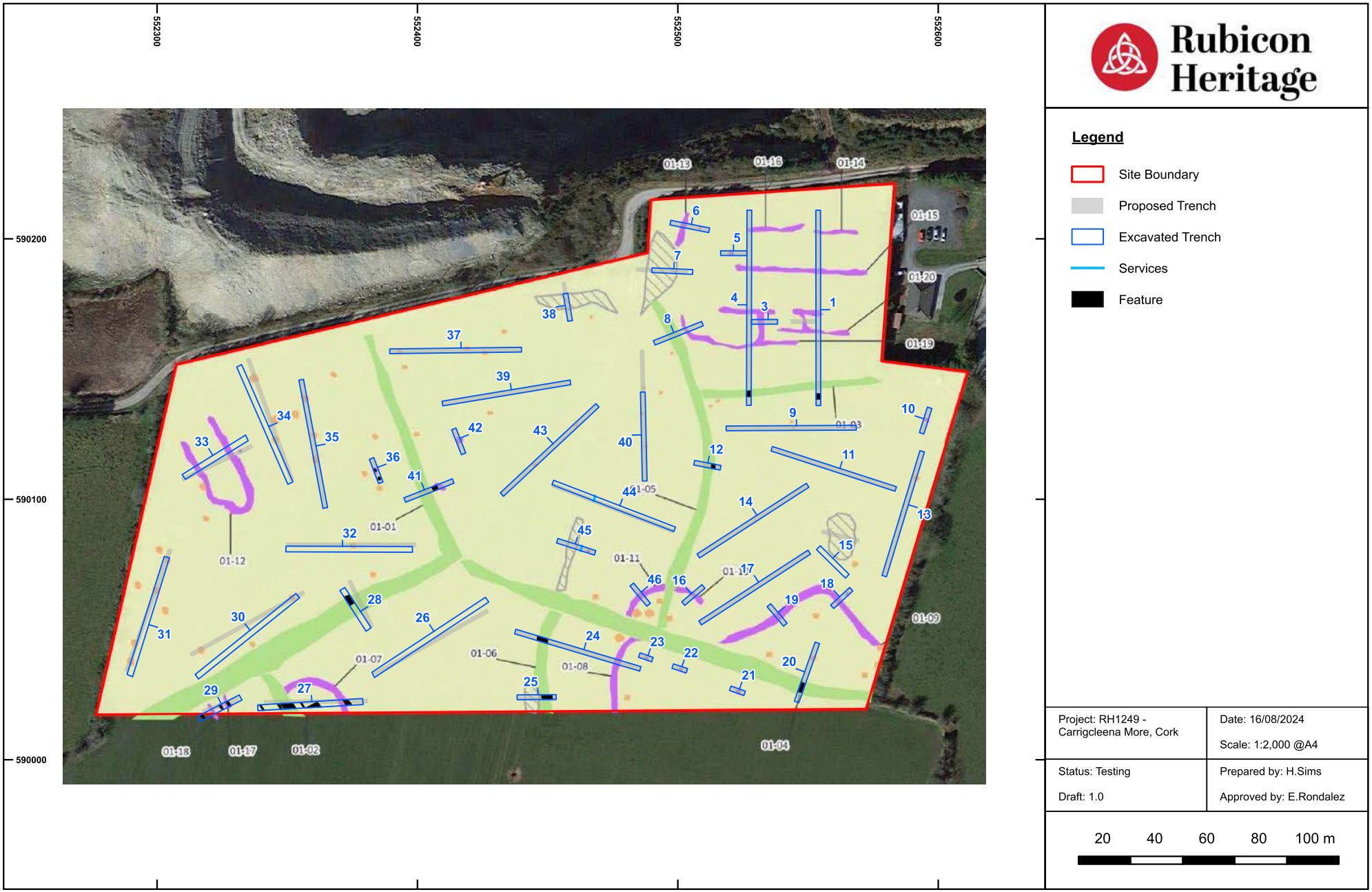

Figure 2 - Excavated test trench array with geophysical survey interpretation.

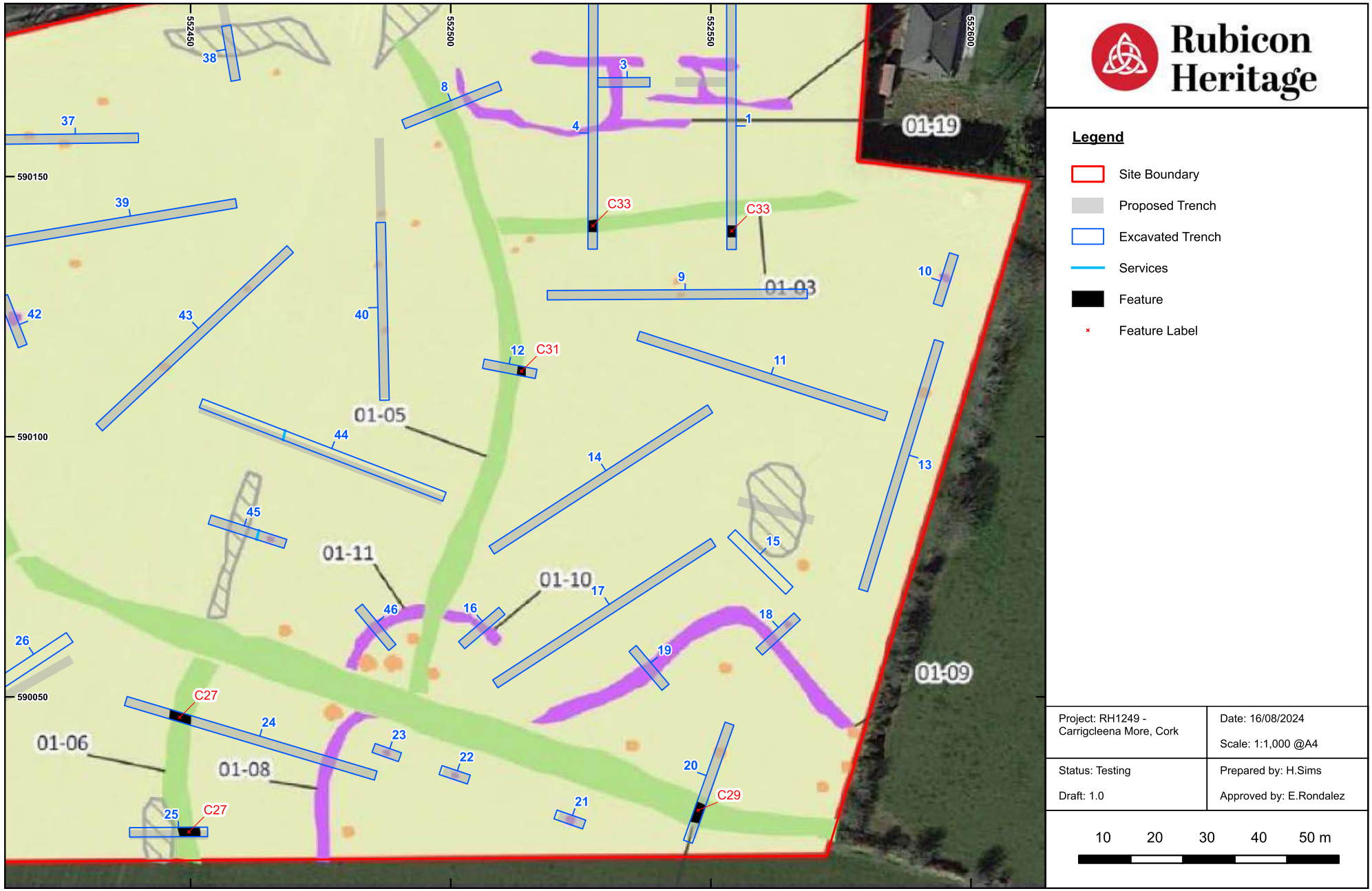

Figure 3 - Features identified in Trench 1, 4, 12, 20, 24 and 25.

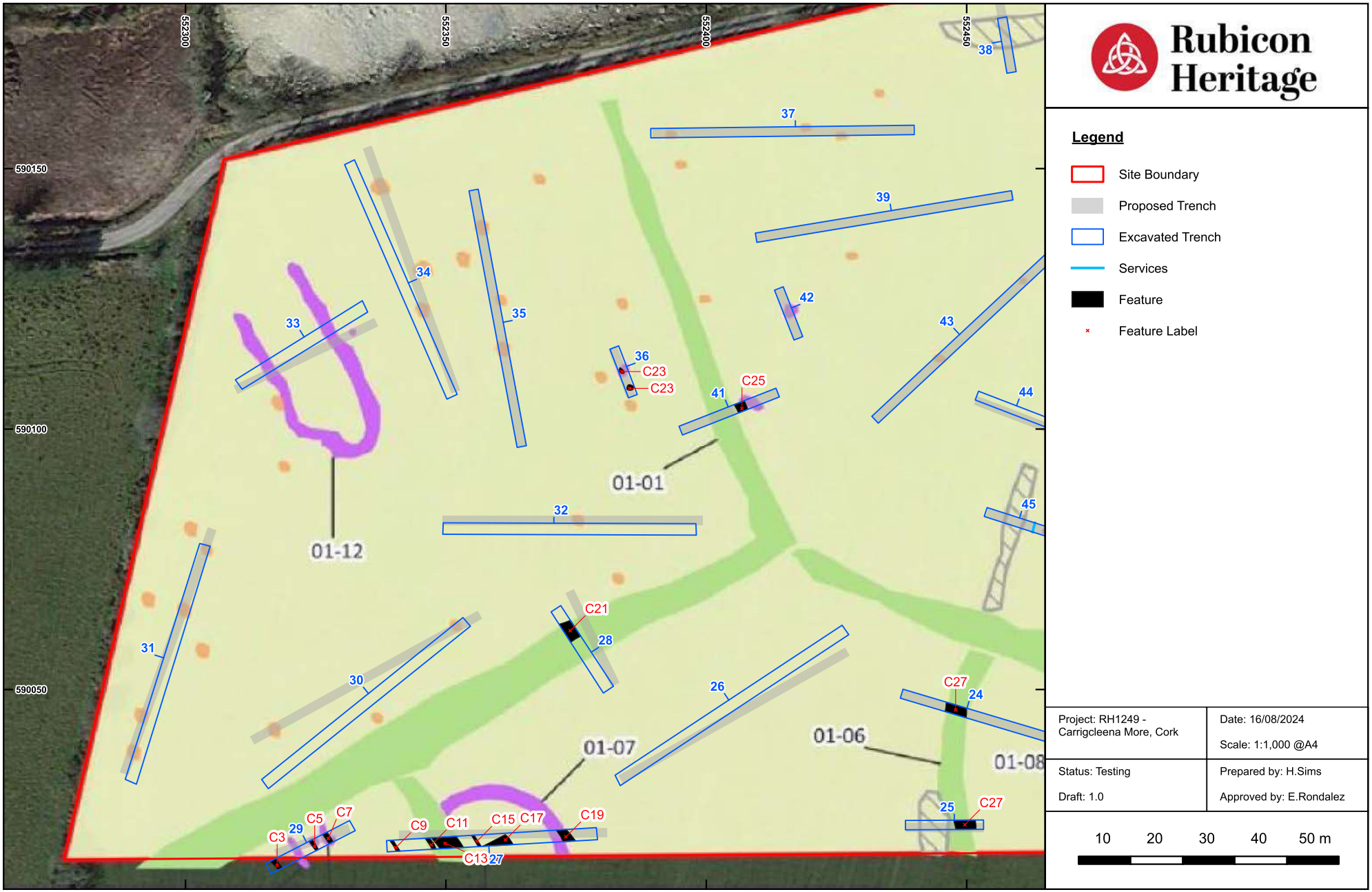

Figure 4 - Features identified in Trench 27, 28, 29, 36 and 41.

Plate 1 - TR 1 general shot, looking south

Plate 2 - TR 9 general shot, looking west

Plate 3 - TR 13 general shot, looking north

Plate 4 - TR 27 general shot, looking east

Plate 5 - Field boundary C21 in TR 28, looking north

Plate 6 - TR 32 general shot, looking west

Plate 7 - TR 31 general shot, looking south

Plate 8 - TR 43 general shot, looking northeast

APPENDIX 1 CONTEXT REGISTER

Context No.	Trench	Type	Fill of	Filled by	Length (m)	Width (m)	Depth (m)	Description	Interpretation
1	All							Dark brown, grey silt	Topsoil
2	All							Light greyish–orange silty clay	Natural
3	29	cut		4	N/A	1	0.12	Cut of a linear feature	Agricultural furrow
4	29	fill	3		N/A	1	0.12	Dark grey silt	Fill of furrow cut C3
5	29	cut		6	N/A	0.6	0.14	Cut of linear feature	Agricultural furrow
6	29	fill	5		N/A	0.6	0.14	Dark grey silt	Fill of furrow cut C5
7	29	cut		8	N/A	0.85	0.19	Cut of linear feature	Agricultural furrow
8	29	fill	7		N/A	0.85	0.19	Dark grey silt	Fill of furrow cut C7
9	27	cut		10	N/A	0.5	0.08	Cut of linear feature	Agricultural furrow
10	27	fill	9		N/A	0.5	0.08	Dark grey silt	Fill of furrow cut C9
11	27	cut		12	N/A	0.7	0.12	Cut of linear feature	Agricultural furrow
12	27	fill	11		N/A	0.7	0.12	Dark grey silt	Fill of furrow cut C11
13	27	cut		14	N/A	4	0.15	Cut of linear feature	Field boundary (GA2)
14	27	fill	13		N/A	4	0.15	Mid brown silt	Fill of field boundary cut C13
15	27	cut		16	N/A	0.7	0.12	Cut of linear feature	Agricultural furrow
16	27	fill	15		N/A	0.7	0.12	Dark grey silt	Fill of furrow cut C15
17	27	cut		18	2.9	2.2	0.12	Cut of sub-rectangular feature	Machine–cut rubbish pit
18	27	fill	17		2.9	2.2	0.12	Mid brown silt	Fill of cut 18

19	27	cut		20	N/A	1.8	0.12	Cut of linear feature	Cut of linear feature (GA7)
20	27	fill	19		N/A	1.8	0.12	Dark grey silt	Fill of linear cut C19
21	28	cut		22	N/A	3.84	0.22	Cut of linear feature	Field boundary (GA1)
22	28	fill	21		N/A	3.84	0.22	Dark brown silty sand	Fill of field boundary cut C21
23	36	cut		24	0.86	0.78	0.13	Cut of subcircular feature	Tree bowl
24	36	fill	23		0.86	0.78	0.13	Dark brown silty sand clay with stones	Fill of cut C23
25	41	cut		26	N/A	1.9	0.12	Cut of linear feature	Field boundary (GA1)
26	41	fill	25		N/A	1.9	0.12	Dark brown silty sand	Fill of field boundary cut C25
27	25	cut		28	N/A	4.06	0.3	Cut of linear feature	Field boundary (GA6)
28	25	fill	27		N/A	4.06	0.3	Dark brown silty sand	Fill of field boundary cut C27
29	20	cut		30	N/A	3.9	0.17	Cut of linear feature	Field boundary (GA4)
30	20	fill	29		N/A	3.9	0.17	Dark brown silty sand	Fill of field boundary cut C29
31	11	cut		32	N/A	1.8	0.06	Cut of linear feature	Field boundary (GA5)
32	11	fill	31		N/A	1.8	0.06	Dark brown silty sand	Fill of field boundary cut C31
33	4	cut		34	N/A	2.2	0.11	Cut of linear feature	Field boundary (GA3)
34	4	fill	33		N/A	2.2	0.11	Dark brown silty sand	Fill of field boundary cut C33

APPENDIX 2 TRENCH REGISTER

Field No.	Trench No.	Length (m)	Width (m)	Depth (m)	Orientation	Description	Comments
1	1	75	1.8	0.52	N–S	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 20, 15 and 14 were plough furrows. GA 3 was not visible. There were 19 furrows in total; all E–W and 0.51–1.07 m wide.
1	2	10	1.8	0.49	E–W	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	One furrow, E–W, continues in Trench 3.
1	3	10	1.8	0.31	E–W	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 19 was a change in natural. One E–W furrow continued from this trench into Trench 2.
1	4	5	1.8	0.41	N–S	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 3 was a field boundary. GA 15, 16 & 19 were furrows. There were 23 E–W furrows, all 0.4–1.04 m wide.
1	5	10	1.8	0.31	E–W	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	One E–W furrow. The geophysical anomaly was not visible.
1	6	15	1.8	0.38	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 13 was not visible.
1	7	20	1.8	0.51	E–W	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	
1	8	20	1.8	0.4	NE–SW	Topsoil: Dark brownish–grey silt	GA 19 was not visible.

						Natural: Light greyish–orange silty clay	
1	9	50	1.8	0.44	E–W	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	2 furrows, NW–SE. Geophysical anomaly was not visible.
1	10	10	1.8	0.36	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Geophysical anomaly was not visible.
1	11	20	1.8	0.48	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 15 was a field boundary and was recorded as C31.
1	12	50	1.8	0.49	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Two N–S furrows.
1	13	50	1.8	0.4	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Two NE–SW furrows.
1	14	50	1.8	0.5	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	
1	15	15	1.8	0.38	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Trench moved due to power line. Six N–S furrows.
1	16	10	1.8	0.52	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 10 was not visible.
1	17	50	1.8	0.51	NE–SW	Topsoil: Dark brownish–grey silt	

						Natural: Light greyish–orange silty clay	
1	18	10	1.8	0.55	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 9 was not visible. Two NW–SE furrows were revealed.
1	19	10	1.8	0.4	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 9 was not visible.
1	20	23	1.8	0.3	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Field boundary GA 4 (C29) visible. One furrow, next to the field boundary, NW–SE.
1	21	5	1.8	0.45	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	A geophysical anomaly was not visible.
1	22	5	1.8	0.43	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	A geophysical anomaly was not visible.
1	23	5	1.8	0.43	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	A geophysical anomaly was not visible.
1	24	50	1.8	0.48	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 6 (C27) – change in natural. No GA 8.
1	25	15	1.8	0.36	E–W	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 6 (C27) – is a modern field boundary with plastic found inside the fill.
1	26	50	1.8	0.5	NE–SW	Topsoil: Dark brownish–grey silt	

						Natural: Light greyish–orange silty clay	
1	27	40	1.8	0.5	E–W	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 2 – field boundary, GA 7– furrow.
1	28	20	1.8	0.37	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 1 – Field boundary
1	29	15	1.8	0.45	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 17– series of furrows (C3–8).
1	30	50	1.8	0.42	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Geophysical anomalies –mottled stony patches in natural
1	31	50	1.8	0.25	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	
1	32	50	1.8	0.5	E–W	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Geophysical anomaly – change in natural (tree roots)
1	33	30	1.8	0.3	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	A geophysical anomaly was not visible.
1	34	50	1.8	0.36	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	
1	35	50	1.8	0.38	N–S	Topsoil: Dark brownish–grey silt	A geophysical anomaly was not visible.

						Natural: Light greyish–orange silty clay	
1	36	10	1.8	0.42	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	C23 – change in natural
1	37	50	1.8	0.44	E–W	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Five furrows, NE–SW, 0.5–0.67 m width. Geophysical anomalies were not visible.
1	38	15	1.8	0.5	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	
1	39	50	1.8	0.36	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Three furrows, E–W, 0.44–0.53 m in width
1	40	40	1.8	0.44	N–S	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Eight furrows, E–W, 0.46–0.9 m in width. The trench was shortened due to overhead cables.
1	41	10	1.8	0.42	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 1 – field boundary; second geophysical anomaly (C25) – change in natural
1	42	20	1.8	0.37	NE–SW	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Seven furrows, E–W, 0.43–0.77 m in width. The trench was extended due to TR40 being shortened. Geophysical anomalies were not visible.
1	43	50	1.8	0.49	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	14 furrows, NW–SE, 0.84–0.57 m in width, 0.09 m deep. Geophysical anomalies were not visible.

1	44	50	1.8	0.48	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	Four furrows, E–W, 0.4–0.7 m in width
1	45	15	1.8	0.43	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	The field fence and water pipe cross this trench. The geophysical anomalies marked in this trench turn out to be a furrow–orientated E–W with 0.57 m in width.
1	46	10	1.8	0.42	NW–SE	Topsoil: Dark brownish–grey silt Natural: Light greyish–orange silty clay	GA 11 was not visible.

APPENDIX 3 PHOTO REGISTER

Photo No.	Camera No.	Direction Facing	Description
100_3405	Olympus	S	TR31 general shot
100_3406	Olympus	E	TR29 general shot
100_3407	Olympus	N	C3 and C4 in TR 29
100_3408	Olympus	E	C5 and C6 in TR 29
100_3409	Olympus	E	C7 and C8 in TR 29
100_3410	Olympus	E	TR 30 general shot
100_3411	Olympus	E	TR 27 general shot
100_3412	Olympus	SE	C9 and C10 in TR 27
100_3413	Olympus	N	C11 and C12 in TR 27
100_3414	Olympus	SE	Field boundary (C13 and C14) in TR 27
100_3415	Olympus	SE	C17 and C18 in TR 27
100_3416	Olympus	SW	C15 and C16 in TR 27
100_3417	Olympus	E	C19 and C20 in TR 27
100_3418	Olympus	W	TR 27 general shot
100_3419	Olympus	E	TR 26 general shot
100_3420	Olympus	N	TR 28 general shot
100_3421	Olympus	N	C21 in TR 28
100_3422	Olympus	W	TR 32 general shot
100_3423	Olympus	SW	TR 33 general shot
100_3424	Olympus	S	TR 34 general shot
100_3425	Olympus	N	TR 35 general shot
100_3426	Olympus	N	TR 36 general shot
100_3427	Olympus	ENE	C23 in TR 36
100_3428	Olympus	SN	TR 41 general shot
100_3429	Olympus	E	C25 in TR 41
100_3430	Olympus	SE	TR 46 general shot
100_3431	Olympus	SW	TR 16 general shot
100_3432	Olympus	NW	TR 19 general shot
100_3433	Olympus	NE	TR 18 general shot
100_3434	Olympus	WNW	TR 21 general shot
100_3435	Olympus	WNW	TR 22 general shot
100_3436	Olympus	NW	TR 23 general shot
100_3437	Olympus	W	Plastic in C27 in TR 25
100_3438	Olympus	W	C27 in TR 25
100_3439	Olympus	W	TR 25 general shot
100_3440	Olympus	W	C27 in TR 24
100_3441	Olympus	SE	TR 24 general shot
100_3442	Olympus	NW	C29 in TR 20

100_3443	Olympus	NW	TR 20 general shot
100_3444	Olympus	ENE	TR 17 general shot
100_3445	Olympus	N	TR 13 general shot
100_3446	Olympus	N	TR 10 general shot
100_3447	Olympus	W	TR 9 general shot
100_3448	Olympus	E	TR 8 general shot
100_3449	Olympus	SE	TR 12 general shot
100_3450	Olympus	SW	Natural outcrop of stones in TR 14
100_3451	Olympus	SW	TR 14 general shot
100_3452	Olympus	NW	C31 in TR 11
100_3453	Olympus	SE	TR 11 general shot
100_3454	Olympus	N	Geophysical anomaly20 in TR 1
100_3455	Olympus	N	Geophysical anomaly 15 in TR 1
100_3456	Olympus	N	Geophysical anomaly 14 in TR 1
100_3457	Olympus	S	TR 1 general shot
100_3458	Olympus	SE	TR 2 general shot
100_3459	Olympus	W	TR 3 general shot
100_3460	Olympus	W	Geophysical anomaly 19 in TR 3
100_3461	Olympus	N	C33 in TR 4
100_3462	Olympus	N	Geophysical anomaly 19 in TR 4
100_3463	Olympus	N	Geophysical anomaly 15 in TR 4
100_3464	Olympus	S	Geophysical anomaly 16 in TR 4
100_3465	Olympus	S	TR 4 general shot
100_3466	Olympus	SE	Geophysical anomaly 13 in TR 6
100_3467	Olympus	S	Natural feature, similar to geophysical anomalies, in TR 6
100_3468	Olympus	NW	TR 6 general shot
100_3469	Olympus	E	TR 5 general shot
100_3470	Olympus	SE	TR 7 general shot
100_3471	Olympus	NW	TR 15 general shot
100_3472	Olympus	NW	TR 45 general shot
100_3473	Olympus	W	TR 44 general shot
100_3474	Olympus	S	TR 40 general shot
100_3475	Olympus	SE	TR 37 general shot
100_3476	Olympus	NW	TR 42 general shot
100_3477	Olympus	W	TR 39 general shot
100_3478	Olympus	W	TR 39 general shot
100_3479	Olympus	S	TR 42 general shot
100_3480	Olympus	S	TR 42 general shot
100_3481	Olympus	NE	TR 43 general shot
100_3482	Olympus	N	TR 38 general shot

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INTRODUCTION

Background

13.1 This chapter of the EIAR assesses the landscape and visual effects arising from the continued use of the existing permitted Bweeng Quarry and a proposed lateral extension of said quarry over an extended extraction area of c. 3.7ha, within an overall application area of c. 28.8ha. The planning application area, hereafter referred to as the application area or the site, is located 2.5km northeast of the village of Bweeng and 1.5km east of the R619 – Regional Road. Mallow town is located 7km to the northeast.

13.2 The existing quarry contains an extraction void, covering approximately the southern half of the development. The northern half of the development comprises processing facilities, including a readymix concrete plant, settlement ponds and stockpiling areas, as well as ancillary facilities, such as portacabin offices, the weighbridge and wheelwash. All of these facilities will continue to be used, as part of the proposed development.

13.3 It is proposed to extend the existing quarry void in a southern direction into adjoining lands that are currently laid out in agricultural use. To facilitate the proposed extension, an existing local road along the current southern boundary of the quarry will need to be realigned to the south of the proposed extension area. Perimeter screening berms will be installed to separate the proposed quarry extension area from the realigned road, as well as provide screening. Also, hedge and woodland planting will be carried out, to provide further screening, security and biodiversity benefits.

13.4 On completion of all extraction works the quarry will be restored to a natural habitat afteruse, comprising the retention of all existing vegetation within the site, the natural filling of the quarry void with water, creating a wetland habitat, and the natural regeneration of all remaining areas with locally occurring grass and scrub species. Further details on the proposed development, including the Landscape and Restoration Plan (**Figure 2-5**) are contained in Chapter 2 of this EIAR.

13.5 This chapter should be read in conjunction with the following figures, which have been used to inform the EIAR chapter:

- **Figure 13-1:** Landscape Baseline and Viewpoint Locations
- **Figure 13-2:** Viewpoints A & B
- **Figure 13-3:** Viewpoints C & D
- **Figure 13-4:** Viewpoints E & F

Scope of Work / EIA Scoping

13.6 The European Commission Guidance on the preparation of the Environmental Impact Assessment report (2017) was taken into account with regard to the structure of this chapter, including headings covered, as well as general EIA terminology. Regarding the content of the landscape chapter, the EPA guidelines in relation to the preparation of an EIAR (May 2022) suggest the following typical headings that may be included in respect of the prescribed environmental factor 'The Landscape':

- Landscape Appearance and Character;
- Landscape Context;
- Views & Prospects; and

- Historical Landscapes.

13.7 These headings are incorporated in the below assessment, as appropriate. However, in the absence of more detailed Irish guidance, the assessment contained within this chapter is based on the Third Edition of the Guidelines for Landscape and Visual Impact Assessment issued by the Landscape Institute and Institute of Environmental Management and Assessment (hereinafter referred to as 'GLVIA3'). These guidelines are widely accepted as best practice for Landscape and Visual Assessment (LVIA) in Ireland.

13.8 GLVIA3 emphasises that landscape and visual effects are related but independent issues; landscape effects are changes in the landscape, its character and quality; while visual effects relate to the appearance of these changes and the resulting effect on visual amenity.

13.9 The assessment of overall landscape and visual effects and their significance is defined in terms of the relationship between the sensitivity of the landscape/visual receptors and the magnitude of the change.

13.10 As GLVIA3 (paragraph 2.23) states, professional judgement is an important part of the LVIA process: whilst there may be some scope for objective measurement of landscape and visual changes, much of the assessment must rely on qualitative judgements. It is critical that these judgements are based upon a clear and transparent method so that the reasoning can be followed and examined by others.

13.11 GLVIA3 sets out a framework for making judgements about the level of effects that may result from change or development. It describes a step by step approach in which: judgements about the value and susceptibility of the receptor are combined into a judgement about sensitivity; judgements about the size/scale of the effect, its geographical extent and its duration and reversibility are combined into a judgement about the magnitude of the effect; and finally, the judgements about sensitivity of the receptor and the magnitude of the effect are combined to judge the level of the effect. If the assessment forms part of an EIA, a threshold may then be identified to show which effects are considered to be significant and which are not.

13.12 GLVIA3 is not prescriptive about exactly how the various judgments required in this framework should be made. This is a matter for individual practitioners to decide and explain. In this document it has been assessed that Major or Major/Moderate levels of effect are significant.

13.13 The full LVIA methodology is described in Appendix 13-A. Please note that much of the terminology used in assessing the landscape and visual effects is in accordance with the above-mentioned EPA Guidelines. However, the terminology used in this LVIA to describe the level of effects (= "significance of effects" in the EPA Guidelines) differs slightly from said EPA Guidelines, based on examples provided in GLVIA3.

Technical Standards

13.14 Photography and visual representations are based on the principles set out in the Landscape Institute – Technical Guidance Note 06/19 – Visual Representation of Development Proposals. There is no Irish standard/guidance, and in our experience, it is typically considered sufficient to provide two (annotated) viewpoints on one A3-sized sheet, using a range of horizontal angles of view (i.e. 40˚-110˚) to illustrate the full extent of the proposed application area within each photograph presented, as well as the context within which the site is located.

13.15 The Landscape Institute – Technical Guidance Note 02/21 – Assessing landscape value outside national designations was taken account of in the preparation of the assessment methodology, as provided in Appendix 13-A at the end of this chapter.

Consultations / Consultees

13.16 A pre-planning consultation meeting was held between officials of Cork County Council and representatives of SLR Consulting Ireland and Breedon Materials Ltd. (Breedon Ireland). No matters to be addressed, specifically relating to this landscape and visual impact assessment, were raised during this meeting.

13.17 Following a review of published development plans and the site survey, it was considered that there was no requirement for a separate formal consultation to be carried out regarding the landscape and visual effects of the proposed development.

Contributors / Author(s)

13.18 The LVIA including site work and completion of drawings was carried out by Anne Merkle, a Principal Landscape Architect with SLR Consulting Ireland. Anne graduated from the Nürtingen-Geislingen University (Germany) in Landscape Architecture (Dipl.-Ing. (FH)), in 2002. She has 20+ years' experience working for landscape consultancies in Ireland, specialising in Landscape and Visual Impact Assessments for a wide range of projects, including quarries, waste recovery facilities, wind farms, powerlines and mixed developments. In 2017, Anne completed an MSc in Biodiversity and Land Use Planning at NUI Galway. She is a full member of the Irish Landscape Institute (MILI) since 2005.

Sources of Information

13.19 The assessment is based upon a desk top assessment of relevant plans, guidance and landscape character assessments, as well as a thorough site assessment carried out in August 2022. The desktop study and field work were informed by:

- Cork County Development Plan 2022-2028;
- Draft Cork County Landscape Strategy (2007);
- Digital and paper (Ordnance Survey Ireland) mapping at different scales; and
- Information available on the internet (such as satellite images and information on recreational facilities and nature conservation sites)

Study Area

13.20 A study area of up to 3km surrounding the application area was identified during the desktop study, based on prior experience with mineral extraction sites, as well as a desk-top assessment of the topography and existing screening vegetation surrounding the site (using OSI mapping and satellite images). While existing topography and vegetation provides abundant screening, the 3km study area is maintained for the purposes of providing landscape context.

Field Survey

13.21 A detailed field survey was carried out on 15th June 2021, followed by a second visit on 20th November 2023 to collect up-to-date viewpoint photography. Conditions during the first site visit were overcast with distant visibility restricted at times by mist. During the second visit conditions were partially overcast, with good visibility. The low elevation of the sun (due to the November date) and changes from sunny spells to no sun have affected the lighting of some of the photographs. Nevertheless, the more recent photographs were chosen for the viewpoint sheets, as they reflect the current visibility of the existing quarry and proposed extension site. Photographs were taken during the field survey, using a Nikon D610 digital SLR full frame camera, with a fixed 50mm lens, mounted on a tripod with a panoramic head. The individual photos were taken in portrait format.

13.22 In accordance with GLVIA3, the field survey and viewpoint photography concentrated on publicly accessible areas, such as the road and public footpath networks, residential and outdoor recreational areas.

Limitations / Difficulties Encountered

13.23 No difficulties were encountered during the desktop study, field survey or in the preparation of this report.

Significant Risks

13.24 There are no known significant risks to human health or environmental effects, which may occur in relation to this landscape and visual impact assessment.

REGULATORY BACKGROUND

13.25 The following paragraphs set out the regulatory background with regard to LVIA in Ireland and the site-specific planning background relevant to the proposed development.

Legislation

13.26 In 2002, Ireland ratified the European Landscape Convention, which promotes the protection, management and planning of landscapes. The National Landscape Strategy for Ireland 2015-2025 was published "to ensure compliance with the European Landscape Convention and establish principles for protecting and enhancing the landscape while positively managing its change".

13.27 Article 1a of the European Landscape Convention defines landscape as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors". This definition has been included in the Planning and Development (Amendment) Act 2010, along with the requirement that objectives relating to landscape shall be included in development plans.

13.28 There is no Irish legislation specifically governing the preparation of landscape and visual impact assessments.

Planning Policy and Development Control

13.29 The Cork County Development Plan (CDP) 2022-2028 is the statutory plan detailing the development objectives/policies of the authority, covering the application area. Those policies/ objectives, with relevance to this assessment, are listed below. Refer to **Figure 13-1** – Landscape Baseline and Viewpoint Locations for the location and extent of the relevant designations within the study area.

Mineral Extraction

13.30 Section 8.17 of the current Cork CDP, 'Mineral Extraction', states that the Council *"aims to protect and safeguard the operations of working quarries and proven aggregate resources from incompatible developments to ensure the continued viability of the extractive industry, whilst also ensuring that environmental, rural, scenic and residential amenities are protected."*

13.31 CDP **Objective EC 8-16:** 'Safeguarding Mineral resources' states the following:

"a) Protect and safeguard the county's natural mineral resources from inappropriate development, by seeking to prevent incompatible land uses that could be located elsewhere, from being located in the vicinity of the resource, since the extraction of minerals and aggregates is resource based. …"

Green Infrastructure and Development

13.32 CDP **Objective GI 14-3:** 'Green Infrastructure and Development' states the following:

13.33 *"a) Require new development and redevelopment proposals, where considered appropriate, to contribute to the protection, management and enhancement of the existing green and blue infrastructure of the local area in terms of the design, layout and landscaping of development proposals.*

b) Require all development to submit a green infrastructure statement outlining how the proposal contributes to green and blue infrastructure both within its environs as well as within the wider settlement or rural area. Larger developments (multiple residential developments including Part 8 applications, retail, industrial, mineral extraction, etc) will be expected to prepare a Landscape/ Green (and Blue) Infrastructure Plan including a Landscape Design Rationale. This Plan should identify environmental assets and include proposals which protect, manage and develop green infrastructure resources in a sustainable manner. …"

Landscape Character Assessment of County Cork

13.34 Section 14.8 of the current Cork CDP summarises the content of the Draft Landscape Strategy, which was prepared for County Cork in 2007. This strategy identifies 16 landscape character types (LCT) and includes *"an evaluation of each landscape character type in terms of its Landscape Value, Sensitivity and Importance"*. Refer to the Landscape Baseline section below for more detail from the Draft Landscape Strategy relevant to the study area.

13.35 Those LCTs of particularly high value, sensitivity and importance were designated as High Value Landscapes (HVL), within which *"considerable care will be needed to successfully locate large scale developments without them becoming unduly obtrusive"*. The application area is not located within or in close proximity to a HVL. The closest HVL is located over 4km to the northeast, to the east of the Clyda River and the N20 – National Road.

13.36 CDP **Objective GI 14-9**: 'Landscape' states the following:

"a) Protect the visual and scenic amenities of County Cork's built and natural environment.

b) Landscape issues will be an important factor in all land-use proposals, ensuring that a pro-active view of development is undertaken while protecting the environment and heritage generally in line with the principle of sustainability.

c) Ensure that new development meets high standards of siting and design.

d) Protect skylines and ridgelines from development.

e) Discourage proposals necessitating the removal of extensive amounts of trees, hedgerows and historic walls or other distinctive boundary treatments."

13.37 CDP **Objective GI 14-10**: 'Draft Landscape Strategy' states the following:

"Ensure that the management of development throughout the County will have regard for the value of the landscape, its character, distinctiveness and sensitivity as recognised in the Cork County Draft Landscape Strategy and its recommendations, in order to minimize the visual and environmental impact of development, particularly in areas designated as High Value Landscapes where higher development standards (layout, design, landscaping, materials used) will be required."

Landscape Views and Prospects

13.38 Section 14.9 of the current Cork CDP, 'Landscape Views and Prospects' includes objectives with regard to Views and Prospects and Scenic Routes.

13.39 CDP **Objective GI 14-12**: 'General Views and Prospects' states the following:

"Preserve the character of all important views and prospects, particularly sea views, river or lake views, views of unspoilt mountains, upland or coastal landscapes, views of historical or cultural significance (including buildings and townscapes) and views of natural beauty as recognized in the Draft Landscape Strategy."

13.40 There are no (distinctive) sea, river or lake views or views of unspoilt mountains, upland or coastal landscapes within the study area and these types of views as listed under Objective GI 14-12 will therefore not be considered further, as part of this LVIA.

13.41 CDP **Objective GI 14-13**: 'Scenic Routes' states the following:

"Protect the character of those views and prospects obtainable from scenic routes and in particular stretches of scenic routes that have very special views and prospects identified in this Plan. The scenic routes identified in this Plan are shown on the scenic amenity maps in the CDP Map Browser and are listed in Volume 2 Heritage and Amenity Chapter 5 Scenic Routes of this Plan"

13.42 CDP **Objective GI 14-14**: 'Development on Scenic Routes' states the following:

"a) Require those seeking to carry out development in the environs of a scenic route and/or an area with important views and prospects, to demonstrate that there will be no adverse obstruction or degradation of the views towards and from vulnerable landscape features. In such areas, the appropriateness of the design, site layout, and landscaping of the proposed development must be demonstrated along with mitigation measures to prevent significant alterations to the appearance or character of the area.

b) Encourage appropriate landscaping and screen planting of developments along scenic routes …."

13.43 None of the Scenic Routes listed in Volume 2 / Chapter 5 of the current Cork CDP are located within the study area and these will therefore not be considered further, as part of this LVIA.

RECEIVING ENVIRONMENT

Landscape Baseline

Existing Relevant Landscape Character Assessment

13.44 A Draft Landscape Strategy was prepared in 2007 for County Cork. This strategy identifies 76 landscape character areas (LCA), which were *"amalgamated into a set of 16 landscape character types based on similarities evident within the various areas. These landscape character types provide a more general categorization of the County's landscape"* (refer to section 14.8 of the Cork CDP 2022-2028).

13.45 The application area and the majority of the study area are located within landscape character type (LCT) 10b: Fissured Fertile Middleground (Rylane east to Waterford). A narrow strip along the northern edge of the study area is located within LCT 5: Fertile Pain with Moorland Ridge (Mallow-Mitchelstown-Fermoy). Due to its marginal presence within the study area, the latter will not be considered further.

13.46 The landscape description for LCT 10b: Fissured Fertile Middleground, in the 2007 Draft Landscape Strategy, includes the following:

"… This landscape type, as a middleground, has characteristics of both the flatter fertile farmland type (Fertile Plain with Moorland Ridge) and the higher marginal hilly or rugged type (Rolling Marginal and Forested Middleground). It comprises an area rising above adjacent plains with moderate to low relief of elongated interlocking hills forming sinuous rivers. It is an elevated landscape, which is sequentially fissured by these rivers and their valleys. ... Soils are mostly brown podzolics as well as some acid brown earths at lower altitudes. It is, thus, a reasonably fertile farming landscape comprising a mosaic of medium sized fields but also includes the occasional small marginal field. Hedgerows are typically broadleaf but this can include or be replaced by gorse higher up with punctuation given here and there by conifer shelterbelts. ... Given the elevation of the landscape and resulting exposure, most hedgerows are fairly low. Some of these broaden into swaths of coniferous plantation or merge with more extensive copses of broadleaf trees. These areas of woodland are located in all parts of the landscape. The small plantations that rise to hillcrests provide a characteristic feature along with drifts of gorse which thrive on the thinner soils.

The land is used predominantly for dairy cattle pasture as well as some arable production. Houses, farmsteads and sheds are spread across this landscape at most altitudes, though are least likely to be located on hilltops. Villages and hamlets nestle against hillsides, spreading up from valley bottoms and taking advantage of the shelter provided by the fissured topography. ...

In its continuous rising and falling, this is a somewhat restless landscape. The overall appearance is one of intensive farming. Agricultural practices and buildings are strong components as is the patchwork field pattern and occasional copses and woodland. The openness of this landscape type varies, as vistas are contained or opened depending on the configuration of landform and the viewing position."

13.47 LCT 10b was evaluated as being of medium landscape value, i.e. *"Landscapes with positive characters and with local or county importance."* LCT 10B has further been evaluated as being of county landscape importance and as having high landscape sensitivity, i.e. *"High sensitivity landscapes are vulnerable landscapes with the ability to accommodate limited development pressure. In this rank landscape quality is at a high level, landscape elements*

are highly sensitive to certain types of change. If pressure for development exceeds the landscape's limitations the character of the landscape may change."

Landscape of the Site and its Context

13.48 GLVIA3 recommends that a landscape character assessment should be carried out as part of the baseline study (paragraph 5.4). This should consider:

- The elements that make up the landscape (e.g., physical, land cover and the influence of human activity);
- Aesthetic and perceptual aspects (e.g., scale, complexity, openness, tranquillity or wildness); and
- The overall character of the area.

Landscape Elements

13.49 The application area, which is ca. 28.8ha in size, is located ca. 2.5km northeast of the village of Bweeng and ca. 7km southwest of the town of Mallow. It comprises the quarry void, processing area, including readymix concrete plant, stockpiling area, settlement ponds and related ancillary facilities / infrastructure, as well as parts of one agricultural field. It is proposed to extend the extraction activities into this field, which is located to the south of the quarry void.

13.50 The boundaries of the existing quarry development are marked by a mix of screening berms, scrubby hedgerows, secure fencing and/or lines of conifers which were planted for screening purposes. A tall overburden storage mound is located in the southwestern corner of the existing quarry. This is covered by naturally regenerated grasses and scrub, mainly gorse.

13.51 The proposed extension area covers less than the northern half of the affected agricultural field. The southern boundary of the extension area is open, as located near the centre of the existing field. The western and eastern boundaries of the extension area are marked by existing scrubby hedgerows, dominated by gorse, with some taller hawthorn bushes. The northern boundary is marked by a grassy bank at the eastern end, with the remainder a line of spruce interspersed with short sections of deciduous hedgerow. The extension site is separated from the existing quarry by a public local road.

13.52 The levels within the existing quarry development range from 156m above Ordnance Datum (AOD) in the northeastern corner of the site to 202m AOD on top of the overburden storage mound in the southwestern corner and to 130m AOD at the current low point within the quarry void. The ground levels within the storage and processing area range from 165-170m AOD, with some of the stockpiles reaching over 180m AOD. Levels along the western site boundary gently slope from 162m AOD in the north to 184m AOD in the south. Along the eastern boundary the level change is slightly larger, from 156m AOD in the north to 189m AOD in the south.

13.53 The proposed extension land appears almost flat, but there are gentle level changes from 184m AOD in the north-western corner to 188m AOD along the southern boundary and 190m AOD in the north-eastern corner. Similarly, the levels along the existing public road separating the existing quarry from the extension lands, change from 184m AOD at its western end 189m AOD at its eastern end.

13.54 Levels surrounding the application area are gently undulating, but ultimately falling from around 250m AOD, along the south-western edge of the study area (i.e. the eastern slopes of the Boggeragh Mountains) to levels just below 100m AOD, in the north-eastern corner of

the study area, along the valley of the River Lyre. There are a number of local highpoints, which provide topographical screening. This includes a hill with a summit at 259m AOD, 2km southwest of the site and immediately northeast of the village of Bweeng, as well as a highpoint of 233m AOD, 1km west of the site.

13.55 Several rivers and streams are present within the study area, mostly flowing from west to east, with some from south to north and merging with each other. The river valleys are mostly shallow with broad ridges separating them, which also provide topographical screening. This includes a ridge within 300m south of the site (north of the Glashaboy River), one just over 1km to the north (north of the Ahaneboy Stream) and one 2km to the east (east of the Shinagh Stream).

13.56 The majority of fields within the agricultural landscape of the study area are under pasture, with few tillage fields present as well. Fields typically have straight boundaries, unless adjoined by a watercourse. Smaller fields often have a regular rectangular shape, while larger fields are more irregularly shaped, with few boundaries at right angles to each other. Most fields are bound by gorse and/or bramble dominated hedgerows, with larger shrubs (e.g. hawthorn and elder) irregularly spaced out along them and some tall trees. In some locations hedgerows appear to have been replaced by post and wire fencing, creating visually larger fields.

13.57 There are several small blocks of coniferous plantations dotted around the study area, at various stages of maturity. Also, farmsteads within the area are typically surrounded by shelterbelts of coniferous and/or deciduous trees. To the southwest of the application area, long lines of conifers were planted along the local roads and adjoining fields, which are distinctly visible in local views. Overall, despite the generally low hedgerows, the landscape has a somewhat wooded appearance.

13.58 The R619 - Regional Road is the main transport corridor within the study area, traversing its western half in a north / south direction. At its closest point, it is located approximately 1.5km west of the site. There are no other Regional or National Roads within the study area, however a dense network of local roads provides access throughout the area, both following the rivers/streams and crossing over ridgelines. Bweeng is the largest settlement within the study area with one-off housing (including many farmsteads) common along all roads within the study area.

13.59 Human activity has strongly influenced the land use within the study area, in the form of agriculture and forestry and to a lesser degree the existing quarry development. On a smaller scale, human influences are visible in the form of roads and buildings, as well as wooden electricity poles. On the whole, while this is an attractive rural landscape, due to the abundance of pasture fields and associated hedgerows / shelterbelts, there are few locations from where no man-made structures are visible (i.e. mostly roads, buildings or electricity poles).

Aesthetic and Perceptual Aspects

13.60 The existing quarry development forms a large open area, with views out of the site towards the nearest ridgelines, resulting in a relatively large scale. There is, however, some enclosure from the screening berms and or quarry faces, in particular along the southern boundary and the southern section of the western and eastern boundary, as well as the stockpiles within the northern part of the site. The field within which the extension area is located is similarly open, with views towards the ridgeline to the south and some enclosure from the hedgerows surrounding the field.

13.61 While the landscape within the study area is rural, there is no sense of wildness or tranquillity, as this is clearly a man-made, working landscape. The local roads surrounding

the site are not busy (as noted during the field survey on a weekday morning/afternoon), however, movement and noises from cars regularly interrupt quiet periods.

13.62 The northern section of the application area is strongly influenced by the presence of the existing quarry. The extension area, which is visually separated from the pit, due to the existing screening berm and associated planting, has a more rural characteristic. Noise from the existing processing plant and machinery is audible across the site and in its immediate vicinity, including the extension area.

13.63 The existing quarry comprises a mix of textures, due to the different surfaces present (e.g. bare rock, stockpiles, areas of scrub). Its colour palette is dominated by shades of grey, interspersed with some greens, where vegetation is present. The surrounding pasture fields, including the proposed extension site, are much more uniform in colour and texture. However, the existing hedgerows, conifer plantations and shelterbelts provide some variability in colour and texture, which reduces the contrast between the quarry and the surrounding land.

Overall Character

13.64 The site assessment supports the inclusion of the application area and its immediate context within LCT 10b: Fissured Fertile Middleground, as set out in the 2007 Draft Landscape Strategy.

Protected Nature Conservation Sites

13.65 There is one Special Area of Conservation (SAC) within the study area, as listed below;

- Blackwater River (Cork/Waterford) SAC – Site code: 002170 – ca. 1.8km northeast of the application area.

Visual Baseline

Existing Visibility

13.66 The visibility of the application area was initially assessed by a desktop study of OSI Discovery Maps (1:50,000) and aerial/satellite photography, followed by verification in the field.

13.67 It was found that views of the application area, from publicly accessible locations are greatly restricted by a combination of roadside / intervening vegetation and the gently undulating topography within the study area. The application area is only visible in views from a number of locations along local roads, i.e. views from some locations along roads within 1km to the north and west and within 2km to the south.

13.68 Some residential properties in the vicinity of these roads with potential views of the existing quarry and proposed extension site were identified. However, the total number of properties with visibility is greatly reduced by mature vegetation along most property boundaries, as well as intervening vegetation and topography.

13.69 It is acknowledged that there is further visibility of the application area from the agricultural land surrounding the site, however considering this land is not publicly accessible, the number of visual receptors is very low (i.e. the landowners / farmers tending to the land) and this will therefore not be assessed separately.

13.70 Viewpoint photography was taken during the two field surveys from several locations throughout the study area. A total of six viewpoints were subsequently selected to represent

the range of available views, including some viewpoints illustrating how the site is screened by intervening vegetation / topography.

13.71 The location of the six viewpoints is illustrated on **Figure 13-1**. For each of the viewpoints, annotated panoramic images showing the existing view are provided (refer to **Viewpoints A-F** on **Figures 13-2 to 13-4**). The panoramas are made up from 5-7 individual photographic frames, which were merged together using Adobe Photoshop software. It should be noted that photography is a tool to assist in the visualisation process and cannot be expected to replicate the actual view that would be attained on the ground.

13.72 **Viewpoint A** represents views from the approximately 400m long section of the local road which separates the existing quarry from the extension site. The hedgerow along the eastern section of this road is low and allows open views into the field within which the proposed quarry extension will be located, as well as towards the highpoint and adjoining ridgeline to the northeast of Bweeng. The village is fully screened by this. Further west along this road roadside vegetation, including lines of tall spruce restrict views into the field. To the north of the road, the screening berm along the southern boundary of the existing quarry and associated vegetation are visible. This fully screens views into the quarry and wider landscape. There are no residential properties along this section of road.

13.73 **Viewpoint B** represents intermittent views along approximately 300m of the local road between 450-750m south of the site, as well as an adjoining private access road and associated properties. The hedgerow along the southern boundary of the field within which the proposed extension area will be located is visible along the skyline in views from this area, as it is located along the top of a broad ridgeline. The top of the tall overburden storage mound in the south-western corner of the existing quarry is visible above the hedgerow in some locations. The extension site itself, i.e. the agricultural field, is screened by the hedgerow and topography. Lines of tall trees are visible along the skyline to the west and east.

13.74 **Viewpoint C** represents intermittent views along a ca. 400m long elevated section of the local road within 600-800m to the west of the application area. Due to this elevation, views over the lower lying fields to the east open up in some locations, where not restricted by the roadside hedgerow. In any available views several layers of agricultural fields and associated hedgerows are visible in the foreground. The existing Bweeng Quarry is visible in the midground, with parts of the quarry faces and the stockpiles in the northern part of the site the most noticeable elements. However, existing vegetated screening berms and other boundary vegetation reduce the overall visibility and help the quarry merge with the surrounding landscape. Further undulating agricultural land and a distant elevated ridgeline are visible in the background. While there are a number of residential properties in between this road and the site, views from these are generally restricted by vegetation on the property boundaries.

13.75 **Viewpoint D** represents intermittent views from the local roads and nearby properties to the north and south of the Ahaneboy Stream, north of the application area. Roadside vegetation and topography restricts views in many locations along these roads, however, glimpsed views towards the existing quarry are available in some locations. Where this is the case agricultural land is visible in the foreground and the existing quarry in the background. Within the quarry the existing stockpiles are visible to the front, with the existing northern quarry face at the back, below the existing screening berms and associated vegetation. Views into the wider landscape are not available, as the southern boundary of the quarry is located close to a ridgeline.

13.76 **Viewpoint E** represents intermittent views from the local road in the townland of Glashaboy West, between 1.5-2km south of the site, parts of which are elevated, as well as a number of nearby properties. Views over the lower lying fields to the north open up in some

locations, where not restricted by the roadside hedgerow. In any available views several layers of agricultural fields and associated hedgerows, as well as a small conifer plantation are visible in the foreground. The hedgerow along the southern boundary of the field within which the proposed extension area will be located is distantly visible in the midground, along the top of a broad ridgeline. The top of the tall overburden storage mound in the south-western corner of the existing quarry is visible above this hedgerow. The extension site itself, i.e. the agricultural field, is screened by the hedgerow and topography. Lines of tall trees are visible along the ridgeline to the west and east. Distant elevated ridgelines are visible in the background in a northern and north-eastern direction.

13.77 **Viewpoint F** illustrates how the existing quarry and proposed extension site are screened by intervening vegetation and the undulating topography, in the majority of locations within the study area, including this location along the R619, approximately 2km southwest of the site.

Outdoor Recreational Facilities within the Study Area

13.78 The Blackwater Way / Avondhu Way passes along the local road separating the existing quarry development from the extension site. It continues along local roads in a western and eastern direction for about 2 km, before turning south at both ends. To the west the walking route enters Bweeng where it changes back into a more westerly direction towards the Boggeragh Mountains. To the east it soon changes back to a more northerly direction following the Clyda River.

13.79 A section of rock, known locally as Cleena's Rock, was retained along the southern boundary of the existing quarry and public access is provided to it from the adjoining local road.

13.80 There are no known other outdoor recreational facilities, such as long-distance walking routes, located within the study area.

Sensitive Receptors

Landscape Receptors

13.81 The landscape receptors, potentially affected by the proposed development and therefore considered as part of the assessment of landscape effects, are:

- Individual elements:
  - Approximately half of one agricultural field under pasture (ca. 4.7ha); and
  - Lines of trees / hedgerows along the northern boundary of the extension site and scrub areas along the southern boundary of the existing quarry.
- Overall character:
  - Undulating agricultural land (part of LCT 10b: Fissured Fertile Middleground).

13.82 There are no prominent aesthetic or perceptual aspects within or in the vicinity of the site. Therefore, none were identified as sensitive landscape receptors.

Visual Receptors

13.83 The visual receptors, potentially affected by the proposed development and therefore considered as part of the assessment of visual effects, are:

- Residents:
  - Ca. six residential properties between 450-750m south of the site (represented by **Viewpoint B** on **Figure 13-2**);
  - Ca. seven residential properties within 800m to the west of the site (represented by **Viewpoint C** on **Figure 13-3**);
  - Ca. eight residential properties within 2km to the north of the site (represented by **Viewpoint D** on **Figure 13-3**); and
  - Ca. five residential properties along the local roads between 1.5-2km south of the site (represented by **Viewpoint E** on **Figure 13-4**).
- Recreational users:
  - Users of the Blackwater Way, in the vicinity of the application area, as well as visitors to Cleena's Rock (represented by **Viewpoint A** on **Figure 13-2**);
- Vehicle users:
  - Along a ca. 400m of the local road crossing the application area (represented by **Viewpoint A** on **Figure 13-2**);
  - Intermittently along a ca. 300m section of the local road between 450-750m south of the site and along an adjoining private access road (represented by **Viewpoint B** on **Figure 13-2**);
  - Intermittently along a ca. 400m long section of the local road within 600-800m to the west of the site (represented by **Viewpoint C** on **Figure 13-3**);
  - Glimpsed views from a number of locations along the local roads within 2km to the north of the site (represented by **Viewpoint D** on **Figure 13-3**); and
  - Glimpsed views from a number of locations along the local road in the townland of Glashaboy West between 1.5-2km south of the site (represented by **Viewpoint E** on **Figure 13-4**).

IMPACT ASSESSMENT

13.84 This section sets out the effects that the proposed development would have on both landscape and visual receptors (as identified in the previous section), during the operational stage of the quarry development, including the restoration activities, as well as during the post-operational stage, when all extraction / restoration works are completed. It is based on the detailed project description and layout drawings contained in **chapter 2** of this EIAR.

Aspects of the Development which Have the Potential to Cause Landscape and Visual Effects

Operational Stage

13.85 The operational stage of the proposed development, for the purpose of this assessment, is considered to include the extraction and restoration works, i.e. a 22 year period.

13.86 The following elements of the proposed development, at the operational stage, are those which are most likely to result in landscape & visual effects:

- Stripping of soil and overburden from the proposed extension area and associated construction of screening berms along its western, southern and eastern boundaries;
- Realignment of the existing local road to the south around the proposed extension area and associated realignment of the Blackwater Way;
- Removal of a section of the screening berm along the southern boundary of the existing quarry, as well as the associated scrub vegetation and lines of spruce (ca. 3,300m^2 in total).
- Removal of a total of 260m of hedgerows / treelines along the northern boundary of the extension area and at the junction of the realigned road with the existing local road to the east of the site.
- Planting and establishment of native hedges along the bottom of the proposed screening berms surrounding the quarry extension area, as well as a section of the southern boundary of the site (ca. 800m in total).
- Planting and establishment of native woodland planting along the western and part of the southern boundary of the extension area, as well as in its north-eastern corner (ca. 2,800m^2 in total).
- Changes to the landform, due to the proposed extraction works, resulting in a larger quarry void, with associated benched quarry faces.
- The restoration of the site to a natural habitat afteruse. The quarry void will naturally flood with water, resulting in a large wetland habitat. All surrounding areas, which are not already vegetated, will be cleared, levelled and left for natural regeneration.

13.87 It should be noted that no additional lighting over and above what is already in place within the existing quarry development will be installed. All lighting will continue to only be in use for wintertime operations, when darkness has fallen. It is proposed to continue to operate at the quarry between 07:00 hours and 18:00 hours Monday to Friday, and on Saturday, from 07:00 hours to 14:00 hours, unless in exceptional circumstances, otherwise agreed with the Planning Authority, in line with condition 8 of Quarry Registration Ref. QR073 (ABP Ref. 04.QC.2156). There would therefore continue to be a period where such lighting would be required for up to 2 hours in the morning and 2 hours in the evening during the height of

winter. Night-time light pollution caused by the proposed development would continue to be of brief duration during winter months and is not considered significant.

Post-Operational Stage

13.88 The post-operational stage of the proposed development, for the purpose of this assessment, is the period following the completion of all extraction and restoration works.

13.89 The following elements of the proposed development, at the post-operational stage, are those which are most likely to result in landscape & visual effects:

- The upper quarry faces, which would remain visible in a number of views;
- The lake which will form within the quarry void; and
- The processing / stockpiling area, which will take a number of years to become fully colonised with locally occurring grass and scrub species.

Operational Stage Landscape Effects

Landscape Sensitivity

13.90 In accordance with GLVIA3, the sensitivity of landscape receptors is determined by combining their value with their susceptibility to the type of development proposed.

13.91 In determining the value of landscapes, GLVIA3 recommends that the starting point should be to consider landscape-related designations. In this context it is important to note that no part of the application area or its immediate context is included within a statutory landscape designation.

13.92 GLVIA3 states that the value of undesignated sites should also be considered. Table 1 of Landscape Institute Technical Guidance Note 2/21 supersedes Box 5.1 of GLVIA3 and provides a helpful guide for assessing these sites. A full assessment against a list of factors set out in the Technical Guidance Note is included in **Table 13-1**, below.

Table 13-1: Evaluation of the Value of the Site and its Immediate Context

Factor	Assessment	Notes
Natural Heritage	COMMUNITY	The site is not designated for ecological reasons but contains and is surrounded by a mix of hedgerows, treelines and scrub areas which are of some local habitat value
Cultural Heritage	COMMUNITY	The extension site contains no designated heritage assets. Two such assets were recorded within the existing quarry, both along the western boundary, i.e. a souterrain (RMP CO041-106002) and a fulacht fia (CO041-105----). There are a several further monuments within 1km surrounding the site, including several ringforts and a standing stone.
Landscape Condition	COMMUNITY	The agricultural landscape surrounding the application area is in a good condition with well-tended fields. The existing quarry forms an incongruous element in this landscape, which is however experienced in few locations, due to the screening from topography and vegetation.

Associations	LOW	No known associations with art, literature or events.
Distinctiveness	LOW	The application area and surrounding land comprise a common Irish undulating agricultural landscape. There are no rare or unusual features conferring a strong sense of place.
Recreational	COMMUNITY	While the Blackwater Way currently passes through the application area (along the public road), the existing quarry and extension lands are not publicly accessible and there is no formal recreational access to the land immediately surrounding it.
Perceptual (Scenic)	COMMUNITY	The agricultural nature of the extension area and surrounding undulating agricultural landscape may be appreciated by local residents and vehicle users in the vicinity of the application area. However, there are no memorable or distinctive landmarks / views within the site or in the surrounding land.
Perceptual (Wilderness and tranquillity)	COMMUNITY	The site and immediate surrounding area have no strong perceptual value, such as remoteness or wildness. While there is tranquillity in some parts of the study area, this is diminished in the vicinity of the existing quarry and at times along the local roads.
Functional	COMMUNITY	The hedgerows/treelines/scrub areas within and surrounding the site have a function as a carbon sink (on a local scale) and provide habitat linkage.

13.93 Using the factors set out in **Table 13-1**, it has been concluded that the site and its immediate context is of mostly community value, in particular regarding the rural agricultural nature of the landscape and existing vegetation within the site. No aspects were identified that would support the elevation of the value of the local landscape above the community level.

13.94 The susceptibility of each of the landscape receptors is assessed in **Table 13-2**. This is combined with the previously assessed value and a judgement of the overall sensitivity provided as well.

Table 13-2: Sensitivity of Landscape Receptors

Landscape Receptors	Value	Susceptibility	Overall Sensitivity
Individual Elements			
Pasture field	**COMMUNITY**	**HIGH** The susceptibility of the affected section of the pasture field is high, as it would be removed.	**MEDIUM**
Lines of trees / hedgerow / scrub	**COMMUNITY**	**HIGH** The susceptibility of the affected sections of hedgerows / treelines / scrub areas to the proposed works is high, as they would be removed.	**MEDIUM**
Overall Character			

LCT10b	**COMMUNITY** (LCT 10b assigned medium landscape value at county level)	**MEDIUM** LCT 10b is considered as having *"the ability to accommodate limited development pressure"* in the Draft Landscape Strategy of County Cork. The proposed development comprises an extension to an existing quarry, affecting half of an adjoining agricultural field, with all vegetation along the external site boundaries retained. It is therefore considered that the susceptibility is locally reduced.	**LOW**

Magnitude of Landscape Change

13.95 **Table 13-3** describes the size and scale, geographical extent and duration/reversibility of the landscape effects for each landscape receptor, all of which contribute to the assessment of the magnitude of these effects.

Table 13-3: Magnitude of Landscape Change

Landscape Receptors	Factors	Magnitude of Change
Individual Elements		
Pasture field	Size & Scale: **NEGLIGIBLE** Geographical Extent: **SMALL** Duration / Reversibility: **LONG-TERM – REVERSIBLE** **Notes:** The proposed development would result in the loss of half of one agricultural field. This is a negligible proportion of the vast expanse of agricultural fields in the surrounding landscape and the change would be focused on the site itself. While the landform changes will remain and the agricultural land-use would not be restored, the proposed restoration to a natural habitat, including the retention of all existing vegetation, could be seen as a partial reversal of the removal of the existing grass vegetation.	**SLIGHT**
Lines of trees / hedgerow / scrub	Size & Scale: **SMALL** Geographical Extent: **SMALL** Duration / Reversibility: **LONG-TERM – REVERSIBLE** **Notes:** The proposed development would result in the loss of ca. 260m of hedgerows / treelines and 3,300m^2 of scrub, which also contains some rows of spruce. This is a small proportion of the hedgerows/ treelines/ scrub vegetation to be retained within the application area and along its boundaries. Considering these types of elements are abundant in the surrounding landscape, the composition/balance of the landscape would not be significantly changed. The loss would influence the landscape at a local level only, i.e. the site and area immediately surrounding it. Native hedge (800m) and woodland planting (2,800m^2) along the extension site boundaries and realigned road will be carried out on commencement of the development, reversing some of the effects, as it matures.	**SLIGHT/ MEDIUM**
Overall Character		

LCT10b	Size & Scale: **SMALL** Geographical Extent: **SMALL** Duration / Reversibility: **LONG -TERM – REVERSIBLE** **Notes:** The proposed development would not result in the introduction of new elements into the landscape, but would form an extension of the existing quarry. The overall composition / balance of the landscape would not be significantly changed. The changes would only influence the landscape at a local level, i.e. the site and area immediately surrounding it. Native hedge and woodland planting along the extension site boundaries and realigned road will be carried out on commencement of the development, reversing some of the effects, as it matures.	**SLIGHT/ MEDIUM**

Assessment of Landscape Effects and Significance

13.96 An assessment of the landscape effects during the operational phase, based on the sensitivity of each of the landscape receptors combined with the magnitude of change experienced by each of them, are provided in Table 13-4 below. The assessment also includes a judgment of the nature of the effect (i.e. negative/positive/neutral).

Table 13-4: Assessment of Landscape Effects

Landscape Receptors	Sensitivity	Magnitude	Landscape Effects	Nature of Effect
Individual Elements				
Pasture field	MEDIUM	SLIGHT	MINOR	Negative
Lines of trees / hedgerow / scrub	MEDIUM	SLIGHT/ MEDIUM	MODERATE/MINOR	Negative
Overall Character				
LCT10b	LOW	SLIGHT/ MEDIUM	MINOR	Negative

13.97 Even though the landscape effects are assessed as negative, none of these are considered significant, due to the moderate-minor or lower level of the effects. In other words, the changes, due to the project, will have a negative effect on the current state of the landscape, as they will result in the removal of vegetation and a landuse change (and can therefore not be classed as neutral). However, the levels of these effects are at the lower end of the spectrum, either due to the low sensitivity of the landscape receptors or the low magnitude of the effects, or both, which is why they are not considered significant.

Post – Operational Stage Landscape Effects

13.98 At the post-operational stage, the quarry development would integrate more and more with the surrounding landscape, for the following reasons:

- the site would continue to be enclosed by the existing boundary vegetation, as well as the proposed hedge and woodland planting surrounding the extension site, which will have matured at this stage;
- the quarry void will continue to fill with water, forming a wetland habitat, and
- locally occurring grass and scrub species would continue to colonise those areas of the quarry (i.e. the processing and stockpiling area and quarry benches above the water level) left for natural regeneration.

13.99 As a result of all of the above, the effects on all landscape receptors would reduce to **NEGLIGIBLE** (negative, becoming neutral over time).

Operational Stage Visual Effects

Visual Receptor Sensitivity

13.100 The value placed on each of the types of visual receptors identified above is described in **Table 13-5** below. Also, the susceptibility to change of each of the receptor types (as per the LVIA Methodology in **Appendix 13-A**) is described and a judgement of the overall sensitivity made.

Table 13-5: Sensitivity of Visual Receptors

Visual Receptors	Value	Susceptibility	Overall Sensitivity
Residents			
All residential receptors identified.	LOW (No designated or locally promoted views)	HIGH (Susceptible to changes in views, particularly from gardens and living rooms)	MEDIUM
Recreational Users			
Users of the Blackwater Way and visitors to the Cleena's Rock.	LOW (While located along a public walking route, there are no important / highly scenic views along the affected section)	HIGH (Attention generally focused on landscape)	MEDIUM
Vehicle Users			
All vehicle users identified.	LOW (No designated or locally promoted views)	LOW (Unlikely to be focused on views)	LOW

Magnitude of Visual Change

13.101 **Table 13-6** describes the size & scale, geographical extent and duration/reversibility of the visual effects for each visual receptor, all of which contribute to the assessment of the magnitude of these effects.

Table 13-6: Magnitude of Visual Change

Visual Receptors	Factors	Magnitude of Change
Recreational and Vehicle Users		
Along ca. 400m of the local road crossing the application area (including users of Blackwater Way and visitors to Cleena's Rock) (**Viewpoint A**)	Size & Scale: **LARGE** Geographical Extent: **SMALL** Duration / Reversibility: **LONG-TERM – REVERSIBLE** **Notes:** Please note that the majority of the affected section of public road will be closed and therefore views will no longer be available to visual receptors. Views from the realigned section of the road will be similar to the views along the existing road. i.e. the new road will be lined by sections of native hedgerows / woodland and glimpsed views will be available over agricultural land in a northern direction. To the south of the realigned road, views will be restricted by the proposed screening berms and associated planting. Views from the eastern end of the road, i.e. from Viewpoint A will still be available, due to the retention of the public access to Cleena's Rock. Here the view will be completely changed by the installation of secure fencing along the outline of the proposed extraction area and by woodland planting being carried out in the remaining section of the field beside the road. The trees along the road, currently visible in this view, will be removed. Views into the extraction area will be available through the fence but will be partially screened by the woodland planting, as it matures. This planting will also eventually block views towards the ridgeline to the north. The remaining views will only be available from a very short section of this road (i.e. approximately the final 50m before the dead end) and will be experienced by a very small number of people (i.e. the visitors to Cleena's Rock, who's views are unlikely to be focused along the road). The changes to the views will be visible for the duration of the operational stage. The proposed woodland planting in the adjoining field could be seen as a partial reversal of the loss of trees visible in this view.	**MEDIUM**
Residents and Vehicle Users		
Along local road and from ca. six properties between 450-750m south of the site (**Viewpoint B**)	Size & Scale: **NEGLIGIBLE** Geographical Extent: **SMALL** Duration / Reversibility: **LONG-TERM – REVERSIBLE** **Notes:** The only changes visible in views from this road and adjoining properties will be the native hedge / woodland planting which will become visible above the hedgerow in the background of views, as it matures. Depending on the exact viewing location the tops of the proposed screening berms may also become temporarily visible, before being screened by the maturing vegetation. The additional vegetation will merge with the taller treelines to the east and west and the change will therefore be barely noticeable. The proposed extraction works will be fully screened at all times.	**SLIGHT**

Visual Receptors	Factors	Magnitude of Change
	The views would be experienced by the residents of a limited number of properties, which typically have tall vegetation along their boundaries, reducing the number of available views, as well as intermittently from limited sections of road. The changes within the site would be visible for the duration of the operational stage	
Along local road and from ca. seven residential properties within 800m to the west of the site (**Viewpoint C**)	Size & Scale: **SMALL** Geographical Extent: **SMALL** Duration / Reversibility: **LONG-TERM – REVERSIBLE** **Notes:** The only changes visible in views from this road and nearby properties will be the removal of some trees along the southern boundary of the existing quarry and glimpsed views of the overburden stripping and construction of screening berms within the extension site. The majority of the works to facilitate the access from the existing quarry into the extension site will be screened by the existing vegetated overburden storage mound in the south-western corner of the quarry and existing vegetation along the western boundary of the extension site. The rock extraction works will be mostly at a low level and therefore screened by topography and vegetation. The visibility of the existing processing and stockpiling area will remain unchanged. While the quarry extension will result in a slightly wider area being occupied by the quarry development, this change will occupy a narrow band in the midground of the available views and will therefore only partially alter the composition of the available views. The views would be experienced by the residents of a limited number of properties, which typically have tall vegetation along their boundaries, reducing the number of available views, as well as intermittently from a limited section of road. The changes within the site would be visible for the duration of the operational stage. The proposed hedgerow / woodland planting along the western boundary of the extension site will become visible in this view. Also, the restoration of the quarry area and processing/stockpiling area to a natural habitat will reduce the visibility of the site within views, resulting in a partial reversal of visual effects, due to the development.	**MEDIUM - SLIGHT**
Along local roads and from ca. eight residential properties within 2km to the north of the site (**Viewpoint D**)	Size & Scale: **SMALL** Geographical Extent: **SMALL** Duration / Reversibility: **LONG-TERM – REVERSIBLE** **Notes:** The only changes visible in views from these roads and nearby properties will be the removal of some trees along the southern boundary of the existing quarry, the removal of underlying overburden and the upper layers of rock. This will result in the visible quarry face being pushed back in the available views. Once the rock extraction moves to a lower level it will be screened by topography. The screening berms surrounding the extension site and associated planting, once it reaches over the berms, may become visible in the background, forming the new skyline. The visibility of the existing processing and stockpiling area will remain unchanged.	**MEDIUM-SLIGHT**

Visual Receptors	Factors	Magnitude of Change
	While the skyline will change slightly, overall the changes will be contained within the existing visible quarry area and therefore the composition of the available views will only be partially altered. The views would be experienced by the residents of a limited number of properties, which typically have tall vegetation along their boundaries, reducing the number of available views, as well as intermittently from limited sections of road. The changes within the site would be visible for the duration of the operational stage. The restoration of the quarry area and processing/stockpiling area to a natural habitat, as well as the proposed planting in the background, will reduce the visibility of the site within views, resulting in a partial reversal of visual effects, due to the development.	
Along local road and from ca. five residential properties between 1.5-2km south of the site (**Viewpoint E**)	Size & Scale: **NEGLIGIBLE** Geographical Extent: **SMALL** Duration / Reversibility: **LONG-TERM – REVERSIBLE** **Notes:** The main change visible in views from this road and adjoining properties will be the reduction in height of part of the screening berm along the southern boundary of the existing quarry and associated removal of vegetation. In addition the native hedge / woodland planting which will become visible in the background of views, as it matures, although this will be hardly visible at this distance. Depending on the exact viewing location the tops of the proposed screening berms may also become temporarily visible, before being screened by the maturing vegetation. The additional vegetation will merge with the taller treelines to the east and west and the overall changes will therefore be barely noticeable. The proposed extraction works will be fully screened. The views would be experienced by the residents of a limited number of properties, which typically have tall vegetation along their boundaries, reducing the number of available views, as well as intermittently from a limited section of road. The changes within the site would be visible for the duration of the operational stage. The proposed hedge / woodland planting surrounding the extension area could be seen as a partial reversal of the loss of trees visible in this view.	**SLIGHT**

Assessment of Visual Effects and Significance

13.102 An assessment of the visual effects during the operational phase, based on the sensitivity of each of the visual receptors combined with the magnitude of change experienced by each of them, are provided in **Table 13-7** below. The assessment also includes a judgment of the nature of the effect (i.e. negative/positive/neutral).

Table 13-7: Magnitude of Visual Change

Visual Receptor	Sensitivity	Magnitude	Visual Effects	Nature of Effect
Residents				
Ca. six properties between 450-750m south of the site (**Viewpoint B**)	MEDIUM	SLIGHT	MINOR	Neutral
Ca. seven residential properties within 800m to the west of the site (**Viewpoint C**)	MEDIUM	MEDIUM-SLIGHT	MODERATE-MINOR	Negative
Ca. eight residential properties within 2km to the north of the site (**Viewpoint D**)	MEDIUM	MEDIUM-SLIGHT	MODERATE-MINOR	Negative
Ca. five residential properties between 1.5-2km south of the site (**Viewpoint E**)	MEDIUM	SLIGHT	MINOR	Negative
Recreational Users				
Users of the Blackwater Way and visitors to Cleena's Rock along the local road crossing the application area (**Viewpoint A**)	MEDIUM	MEDIUM	MODERATE	Negative
Vehicle Users				
Along ca. 400m of the local road crossing the application area (**Viewpoint A**)	LOW	MEDIUM	MINOR	Negative
Along the local road between 450-750m south of the site (**Viewpoint B**)	LOW	SLIGHT	MINOR / NEGLIGIBLE	Neutral
Along the local road within 600-800m to the west of the site (**Viewpoint C**)	LOW	MEDIUM-SLIGHT	MINOR	Negative
Along the local roads within 2km to the north of the site (**Viewpoint D**)	LOW	MEDIUM-SLIGHT	MINOR	Negative
Along the local road between 1.5-2km south of the site (**Viewpoint E**)	LOW	SLIGHT	MINOR / NEGLIGIBLE	Negative

13.103 Even though most of the visual effects are assessed as negative, none of these are considered significant, due to the moderate or lower level of the effects. In other words, the changes, due to the project, will become visible in some views and will be negative in nature, as they consist of existing vegetation being removed from and/or quarry related elements included in the existing views and therefore cannot be classed as neutral. However, the levels of these effects are at the medium to lower end of the spectrum, either due to the low

sensitivity of the visual receptors or the low magnitude of the effects, or both, which is why they are not considered significant.

Post – Operational Stage Visual Effects

13.104 At the post-operational stage, much of the site will have been restored to a natural habitat, with all existing vegetation having been retained and the processing and stockpiling areas cleared and left for natural regeneration. The quarry void will continue to flood with water, although this may not be visible in any views, due to the screening from topography and vegetation. In the small number of available views the site would more and more blend with the surrounding land as the vegetation within the site and along the site boundaries continues to mature. As a result, the effects on all visual receptors would reduce to **MINOR-NEGLIGIBLE** and would become neutral.

Direct/Indirect Effects

13.105 All landscape and visual effects described above are direct effects. The proposed development is not considered to have indirect effects in landscape and visual terms, i.e. the proposed development is unlikely to cause consequential changes to the surrounding landscape character areas or to existing views of the landscape surrounding the application area.

Compliance with relevant Planning Policies

Mineral Extraction

13.106 The above assessment demonstrates that the landscape and visual effects, due to the proposed development will be moderate/minor or minor for the identified landscape receptors and moderate or less for the visual receptors. This is due to the fact that the proposed development would be largely screened by intervening vegetation and topography and therefore visible from a very small area only. Also, the proposed native hedge and woodland planting, would help further screen the site.

13.107 It is therefore considered that the rural, scenic and residential amenities of the local area are protected and that the proposed development would be in compliance with **Objective EC 8-16** contained in the current Cork CDP.

Green Infrastructure and Development

13.108 A Landscape and Restoration Plan was prepared for the proposed development and can be found in **Chapter 2** of this EIAR (refer to **Figure 2-5**). This contains information on the existing vegetation/habitats to be retained on the site and the proposed restoration of the site to a natural habitat. If further contains information on proposed native hedge and woodland planting along the boundaries of the proposed extension areas, which would compensate the loss of some sections of existing hedgerows / treelines and scrub areas, as well as increase the biodiversity levels on site and provide additional habitat linkage.

13.109 It is considered that the Landscape and Restoration Plan meets the requirements of and therefore would be in compliance with **Objective GI 14-3** contained in the current Cork CDP.

Landscape Character Assessment of County Cork

13.110 The above landscape and visual impact assessment had regard to the Cork County Draft Landscape Strategy and has concluded that the landscape and visual effects, due to the proposed development on the whole would be moderate or less and not significant. No prominent skylines or ridgelines would be affected by the proposed development. While some sections of existing hedgerows / treelines and scrub vegetation would have to be removed to facilitate the development, the majority of the existing hedgerow / scrub / woodland vegetation within the site would be retained. Also, the loss would be compensated by the planting of a new native hedge and woodland along the boundaries of the extension area.

13.111 In light of the above, it is considered that the proposed development is in compliance with **Objective GI 14-9** and **Objective GI 14-10** contained in the current Cork CDP.

Unplanned Events (i.e. Accidents)

13.112 It is highly unlikely that any unplanned events within the application area would result in significant landscape or visual impact.

Cumulative / Synergistic Impacts

13.113 There is no intervisibility between the existing quarry and other quarries in the wider landscape. Also, considering the proximity to the existing quarry and partial screening of the extension area in all views, cumulative landscape or visual impacts with any other existing developments or developments currently in the planning process are highly unlikely.

Transboundary Impacts

13.114 The proposed application area is not located in the vicinity of a national boundary. Therefore, transboundary landscape or visual impacts would not arise.

Interaction with Other Impacts

13.115 There are no known interactions with other impacts.

'Do-nothing Scenario'

13.116 If the proposed development is not carried out, the existing quarry would continue to be worked in line with the existing planning application and ultimately restored to a natural habitat, similar to what is proposed, as part of this planning application.

13.117 Therefore, there would be little difference with regard to the landscape or visual effects between the 'Do-nothing Scenario' and what is currently proposed, except for the timeframe within which the site would be restored and that a slightly smaller area would be affected.

MITIGATION MEASURES

Operational Stage

13.118 The location within/close to an existing quarry, as well as the substantial screening provided by topography and vegetation along the site boundaries and in the wider landscape, are the main mitigating factor minimising the landscape and visual impacts associated with the proposed development. It is proposed to retain all vegetation along the outer site boundaries.

13.119 This combined with the landscape and restoration proposals, including hedge and woodland planting along the boundaries of the extension area and the restoration of the site to a natural habitat will help the integration of the site into the local landscape and reduce its visibility. No additional landscape or visual mitigation measures are therefore considered necessary during the operational stage. Please refer **to Figure 2-5**, the Landscape and Restoration Plan, provided in **Chapter 2** of this EIAR, for the landscape/restoration proposals

Post – Operational Stage

13.120 During the post-operational stage, the boundary vegetation, all of which would be retained, would continue to provide substantial screening. Also, the processing and stockpiling areas would continue to be colonised by locally occurring grass and scrub species, helping them blend in with the surrounding land. The site would more and more merge with the surrounding landscape. Additional landscape or visual mitigation measures at the post-operational stage are therefore not considered necessary.

RESIDUAL IMPACT ASSESSMENT

Operational Stage

13.121 As no additional mitigation measures are required during the operational stage, the residual levels of landscape and visual effects would be as per the assessment above. In summary, the assessment has found that the proposed development would have moderate/minor or minor landscape effects on the identified sensitive receptors, during the operational stage (i.e. levels of impact not considered to be significant).

13.122 The visual effects on views would range from none for the vast majority of locations within the study area, to moderate or less for a small number of locations within 1km to the north and west and within 2km to the south of the application area (i.e. impacts not regarded as significant).

Post – Operational Stage

13.123 As no additional mitigation measures are required during the post-operational stage, the residual landscape and visual effects would be as per the assessment above. In summary,

on completion of all restoration works the predicted landscape effects would reduce to negligible and the visual effects to minor/negligible.

MONITORING

13.124 Apart from the proposed 2-year aftercare period, as part of the Restoration Proposals (refer to **EIAR Figure 2-5**), to ensure the successful establishment of the native hedge and woodland planting, there are no monitoring requirements, arising from this landscape and visual assessment.

REFERNCES

Environmental Protection Agency (May 2022) Guidelines on the Information to be contained in Environmental Impact Assessment Reports, EPA Ireland

European Commission (2017) Environmental Impact Assessment of Projects, Guidance on the preparation of the Environmental Impact Assessment Report

The Landscape Institute with the Institute of Environmental Management and Assessment (2013) Guidelines for Landscape and Visual Impact Assessment, Third Edition, Routledge

The Landscape Institute (2019) Technical Guidance Note 06/19: Visual Representation of Development Proposals, Landscape Institute

The Landscape Institute (2021) Technical Guidance Note 02/21: Assessing landscape value outside national designations, Landscape Institute

FIGURES

Figure 13-1
Landscape Baseline and Viewpoint Locations

Figure 13-2
Viewpoints A & B

Figure 13-3
Viewpoints C & D

Figure 13-4
Viewpoints E & F

N

LCT 5

LCT 10b

R619

N20

Proposed Realigned Road

A

B

C

D

E

F

1 km

2 km

3 km

4 km

0 500 1000 1500 2000 2500m

Scale 1:25,000

Notes:

1. Extract from Ordnance Survey Ireland Map **No. 80**

Legend:

- Landholding boundary
- Application area
- Viewpoint locations
- Distance from the application area
- Areas / sections of road with similar views of the application area to that of the sample viewpoint(s) within the area

Landscape Designations:

- LCT 5 — Landscape character types

Outdoor Recreational Facilities:

- Blackwater Way

Protected Sites:
(Refer to http://webgis.npws.ie/npwsviewer/)

- Special Area of Conservation (SAC)

Rev	Amendments	Date	By	Chk	Auth

SLR

www.slrconsulting.com

Client: Breedon Ireland

Project: Bweeng Quarry, Mallow, Co. Cork

Figure Title: Landscape Baseline & Viewpoint Locations

Scale		SLR Project No.
1:25,000	@ A3	00584.00023.0

Designed	Drawn	Checked	Authorised
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Date: 11/23	Date: 11/23	Date: 12/23	Date: 12/23

Figure Number: **Figure 13-1** Rev.

08/01/2024

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Viewpoint A: Local Road along southern boundary of the existing Bweeng Quarry

Grid Coordinates (ITM): **552570:590225** Approximate Elevation: **190m AOD** Distance from planning application boundary: **0m** Direction of View: **Southwest** Date/time of photograph: **20/11/2023 @ 15:25**

Description: This is a view into the field within which the proposed quarry extension will be located, from the local road south of the existing quarry. Part of this road, as well as the trees/hedgerows along its boundaries will need to be removed to facilitate the connection between the existing quarry void and the extension area. The existing road will therefore be blocked in the location indicated above and realigned around the extension area. Views into the extraction area from this viewpoint will be screened by a block of woodland planting behind the existing low hedgerow along this section of the road. A proposed fence will secure the site, tying in with the existing fence to the north of this road. There are no residential properties in the vicinity of this viewpoint. Note: The Blackwater Way currently follows this local road, but would be re-routed along the realigned road, thereby moving the users of this long-distance walking route (= visual receptors) along the new road. Views of the quarry works would be fully screened by the proposed screening berms and the new road framed by proposed hedgerow and woodland planting. Public access to what is known as Cleena's Rock is available immediately beside this viewpoint. Local access to this site will be maintained.

Viewpoint B: Local Road, approximately 1km south of the entrance to the existing Bweeng Quarry

Grid Coordinates (ITM): **552620:589510** Approximate Elevation: **185m AOD** Distance from planning application boundary: **500m** Direction of View: **Northwest** Date/time of photograph: **20/11/2023 @ 15:35**

Description: This viewpoint illustrates that the extension site is screened by intervening topography and vegetation in views from the local road which runs from the south-eastern corner of the existing quarry in a southern direction. The top of the existing overburden storage mound in the south-western corner of the existing quarry is visible in some views from this direction. Similarly, the top of the proposed screening berm along the southern boundary of the extension area may become visible above the hedgerow at the centre of this view. However, since the extension area is set back half way into the field behind this hedgerow, the berm, which will be grass seeded, will be barely noticeable, if at all visible. None of the proposed extraction works or the construction of the realigned local road will be visible from this viewpoint or in views from this road in general, except for at the junction between this and the realigned road. Views from any residential properties along this road will be similarly screened.

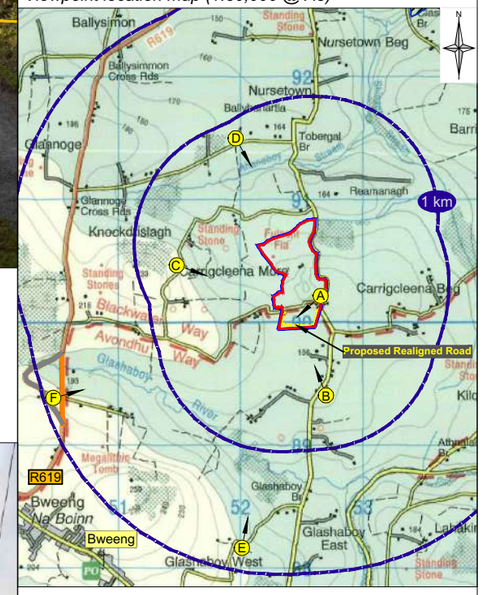
Notes:

1. Extract from Ordnance Survey Ireland Map **No. 80**

Legend:

- Landholding boundary
- Application area
- Viewpoint locations
- Distance from the application area

Viewpoint location map (1:50,000 @ A3)



Rev	Amendments	Date	By	Chk	Auth

SLR

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Client: Breedon Ireland

Project: Bweeng Quarry, Mallow, Co. Cork

Figure Title: Viewpoints A & B

Scale	SLR Project No.
NTS @ A3	00584.00023.0

Designed	Drawn	Checked	Authorised
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Date: 11/23	Date: 11/23	Date: 12/23	Date: 12/23

Figure Number: **Figure 13-2** Rev.

08/01/2024

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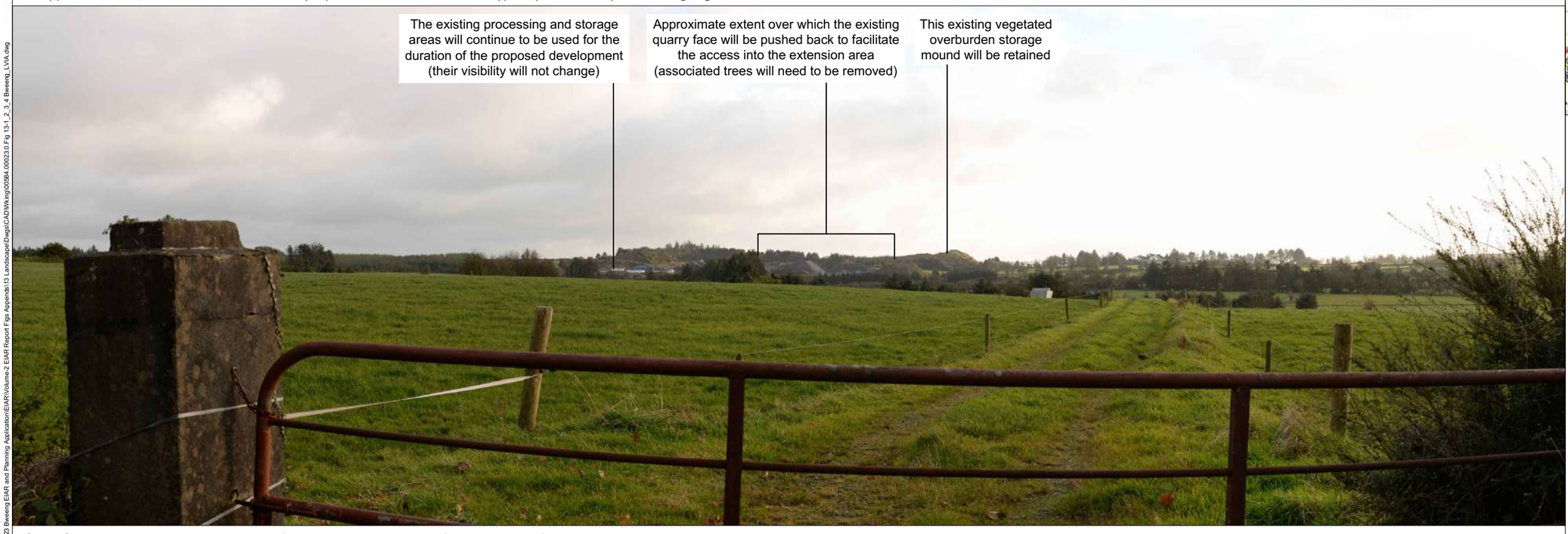
Viewpoint C: Local Road west of the existing Bweeng quarry

Grid Coordinates (ITM): **551495:590495** Approximate Elevation: **205m AOD** Distance from planning application boundary: **630m** Direction of View: **Southeast** Date/time of photograph: **20/11/2023 @ 15:10**

Description: This viewpoint represents a number of views from the elevated section of the local road to the west of the existing Bweeng Quarry. In views through gaps in the roadside hedgerow or where this is kept low, parts of the existing quarry are visible. This includes the upper sections of the western and northern quarry faces, an overburden storage mound in the south-western corner of the site, as well as the processing and storage areas. The field within which the extension area will be located can be glimpsed through gaps in intervening vegetation, however is largely screened. The construction of the screening berms along the western boundary of the extension area, as well as the removal of some of the trees along the southern boundary of the existing quarry will be visible in these views. However, the extraction works will be largely screened, once the new screening berms are in place, as well as by the existing overburden storage mound. There are ca. 7 residential properties located between this road and the application area, however views from these properties towards the site are typically screened by intervening vegetation, as indicated above.



Viewpoint D: Local Road in the townland of Nursetown More, north of the Ahaneboy Stream

Grid Coordinates (ITM): **551925:591500** Approximate Elevation: **165m AOD** Distance from planning application boundary: **810m** Direction of View: **Southeast** Date/time of photograph: **20/11/2023 @ 15:00**

Description: This viewpoint represents a number of views from the local road to the north fo the Ahaneboy Stream. In views through gaps in the roadside hedgerow or where this is kept low, parts of the existing quarry are visible. This includes the upper sections of the northern quarry face, an overburden storage mound in the south-western corner of the site, as well as the processing and storage areas. The field within which the extension area will be located is fully screened by the existing screening berms and vegetation along the southern boundary of the existing quarry. The removal of the existing vegetation above the section of the southern boundary of the existing quarry, which will form the connection with the extension area will be visible, as well as the removal of the overburden in this area. The visible section of the quarry face will then be pushed back into the extension site, resulting in some of the extraction works becoming temporarily, but distantly visible. The visibility of the existing storage and processing area will remain largely unchanged (i.e. the height and mass of stockpiles will continuously change). There are ca. 8 residential properties located in the vicinity of this road, however views from these properties towards the site are largely screened by intervening vegetation.

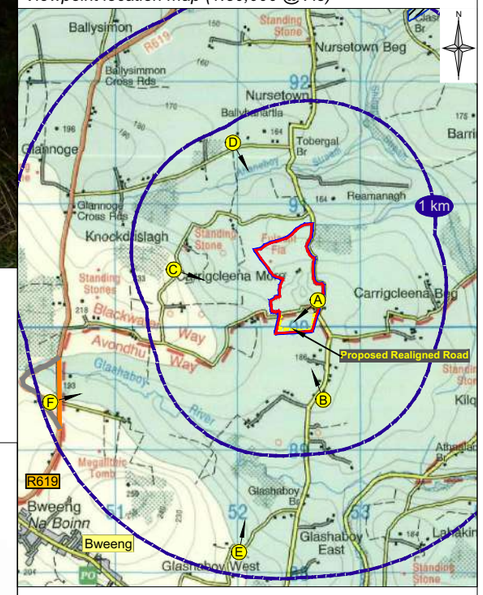
Notes:

1. Extract from Ordnance Survey Ireland Map **No. 80**

Legend:

- Landholding boundary
- Application area
- Viewpoint locations
- Distance from the application area

Viewpoint location map (1:50,000 @ A3)



Rev	Amendments	Date	By	Chk	Auth

SLR

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Client: Breedon Ireland

Project: Bweeng Quarry, Mallow, Co. Cork

Figure Title: Viewpoints C & D

Scale	SLR Project No.
NTS @ A3	00584.00023.0

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Date	Date	Date	Date
11/23	11/23	12/23	12/23

Figure Number: **Figure 13-3** Rev.

08/01/2024

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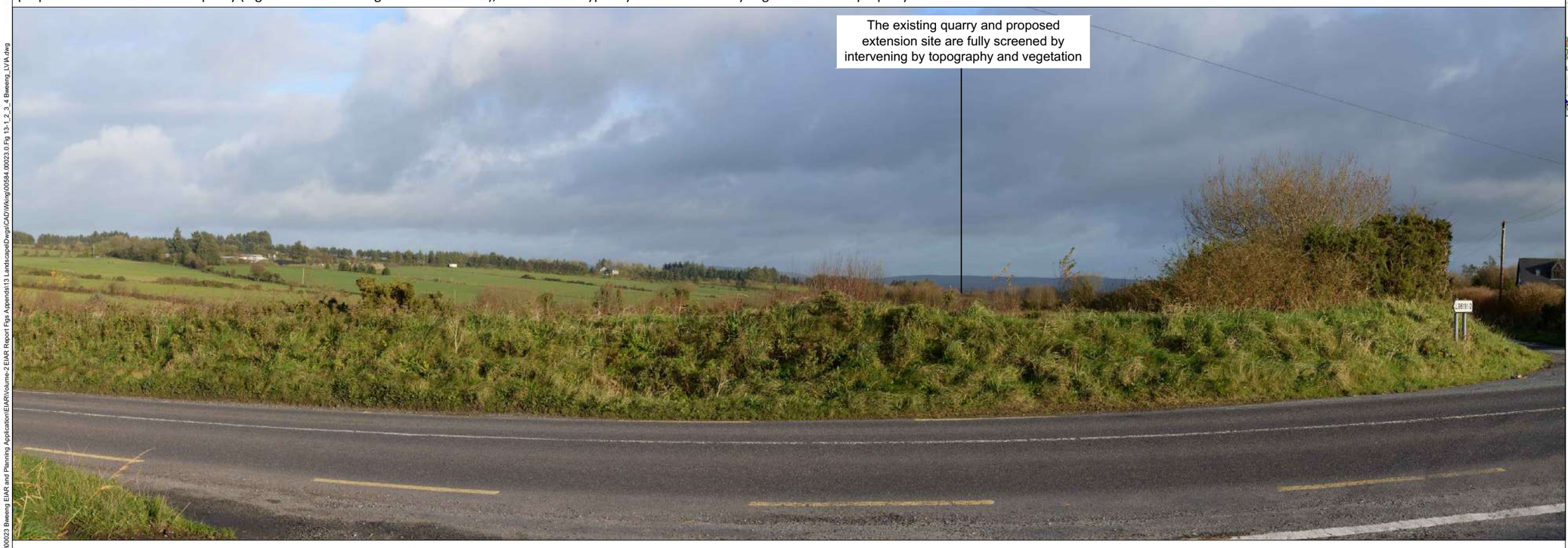
Viewpoint E: Local Road in the townland of Glashaboy West

Grid Coordinates (ITM): **551950:588275** Approximate Elevation: **200m AOD** Distance from planning application boundary: **1,750m** Direction of View: **North** Date/time of photograph: **20/11/2023 @ 14:40**

Description: This viewpoint represents a number of views from locations to the south of the application area, through gaps in hedgerows or where this is kept low. In all these views, the extension site is screened by intervening topography and vegetation in, even from slightly elevated locations such as this. The existing overburden storage area and associated planting along the southern boundary of the existing Bweeng Quarry is visible in the background. A section of this will be removed to facilitate the access into the extension area, however the change to the views will be small, due to a combination of distance, intervening vegetation and/or the panoramic nature of the available views. The proposed screening berms along the western, southern and eastern boundary of the extension area will be barely noticeable behind existing intervening vegetation and proposed woodland and hedgerow planting along the site boundaries. The extraction works will be fully screened. There are are a number of residential properties to the south of the quarry (e.g. visible in the mid-ground of this view), but views are typically more restricted by vegetation on the property boundaries.



Viewpoint F: R619 - Regional Road, approximately 1km north of the village of Bweeng

Grid Coordinates (ITM): **550490:589460** Approximate Elevation: **205m AOD** Distance from planning application boundary: **1,850m** Direction of View: **Northeast** Date/time of photograph: **20/11/2023 @ 14:25**

Description: This view illustrates how intervening topography and vegetation screens views of the existing Bweeng Quarry and proposed extension site from the R619. Similarly, views from within the village of Bweeng are fully screened by a local highpoint to the north-east of the village.

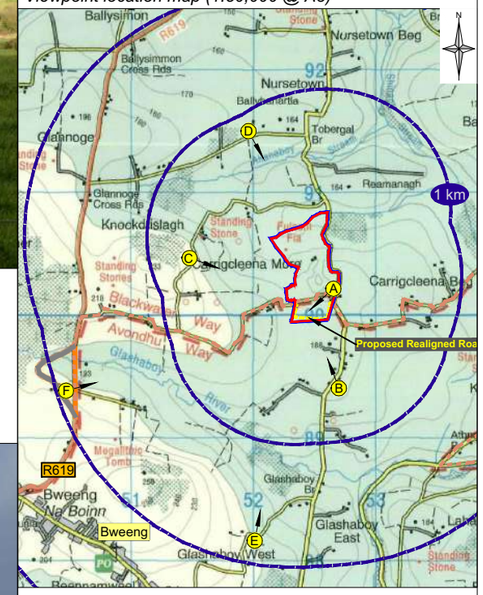
Notes:

1. Extract from Ordnance Survey Ireland Map **No. 80**

Legend:

- Landholding boundary
- Application area
- Viewpoint locations
- Distance from the application area

Viewpoint location map (1:50,000 @ A3)



Rev	Amendments	Date	By	Chk	Auth

SLR

www.slrconsulting.com

Client: Breedon Ireland

Project: Bweeng Quarry, Mallow, Co. Cork

Figure Title: Viewpoints E & F

Scale	SLR Project No.
NTS @ A3	00584.00023.0

Designed	Drawn	Checked	Authorised
SH	SH	AM	AM
Date: 11/23	Date: 11/23	Date: 12/23	Date: 12/23

Figure Number: **Figure 13-4** Rev.

08/01/2024

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APPENDICES

Appendix 13-A Criteria and Definitions used in Assessing Landscape and Visual Effects

Introduction

Landscape and Visual Impact Assessment (LVIA) is a tool used to identify the effects of development on *"landscape as an environmental resource in its own right and on people's views and visual amenity"* (GLVIA3, paragraph 1.1). GLVIA3[1] (paragraph 2.22) states that these two elements, although inter-related, should be assessed separately. GLVIA3 is the main source of guidance on LVIA.

Landscape is a definable set of characteristics resulting from the interaction of natural, physical and human factors: it is a resource in its own right. Its assessment is distinct from visual assessment, which considers effects on the views and visual amenity of different groups of people at particular locations. Clear separation of these two topics is recommended in GLVIA3.

As GLVIA3 (paragraph 2.23) states, professional judgement is an important part of the LVIA process: whilst there is scope for objective measurement of landscape and visual changes, much of the assessment must rely on qualitative judgements. It is critical that these judgements are based upon a clear and transparent method so that the reasoning can be followed and examined by others.

Impacts can be defined as the action being taken, whereas effects are the changes result from that action. This method of assessment assesses landscape and visual effects.

Landscape and visual effects can be positive, negative or neutral in nature. Positive effects are those which enhance and/or reinforce the characteristics which are valued. Negative effects are those which remove and/or undermine the characteristics which are valued. Neutral effects are changes which are consistent with the characteristics of the landscape or view.

In LVIAs which form part of an EIA, it is necessary for identify significant and non-significant effects. In non-EIA LVIAs, also known as appraisals, the same principles and process as LVIA may be applied but, in so doing, it is not required to establish whether the effects arising are or are not significant given that the exercise is not being undertaken for EIA purposes (see GLVIA3 statement of clarification 1/13 10-06-13, Landscape Institute).

[1] Landscape Institute and Institute of Environmental Management and Assessment 'Guidelines for Landscape and Visual Impact Assessment' (Third Edition, April 2013)

Landscape Effects

Landscape, as defined in the European Landscape Convention, is defined as "*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors"*, (Council of Europe, 2000). Landscape does not apply only to special or designated places, nor is it limited to countryside.

GLVIA3 (paragraph 5.34) recommends that the effect of the development on landscape receptors is assessed. Landscape receptors are the components of the landscape that are likely to be affected by the proposed development, and can include individual elements (such as hedges or buildings), aesthetic and perceptual characteristics (for example sense of naturalness, tranquillity or openness), or, at a larger scale, the character of a defined character area or landscape type. Designated areas (such as National Parks or Areas of Outstanding Natural Beauty (AONBs)) are also landscape receptors.

This assessment is being undertaken because the proposed development has the potential to remove or add elements to the landscape, to alter aesthetic or perceptual aspects, and to add or remove characteristics and thus potentially change overall character.

Judging landscape effects requires a methodical assessment of the sensitivity of the landscape receptors to the proposed development and the magnitude of effect which would be experienced by each receptor.

Landscape Sensitivity

Sensitivity of landscape receptors is assessed by combining an assessment of the susceptibility of landscape receptors to the type of change which is proposed with the value attached to the landscape. (GLVIA3, paragraph 5.39).

Value Attached to Landscape Receptors

Landscape receptors may be valued at community, local, national or international level. Existing landscape designations provide the starting point for this assessment, as set out in **Table 13A-1** below.

The table sets out the interpretation of landscape designations in terms of the value attached to different landscape receptors. As GLVIA3 (paragraph 5.24) notes, at the local scale of an LVIA study area it may be found that the landscape value of a specific area may be different to that suggested by the formal designation.

Table 13A-1: Interpretation of Landscape Designations

Designation	Description	Value
World Heritage Sites, candidate World Heritage Site	Unique sites, features or areas identified as being of international importance according to UNESCO criteria. Consideration should be given to their settings especially where these contribute to the attributes of outstanding universal value for which such an area of landscape is valued.	International
National Parks	Areas of landscape identified as being of national importance for their natural beauty and the opportunities they offer for outdoor recreation. Consideration should be given to their settings especially where these contribute to the special qualities for which the landscape is valued.	National
Local Landscape Designations (such as Areas of Outstanding Natural Beauty or Areas of High Amenity) included in local planning documents; or other landscapes of identified value.	Areas of landscape identified as having importance at the local authority level.	Local Authority
Undesignated landscapes of community value	Landscapes which do not have any formal designation but which are assessed as having value to local communities, perhaps on the basis of demonstrable physical attributes which elevate it above ordinary countryside.	Local Authority / Community
Landscapes of low value	Landscapes in poor condition or fundamentally altered by presence of intrusive man-made structures. Landscapes with no demonstrable physical attributes which elevate it above ordinary countryside.	Low

Where landscapes are not designated and where no other local authority guidance on value is available, an assessment is made by reference to criteria in the **Table 13A-2** below. This is based on Table 1 of Landscape Institute Technical Guidance Note 2/21. These factors are not fixed and should be reviewed on a case-by-case basis. When assessing landscape value of a site it is important to consider not only the site itself but also its context.

Landscapes may be judged to be of local authority or community value on the basis of one or more of these factors. There may also be occasional circumstances where an undesignated landscape may be judged to be of national value, for example where it has a clear connection with a nationally designated landscape, or is otherwise considered to be of equivalent value to a national designation. Similarly, on occasions there may be areas within designated landscapes that do not meet the designation criteria, or demonstrate the key characteristics/special qualities in a way that is consistent with the rest of the designated area.

An overall assessment is made for each landscape receptor, based on an overview of the above criteria, to determine its value - whether for example it is comparable to a local authority landscape designation or similar, or whether it is of value to local people and communities. For example, an intact landscape in good condition, where scenic quality, tranquillity, and/or conservation interests make a particular contribution to the landscape, or where there are important cultural or historical associations, might be of equivalent value to a local landscape designation. Conversely, a degraded landscape in poor condition, with no particular scenic qualities or natural or cultural heritage interest is likely to be considered of limited landscape value.

Table 13A-2: Factors Considered in Assessing the Value of Non-Designated Landscapes

Factor	Criteria
Natural Heritage	Landscape with clear evidence of ecological, geological, geomorphological or physiographic interest. Presence of wildlife and habitats that contribute to the sense of place. Landscape which contains valued natural capital assets that contribute to ecosystem services.
Cultural Heritage	Landscape with clear evidence of archaeological, historical or cultural interest. Landscape which contributes to the significance of heritage assets. Landscape which offers a dimension of time depth.
Landscape Condition	Landscape which is in a good physical state both with regard to individual elements and overall landscape structure. Absence of detracting/incongruous features.
Associations	Landscape which is connected with notable people, events and the arts.
Distinctiveness	Landscape that has a strong sense of identity or place. Presence of distinctive features that are characteristic of a place, or presence of rare/unusual features that confer a strong sense of place. Includes landscape that makes an important contribution to the character or identity of a settlement.
Recreational	Landscape offering recreational opportunities where experience of landscape is important. Includes open access areas, common land and rights of way where appreciation of the landscape is an important element of the experience. Landscape that forms part of a view that that is important to the enjoyment of a recreational activity.
Perceptual (Scenic)	Landscape that appeals to the senses, primarily the visual sense. Distinctive features, or distinctive combinations of features. Strong aesthetic qualities. Visual diversity or contrasts. Memorable/distinctive views or landmarks, or landscape that contributes to these.
Perceptual (Wildness and Tranquillity)	Landscape with a strong perceptual value notably remoteness, wildness, tranquillity and/or dark skies.
Functional	Landscape which performs a clearly identifiable and valuable function, particularly in the healthy functioning of the landscape. Natural hydrological systems, important parts of the green infrastructure network, pollinator rich habitats. Landscapes that have strong physical or functional links with an adjacent national landscape designation or are important to the appreciation of the designated landscape and its special qualities.

Susceptibility of Landscape Receptors to Change

As set out in GLVIA3, susceptibility refers to the ability of the landscape receptor to "accommodate the proposed development without undue adverse consequences for the baseline situation and/or the achievement of landscape planning policies and strategies". Judgement of susceptibility is particular to the specific characteristics of the proposed development and the ability of a particular landscape or feature to accommodate the type of change proposed, and makes reference to the criteria set out in **Table 13A-3** below. Aspects of the character of the landscape that may be affected by a particular type of development include landform, skylines, land cover, enclosure, human influences including settlement pattern and aesthetic and perceptual aspects such as the scale of

the landscape, its form, line, texture, pattern and grain, complexity, and its sense of movement, remoteness, wildness or tranquillity.

For example, an urban landscape which contains a number of industrial buildings may have a low susceptibility to buildings of a similar scale and character. Conversely a rural landscape containing only remote farmsteads is likely to have a high susceptibility to large scale built development.

Table 13A-3: Landscape Receptor Susceptibility to Change

Susceptibility	Criteria
High	The landscape receptor is highly susceptible to the proposed development because the key characteristics of the landscape have no or very limited ability to accommodate it without transformational adverse effects, taking account of the existing character and quality of the landscape.
Medium	The landscape receptor is moderately susceptible to the proposed development because the relevant characteristics of the landscape have some ability to accommodate it without transformational adverse effects, taking account of the existing character and quality of the landscape.
Low	The landscape receptor has low susceptibility to the proposed development because the relevant characteristics of the landscape are generally able to accommodate it without transformational adverse effects, taking account of the existing character and quality of the landscape.

Defining Sensitivity

As has been noted above, the sensitivity of landscape receptors is defined in terms of the relationship between value and susceptibility to change as indicated in Figure 13A-1 below. This summarises the general nature of the relationship but it is not formulaic and only indicates general categories of sensitivity. Professional judgement is applied on a case by case basis in determining sensitivity of individual receptors with the diagram only serving as a guide.

Table 13A-4 below summarises the nature of the relationship but it is not formulaic and only indicates general categories of sensitivity. Judgements are made about each landscape receptor, with the table serving as a guide.

Where, taking into account the component judgements about the value and susceptibility of the landscape receptor, sensitivity is judged to lie between levels, an intermediate assessment of high/medium or medium/low is adopted. In a few limited cases a category of less than low (very low) may be used where the landscape is of low value and susceptibility is particularly low.

Figure 13A-1: Levels of Sensitivity defined by Value and Susceptibility of Landscape Receptors

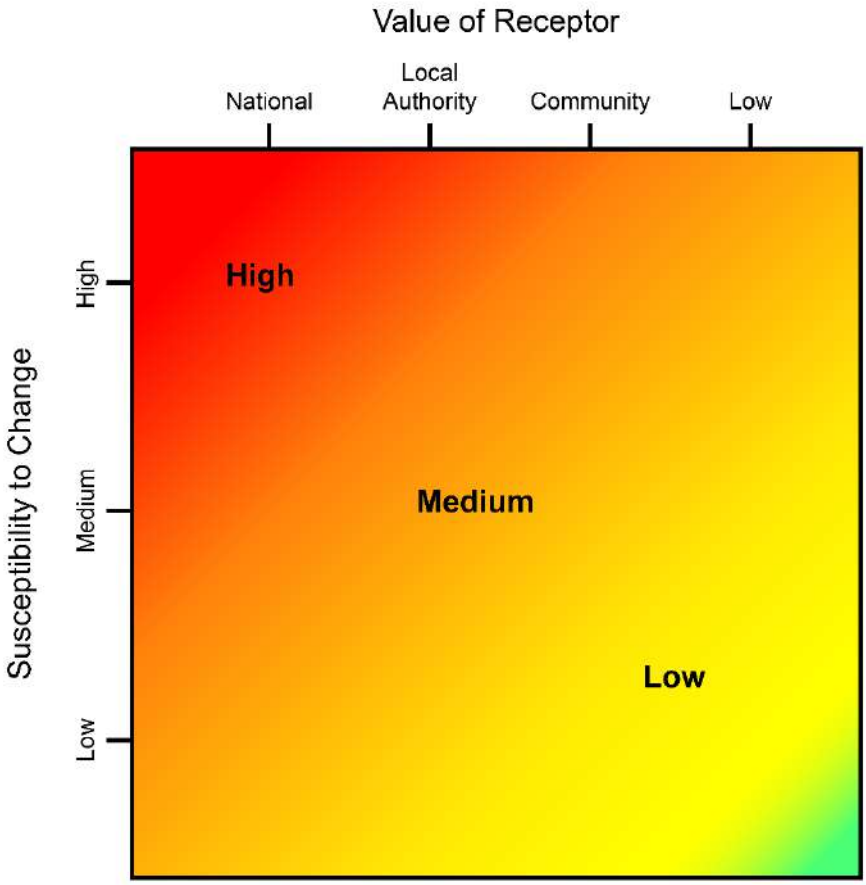


Table 13A-4: Example Levels of Sensitivity defined by Value and Susceptibility of Landscape Receptors

Susceptibility	Criteria
High	The landscape receptor is of international or national value and is considered to have high susceptibility to the effects of the proposed development. OR The landscape receptor is of national value and is considered to have medium susceptibility to the effects of the proposed development.
Medium	The landscape receptor is of international or national value and is considered to have low susceptibility to the effects of the proposed development. OR The landscape receptor is of local authority value and is considered to have high susceptibility to the effects of the proposed development. OR The landscape receptor is of local authority value and is considered to have medium susceptibility to the effects of the proposed development. OR The landscape receptor is of community value and is considered to have high susceptibility to the effects of the proposed development.
Low	The landscape receptor is of local authority value and is considered to have low susceptibility to the effects of the proposed development. OR The landscape receptor is of community value and is considered to have medium susceptibility to the effects of the proposed development. OR The landscape receptor is of community value and is considered to have low susceptibility to the effects of the proposed development.

Magnitude of Landscape Change

The magnitude of landscape change is established by assessing the size or scale of change, the geographical extent of the area influenced and the duration and potential reversibility of the change.

Size and Scale of Change

The size and/or scale of change in the landscape takes into consideration the following factors:

- the extent/proportion of landscape elements lost or added; and/or
- the degree to which aesthetic/perceptual aspects are altered; and
- whether this is likely to change the key characteristics of the landscape.

The criteria used to assess the size and scale of landscape change are based upon the amount of change that will occur as a result of the proposed development, as described in **Table 13A-5** below.

Table 13A-5: Magnitude of Landscape Change: Size/Scale of Change

Category	Description

Large level of landscape change	There would be a large level of change in landscape character, and especially to the key characteristics if, for example, the proposed development: • becomes a dominant feature in the landscape, changing the balance of landscape characteristics; and/or • would dominate important visual connections with other landscape types, where this is a key characteristic of the area.
Medium level of landscape change	There would be a medium level of change in landscape character, and especially to the key characteristics if, for example: • the proposed development would be more prominent but would not change the overall balance or composition of the landscape; and/or • key visual connections to other landscape types may be interrupted intermittently by the proposed development, but these connections would not be dominated by them.
Small level of landscape change	There would be a small level of change in landscape character, and especially to the key characteristics if, for example: • there would be no introduction of new elements into the landscape and the proposed development would not significantly change the composition/balance of the landscape.
Negligible level of landscape change/ No change	There would be a negligible or no level of change in landscape character, and especially to the key characteristics if, for example, the proposed development would be a small element and/or would be a considerable distance from the receptor.

Geographical Extent of Change

The geographical extent of landscape change is assessed by determining the area over which the changes will influence the landscape, as set out in **Table 13A-6**. For example, this could be at the site level, in the immediate setting of the site, or over some or all of the landscape character types or areas affected.

Table 13A-6: Magnitude of Landscape Change: Geographical Extent

Category	Description
Large extent of landscape change	Affects a wider area, far from the site itself.
Medium extent of landscape change	Landscape change extends beyond the site boundaries.
Small extent of landscape change	Change affecting a localised area, often focused on the site itself.
Negligible extent of landscape change	The change will affect only a negligible extent of the landscape receptor under consideration.

Duration and Reversibility of Change

The duration of the landscape change is categorised in **Table 13A-7** below, which considers whether the change will be permanent and irreversible or temporary and reversible. The levels of duration

are based on the EPA Guidelines on the information to be contained in Environmental Impact Assessment Reports (2022).

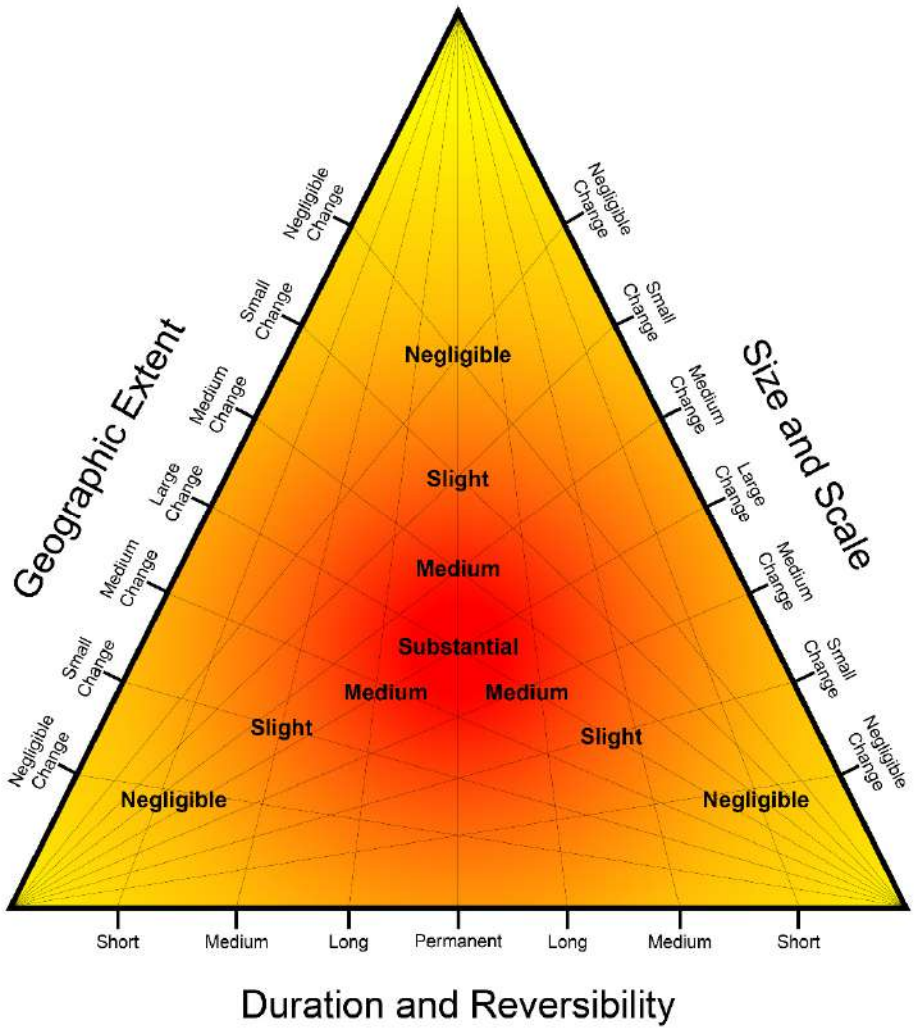
Table 13A-7: Magnitude of Landscape Change: Duration and Reversibility

Category	Description
Permanent/ Irreversible	Change that will last for over 60 years and is deemed permanent or irreversible.
Long-term reversible	Change that will last between 15 and 60 years and is potentially, or theoretically reversible.
Medium-term reversible	Change that will last between 7 and 15 years and is wholly or partially reversible.
Temporary/ Short-term reversible	Change that will last from 0 to 7 years and is reversible - includes construction effects.

Deciding on Overall Magnitude of Landscape Change

The relationships between the three factors that contribute to assessment of the magnitude of landscape effects are illustrated graphically, as a guide, in **Figure 13A-2** below. Various combinations are possible and the overall magnitude of each effect is determined using professional judgement rather than by formulaic application of the relationships in the diagram.

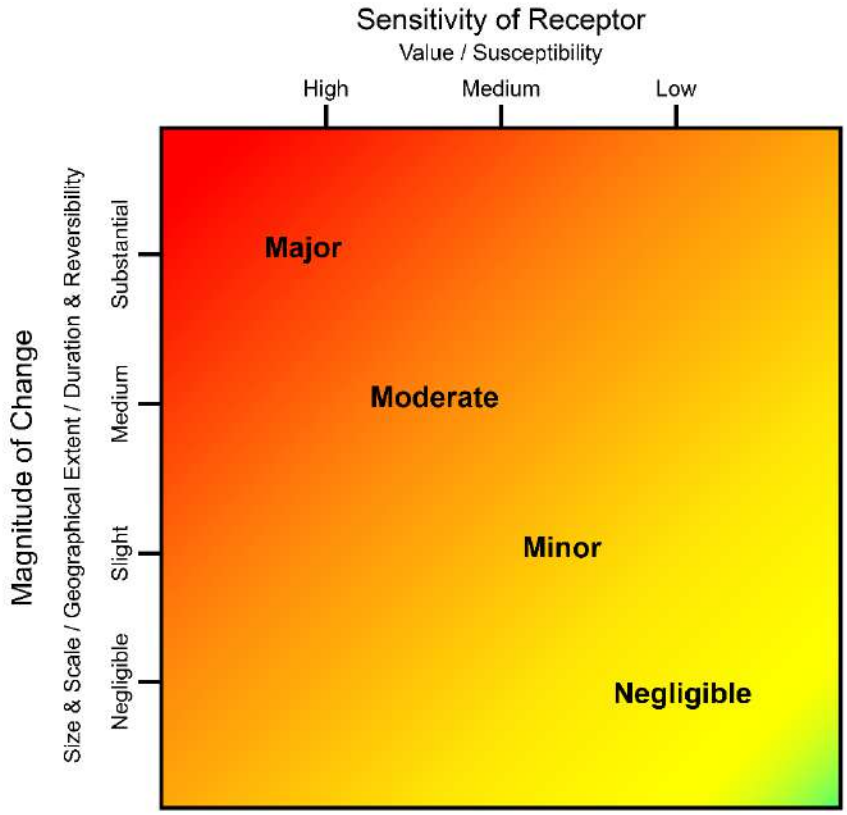
Figure 13A-2: Determining the Magnitude of Landscape Change



Assessment of Landscape Effects

The assessment of overall landscape effects is defined in terms of the relationship between the sensitivity of the landscape receptors and the magnitude of the change. The diagram below (**Figure 13A-3**) summarises the nature of the relationship but it is not formulaic. Judgements are made about each landscape effect using this diagram as a guide.

Figure 13A-3: Assessment of Landscape Effects



Visual Effects

Visual effects are the effects of change and development on the views available to people and their visual amenity. Visual receptors are the people whose views may be affected by the proposed development. They generally include users of walking trails or other recreational facilities or attractions; travellers who may pass through the study area because they are visiting, living or working there; residents living in the study area, either as individuals or, more often, as a community; and people at their place of work:

- Communities within settlements (i.e. towns and villages);
- Residents of individual properties and clusters of properties outside settlements;
- People using nationally designated or regionally promoted footpaths and cycle routes;
- Visitors at publicly accessible sites including, for example, gardens and designed landscapes, historic sites, and other visitor attractions or outdoor recreational facilities where the landscape or seascape is an important part of the experience;
- Users of outdoor sport and recreation facilities;
- Visitors staying at caravan parks or camp sites;
- Road users on recognised scenic or promoted tourist routes;
- Users of other roads;
- Rail passengers;
- People at their place of work.

Judging visual effects requires a methodical assessment of the sensitivity of the visual receptors to the proposed development and the magnitude of effect which would be experienced by each receptor.

Viewpoints are chosen (in discussion with the competent authority and other stakeholders and interested parties) for a variety of reasons but most commonly because they represent views experienced by relevant groups of people although they may also include specific promoted or otherwise important viewpoints.

Visual Sensitivity

Sensitivity of visual receptors is assessed by combining an assessment of the susceptibility of visual receptors to the type of change which is proposed with the value attached to the views. (GLVIA3, paragraph 6.30).

Value Attached to Views

Different levels of value are attached to the views experienced by particular groups of people at particular viewpoints. Assessment of value takes account of a number of factors, including:

- Recognition of the view through some form of planning designation or by its association with particular heritage assets; and
- The popularity of the viewpoint, in part denoted by its appearance in guidebooks, literature or art, or on tourist maps, by information from stakeholders and by the evidence of use including facilities provided for its enjoyment (seating, signage, parking places, etc.); and

- Other evidence of the value attached to views by people including consultation with local planning authorities, some of whom have carried out assessments of valued views, and professional assessment of the quality of views.

The assessment of the value of views is summarised in **Table 13A-8** below. These criteria are provided for guidance only.

Table 13A-8: Examples of Factors Considered in assessing the Value Attached to Views

Value	Description
High	Views from nationally (and in some cases internationally) known viewpoints, which: • have some form of planning designation; or • are associated with internationally or nationally designated landscapes or important heritage assets; or • are promoted in sources such as maps and tourist literature; or • are linked with important and popular visitor attractions where the view forms a recognised part of the visitor experience; or • have important cultural associations. Also, may include views judged by assessors to be of high value.
Medium	Views from viewpoints of some importance at regional or local levels, which: • have some form of local planning designation associated with locally designated landscapes or areas of equivalent landscape quality; or • are promoted in local sources; or • are linked with locally important and popular visitor attractions where the view forms a recognised part of the visitor experience; or • have important local cultural associations. Also, may include views judged by the assessors to be of medium value.
Low	Views from viewpoints which, although they may have value to local people: • have no formal planning status; or • are not associated with designated or otherwise high-quality landscapes; or • are not linked with popular visitor attractions; or • have no known cultural associations. Also, may include views judged by the assessors to be of low value.

Susceptibility of Visual Receptors to Change

The susceptibility of different types of people to changes in views is mainly a function of:

- The occupation or activity of the viewer at a given viewpoint; and
- The extent to which the viewer's attention or interest be focussed on a particular view and the visual amenity experienced at a given view.

The susceptibility of different groups of viewers is assessed with reference to the guidance in **Table 13A-9** below. However, as noted in GLVIA3 “this division is not black and white and, in reality, there will be a gradation in susceptibility to change”. Therefore, the susceptibility of each group of people affected is considered for each project and assessments are included in the relevant text in the report.

Table 13A-9: Visual Receptor Susceptibility to Change

Susceptibility	Description
High	Residents; People engaged in outdoor recreation where their attention is likely to be focused on the landscape and on particular views; Visitors to heritage assets or other attractions where views of the surroundings are an important part of the experience; Communities where views contribute to the landscape setting enjoyed by the residents.
Medium	Travellers on scenic routes where the attention of drivers and passengers is likely to be focused on the landscape and on particular views. People engaged in outdoor sport or recreation, which may involve appreciation of views e.g. users of golf courses.
Low	People engaged in outdoor sport or recreation, which does not involve appreciation of views; People at their place of work whose attention is focused on their work; where the setting is not important to quality of working life; Travellers, where the view is incidental to the journey.

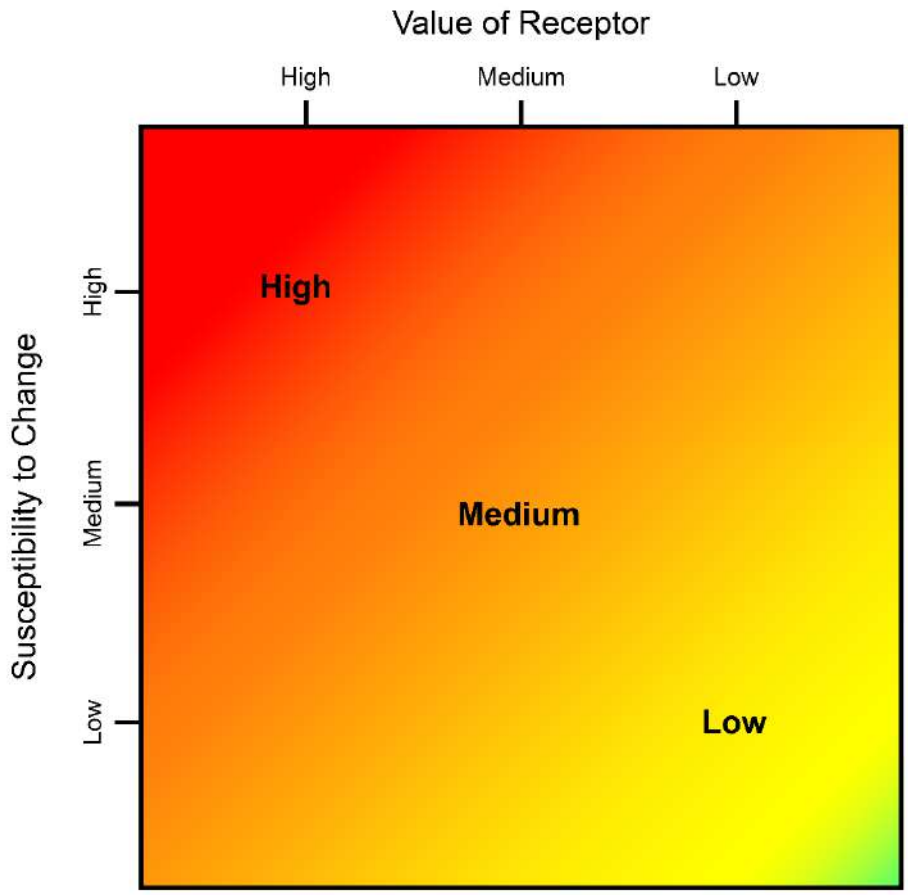
Defining Sensitivity

The sensitivity of visual receptors is defined in terms of the relationship between the value of views and the susceptibility of the different receptors to the proposed change. **Figure 13A-4** below summarises the nature of the relationship; it is not formulaic and only indicates general categories of sensitivity. Judgements are made on merit about each visual receptor, with the table below only serving as a guide. **Table 13A-10** sets down the main categories that may occur but again it is not comprehensive and other combinations may occur.

Table 13A-10: Example Levels of Sensitivity defined by Value and Susceptibility of Visual Receptors

Sensitivity	Criteria
High	The visual receptor group is highly susceptible to changes in views and visual amenity and relevant views are of high value. OR The visual receptor group has a medium level of susceptibility to changes in views and visual amenity and relevant views are of high value.
Medium	The visual receptor group is highly susceptible to changes in views and visual amenity and relevant views are of value at the medium level. OR The visual receptor group is highly susceptible to changes in views and visual amenity and relevant views are of value at the low level. OR The visual receptor group has a medium level of susceptibility to changes in views and visual amenity and relevant views are of value at the medium level. OR The visual receptor group has a low level of susceptibility to changes in views and visual amenity and relevant views are of value at the high level.
Low	The visual receptor group has a medium level of susceptibility to changes in views and visual amenity and relevant views are of value at the low level. OR The visual receptor group has a low level of susceptibility to changes in views and visual amenity and relevant views are of value at the medium level. OR The visual receptor group has a low level of susceptibility to changes in views and visual amenity and relevant views are of value at the low level.

Figure 13A-4: Levels of Sensitivity Defined by Value and Susceptibility of Visual Receptor Groups



Magnitude of Visual Change

The magnitude of visual change is established by assessing the size or scale of change, the geographical extent of the area influenced and the duration and potential reversibility of the change.

Size and Scale of Change

The criteria used to assess the size/scale of visual change are as follows:

- the scale of the change in the view with respect to the loss or addition of features in the view, changes in its composition, including the proportion of the view occupied by the proposed development and distance of view;
- the degree of contrast or integration of any new features or changes in the landscape with the existing or remaining landscape elements and characteristics in terms of factors such as form, scale and mass, line, height, colour and texture; and
- the nature of the view of the proposed development, for example whether views will be full, partial or glimpses or sequential views while passing through the landscape.

The above criteria are summarised in the **Table 13A-11** below:

Table 13A-11: Magnitude of Visual Change: Size/Scale of Change

Sensitivity	Criteria
Large visual change	The proposed development will cause a complete or large change in the view, resulting from the loss of important features in or the addition of important new ones, to the extent that this will substantially alter the composition of the view and the visual amenity it offers.
Medium visual change	The proposed development will cause a clearly noticeable change in the view, resulting from the loss of features or the addition of new ones, to the extent that this will alter to a moderate degree the composition of the view and the visual amenity it offers. Views may be partial/intermittent.
Small visual change	The proposed development will cause a perceptible change in the view, resulting from the loss of features or the addition of new ones, to the extent that this will partially alter the composition of the view and the visual amenity it offers. Views may be partial only.
Negligible visual change	The proposed development will cause a barely perceptible change in the view, resulting from the loss of features or the addition of new ones, to the extent that this will barely alter the composition of the view and the visual amenity it offers. Views may be glimpsed only.
No change	The proposed development will cause no change to the view.

Geographical Extent of Change

The geographical extent of the visual change identified at representative viewpoints is assessed by reference to a combination of the Zone of Theoretical Visibility (ZTV), where this has been prepared, and field work, and consideration of the criteria in **Table 13A-12** below. Representative viewpoints are used as 'sample' points to assess the typical change experienced by different groups of visual receptors at different distances and directions from the proposed development. The geographical extent of the visual change is judged for each group of receptors: for example, people using a particular route or public amenity, drawing on the viewpoint assessments, plus information about the distribution of that particular group of people in the Study Area.

The following factors are considered for each representative viewpoint:

- the angle of view in relation to the main activity of the receptor;
- the distance of the viewpoint from the proposed development; and
- the extent of the area over which changes would be visible.

Thus, low levels of change identified at representative viewpoints may be extensive or limited in terms of the geographical area they are apparent from: for example, a view of the proposed development from elevated Access Land may be widely visible from much or all of the accessible area, or may be confined to a small proportion of the area. Similarly, a view from a public footpath may be visible from a single isolated viewpoint, or over a prolonged stretch of the route. Community views may be experienced from a small number of dwellings, or affect numerous residential properties.

Table 13A-12: Magnitude of Visual Change: Geographical Extent of Change

Category	Description
Large extent of visual change	The proposed development is seen by the group of receptors in many locations across the Study Area or from the majority of a linear route and/or by large numbers of viewers; or the effect on the specific view(s) is extensive.
Medium extent of visual change	The proposed development is seen by the group of receptors from a medium number of locations across the Study Area or from a medium part of a linear route and/or by a medium number of viewers; or the effect on the specific view is moderately extensive.
Small extent of visual change	The proposed development is seen by the group of receptors at a small number of locations across the Study Area or from only limited sections of a linear route and/or by a small number of viewers; or the effect on a specific view is small.
Negligible extent of visual change	The proposed development is either not visible in the Study Area or is seen by the receptor group at only one or two locations or from a very limited section of a linear route and/or by a very small number of viewers; or the effect on the specific view is barely discernible.

Duration and Reversibility

The duration of the visual change at viewpoints is categorised in **Table 13A-13** below, which considers whether views will be permanent and irreversible or temporary and reversible. The levels of duration are based on the EPA Guidelines on the information to be contained in EIA Reports (2022).

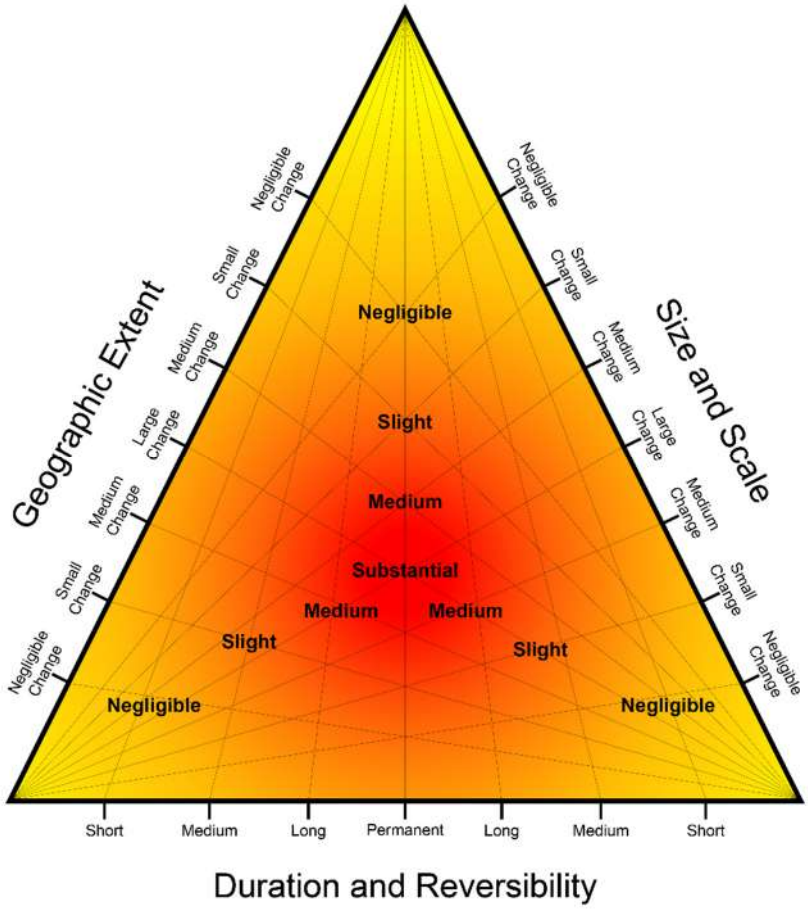
Table 13A-13: Magnitude of Visual Change: Duration and Reversibility

Category	Description
Permanent/ Irreversible	Change that will last for over 60 years and is deemed permanent or irreversible.
Long-term reversible	Change that will last between 15 and 60 years and is potentially, or theoretically reversible.
Medium-term reversible	Change that will last between 7 and 15 years and is wholly or partially reversible.
Temporary / Short-term reversible	Change that will last from 0 to 7 years and is reversible - includes construction effects.

Deciding on Overall Magnitude of Visual Change

The relationships between the three factors that contribute to assessment of the magnitude of visual effects are illustrated graphically, as a guide, in **Figure 13A-5** below. Various combinations are possible and the overall magnitude of each effect is made using professional judgement rather than by formulaic application of the relationships in the diagram.

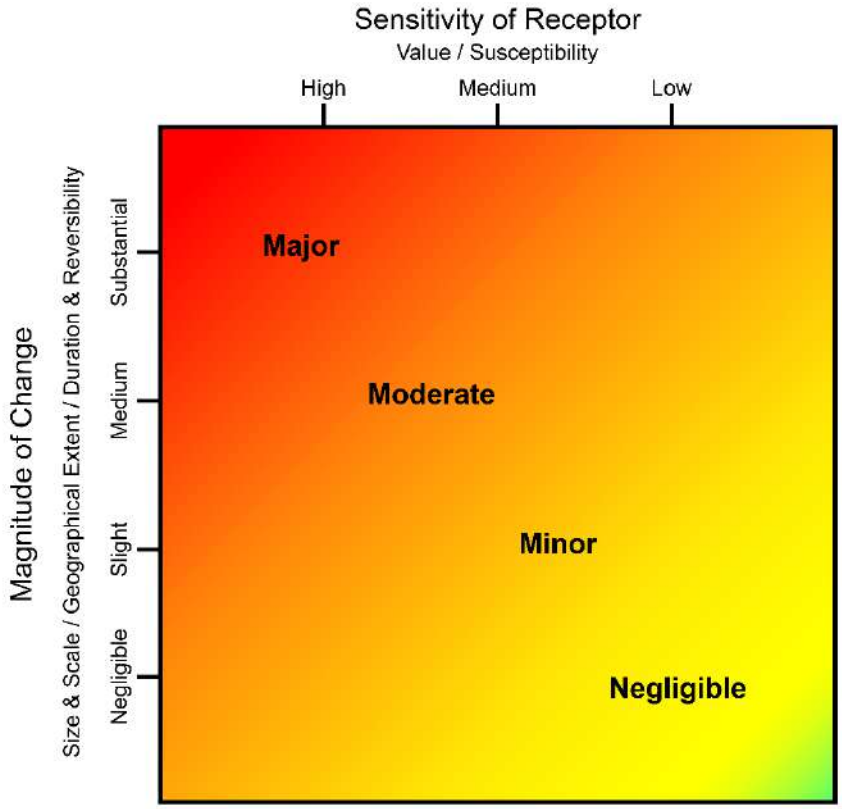
Figure 13A-5: Determining the Magnitude of Visual Change


Geographic Extent
Size and Scale
Duration and Reversibility
Negligible Change
Small Change
Medium Change
Large Change
Medium Change
Small Change
Negligible Change
Negligible
Slight
Medium
Substantial
Medium
Medium
Slight
Slight
Negligible
Negligible
Short
Medium
Long
Permanent
Long
Medium
Short

Assessment of Visual Effects and Significance

The assessment of visual effects is defined in terms of the relationship between the sensitivity of the visual receptors (value and susceptibility) and the magnitude of the change. The diagram below (**Figure 13A-6**) summarises the nature of the relationship but it is not formulaic and only indicates broad levels of effect. Judgements are made about each visual effect using this diagram as a guide.

Figure 13A-6: Assessment of Visual Effects and Overall Significance



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APPENDICES

Appendix 14-A Traffic and Transport Assessment (TTA)

Introduction

14.1 PMCE has been commissioned by Breedon Materials Ltd., trading as Breedon Ireland to undertake a review of the traffic impacts associated with a proposed development at Carrigcleena More, Bweeng, Co. Cork. The proposed development is shown on EIAR Figure 2-2 and will consist of:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c. 3.7 hectares;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Overburden storage;
- Operation landscaping including perimeter screening berms around the proposed extension area; and
- Restoration of the quarry to natural habitat after-uses.

All related ancillary site works within an overall application area of c. 28.8 hectares, and all for a period of 20 years and a further 2 years to complete final restoration of the site.

14.2 The Application Site shown in Figure 14-1 is accessed via an existing access on the L1214 local road approximately 850m south of its junction with L5361 and 750m north of its junction with L2766. Operations at the existing quarry include the extraction and processing of stone and the production of readymix concrete.

14.3 This chapter determines and quantifies the extent of additional trips generated by the proposed development, and the impact on operational performance of such trips on the local road network. It is based on the Traffic and Transport Assessment (TTA) that has been undertaken for the proposed development, which is contained in Appendix 14-A.

Figure 14-1: Site Location

Legislative and Policy Context

14.4 This EIAR has been prepared with due regard to the following overarching legislation and guidance on EIA as outlined in Chapter 2.0 of this EIAR.

14.5 The technical assessment described in this chapter has been undertaken in line with the Transport Infrastructure Ireland (TII) Traffic and Transport Assessment Guidelines (2014).

14.6 Other assessment criteria that have been used to complete this assessment include:

- "Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections" (October 2021) published by Transport Infrastructure Ireland.
- Traffic Count and Speed Survey Data, collected by Traffinomics.
- Topographical Survey Data/Mapping provided by Golder Associates Ireland (WSP).
- "Project Appraisal Guidelines for National Roads Unit 16.1 - Expansion Factors for Short Period Traffic Counts" (October 2016) published by Transport Infrastructure Ireland.
- Cork County Development Plan 2022-2028 (June 2022).
- TII Publications document DN-GEO-03031, "Rural Road Link Design" (October 2017 & May 2023) published by Transport Infrastructure Ireland (TII).
- TII Publications document DN-GEO-03060, "Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade-separated and compact grade-separated junctions)" (May 2023) published by Transport Infrastructure Ireland (TII).

Assessment Methodology and Significance Criteria

Study Methodology

14.7 The methodology adopted for this assessment involved:

- Site visits were undertaken on 31st October 2018, 30th June 2022 and 29th November 2023; the weather was dry, and the ground surface was dry on each occasion;
- Classified 12-hour Traffic Turning Count Surveys undertaken on Tuesday 30th April 2024.
- Trip Generation and Trip Assignment: Used to derive trip rates for a 12-hour period and to provide information as to which direction vehicles will travel to/from the Proposed Development.
- Link Capacity Assessment: To obtain an AADT (annual average daily traffic) value for the roads linking the development to the surrounding network.
- Existing Traffic Assessment: The traffic count data was used to develop models for junctions affected by the Proposed Development.
- Future Year Assessments: The estimated future year volumes on the study area network, as a result of the increase in background traffic and any site related traffic, was used to assess the future operational performance of the junctions and surrounding road network for 2025 (assumed year of opening) and at two future assessment years, the opening year +5 (2030) and the opening year +15 (2040).

Temporal Scope

14.8 The "Traffic and Transport Assessment Guidelines" published by TII recommend the assessment of traffic in the Opening Year, for the Opening Year +5 years and the Opening Year +15 years.

14.9 The assessment years for the Traffic and Transport assessment are therefore 2025 for the Opening Year, 2030 and 2040 for the Future Assessment Years.

Geographical Scope

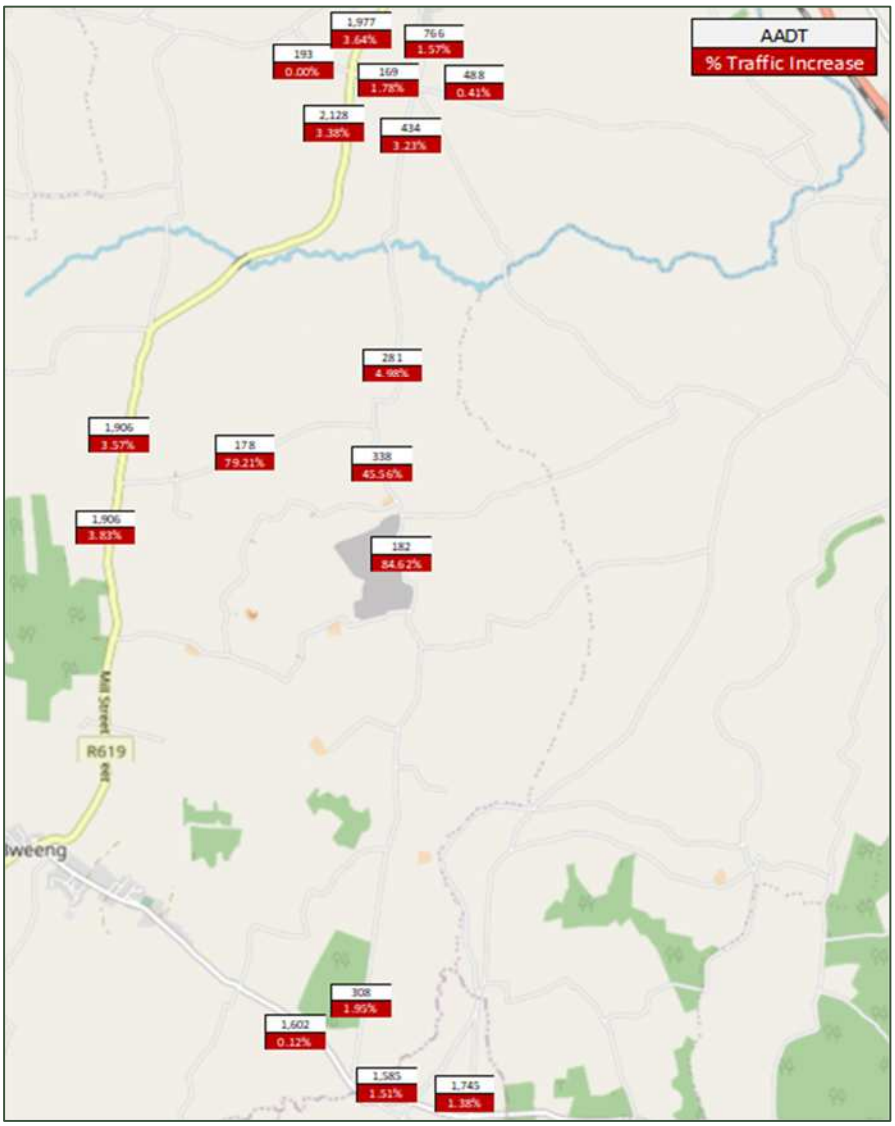
14.10 Section 2.1 of the 'Traffic and Transport Assessment Guidelines' published by Transport Infrastructure Ireland recommends that in an urban or congested setting that a traffic assessment should cover all the roads and junctions where the development traffic exceeds 5% of the existing or background traffic.

14.11 Following the assignment of new traffic from the proposed development, the development traffic at each local road junction was determined. Figure 14.2 shows the development traffic as a percentage of the background traffic on the adjacent road network.

14.12 As the development traffic exceeds 5% on the L5361, L1214-62 and L1214-38, the assessment undertakes a junction capacity assessment of the following junctions (as illustrated in Figure 14.2 below):

- Junction 3 - Glannoge Cross
- Junction 4 - Tobergal Bridge
- Junction 7 – Quarry Site Access

Figure 14-2: Background Development Traffic as a Percentage of the Background Traffic Volume



Traffic Modelling

14.13 Traffic likely to be distributed by the proposed quarry development has been estimated using trip rates from the Trip Rate Information Computer System (TRICS) database based on the surveyed traffic for similar types of developments in similar locations. By inspection, it can be seen that the pattern of arrivals/departures is consistent with a short turn around within the sites, e.g. that vehicles generally arrive and depart within a short time period, likely to be less than an hour. The distribution of the development traffic on the adjacent road network is based on an assessment of the existing traffic flows at the site access derived from the traffic count data.

14.14 A summary of the sites from the TRICS database, used to estimate the traffic distributed by the proposed development, are given in Appendix 14.1.

Traffic Growth

14.15 The "Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections" (October 2021) published by Transport Infrastructure Ireland has been used to determine future year traffic flows on the adjacent road network from the 2021 traffic count data. Table 14-1 contains a summary of the traffic growth factors published in Table 6.2 of Unit 5.3 of the "Project Appraisal Guidelines". For this assessment, a central growth scenario has been adopted (a 'central' growth scenario was assumed given the site location and scale).

Table 14-1: Future year traffic growth figures for Co. Cork - Excluding Metropolitan Area

Years	Low Growth		Central Growth		High Growth	
	LV	HV	LV	HV	LV	HV
2016-2030	1.0173	1.0361	1.0189	1.0377	1.0223	1.0411
2030-2040	1.0067	1.0141	1.0087	1.0160	1.0124	1.0197

Link Capacity Assessment

14.16 When assessing the link capacity of a road a 'Level of Service D' has been chosen as, according to the TII Publications document DN-GEO-03031 "Rural Road Link Design", it is at this level that "*speeds begin to decline slightly with slight increase of flows and density begins to increase somewhat more quickly. Freedom to manoeuvre within the traffic stream is more noticeably limited, and the driver experiences reduced comfort levels*."

14.17 The capacity of the local roads has been assessed by reference to the TII Publications document DN-GEO-03031 "Rural Road Link Design."

Junction Capacity Analysis

14.18 The capacity of the surveyed junctions was assessed using the Transport Research Laboratory's (TRL) computer programme Junctions 9.

14.19 Junction performance is measured as a ratio between the flow and capacity (RFC).

Sightlines

14.20 Sightlines have been assessed against TII Publications document reference DN-GEO-03031.

EIA Significance Terminology

14.21 As identified in Chapter 2.0 (Scope and Methodology) of this EIAR, a common framework of assessment criteria and terminology has been used based on the EPA's Guidelines on the Information to be Contained in EIARs (EPA, 2022). This common framework follows a 'matrix approach' to environmental assessment which is based on the characteristics of the impact (magnitude and nature) and the value (sensitivity) of the receptor.

14.22 Following the common framework described above, it has been assumed that the value (sensitivity) of the transport assets is no greater than Medium, which equates to 'Medium or high importance and rarity, regional scale, limited potential for substitution' (see Table 2.5 of Chapter 2.0).

14.23 A description of the significance categories used is provided in Table 14.3 below. Levels of significance have been assessed based on a combination of the common framework approach of the EIAR in combination with industry standards regarding capacity.

Table 14-2: Effects and Descriptions

Significance Category	Typical Description
Profound	An effect which obliterates sensitive characteristics.
Large	An effect which, by its character, magnitude, duration or intensity alters a significant proportion of a sensitive aspect of the environment.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Imperceptible	An effect capable of measurement but without significant consequences.

Baseline

Local Road Network

14.24 The following sections describe the roads and junctions assessed as part of this assessment.

L1214

14.25 The L1214 road is a local road linking Upper Dromahane to the L2766 local road south-east of Bweeng. The L1214 is approximately 8km long, running in a north to south direction. In the vicinity of the site, The L1214 is approximately 6m wide with no road markings, footpaths or hard strips. The speed limit of the L1214 in the vicinity of the site is 80km/h.

L5361

14.26 The L5361 local road is north of the site. The L5361 links the R619 regional road, approximately 1.6 km north-west of the site (from the nearest point), and the L1214 local road. The L5361 is approximately 1.8km long, running in a south-west to north-east direction. The L5361 is approximately 5m wide with small sections of hard strips and no footpaths or road markings. The speed limit of the L5361 is 80km/h.

L2766

14.27 The L2766 local road south of the site links the L1214 to the L2765 local road and Bweeng to the south-east and north-west, respectfully. The L2766 is approximately 7km long, running in a north-west to south-east direction. The L2766 is approximately 5m wide with no footpaths or hard strips. There are clear traffic warning signs for junctions along the L2766. The speed limit of the L2766 is 80km/h.

Traffic Data

Traffic Counts

14.28 Junction Turning Counts were carried out on the 30th of April 2024, by Traffinomics Ltd., at a total of 8No junctions along the designated haul routes between the quarry site and the surrounding road network. The counts were carried out between 7:00am and 7:00pm, with this time period encompassing the peak hours on the adjacent National and Local Road network. Surveyed vehicles were broken down into five categories as follows:

1 Cars
2 LGV's (Light Goods Vehicles)
3 OGV1 (Two and three axle goods vehicles)
4 OGV2 (Four and five axle goods vehicles)
5 Buses

14.29 The detailed results of the traffic survey are summarised in Appendix B. The morning and evening peak hours have been established as follows:

- Junction 1 - L5360/R619/L5359 crossroads junction

  08:15 - 09:15 (AM Peak) and

  16:45 - 17:45 (PM Peak)
- Junction 2 - L5360/L5364/L1214 crossroads junction

  08:30 - 09:30 (AM Peak) and

  16:30 - 17:30 (PM Peak)
- Junction 3 - L5361 & R619 staggered junction

  07:30 - 08:30 (AM Peak) and

  16:45 - 17:45 (PM Peak)
- Junction 4 - L1214 & L5361 T-junction

  11:00 - 12:00 (AM Peak) and

  16:00 - 17:00 (PM Peak)
- Junction 5 - L2766 & L1214 T-junction

  08:00 - 09:00 (AM Peak) and

  17:15 - 18:15 (PM Peak)
- Junction 6 - L2766 & L2765 T-junction

  08:00 - 09:00 (AM Peak) and

  17:15 - 18:15 (PM Peak)
- Junction 7 - L1214 & Quarry Access T-junction

11:30 - 12:30 (AM Peak) and

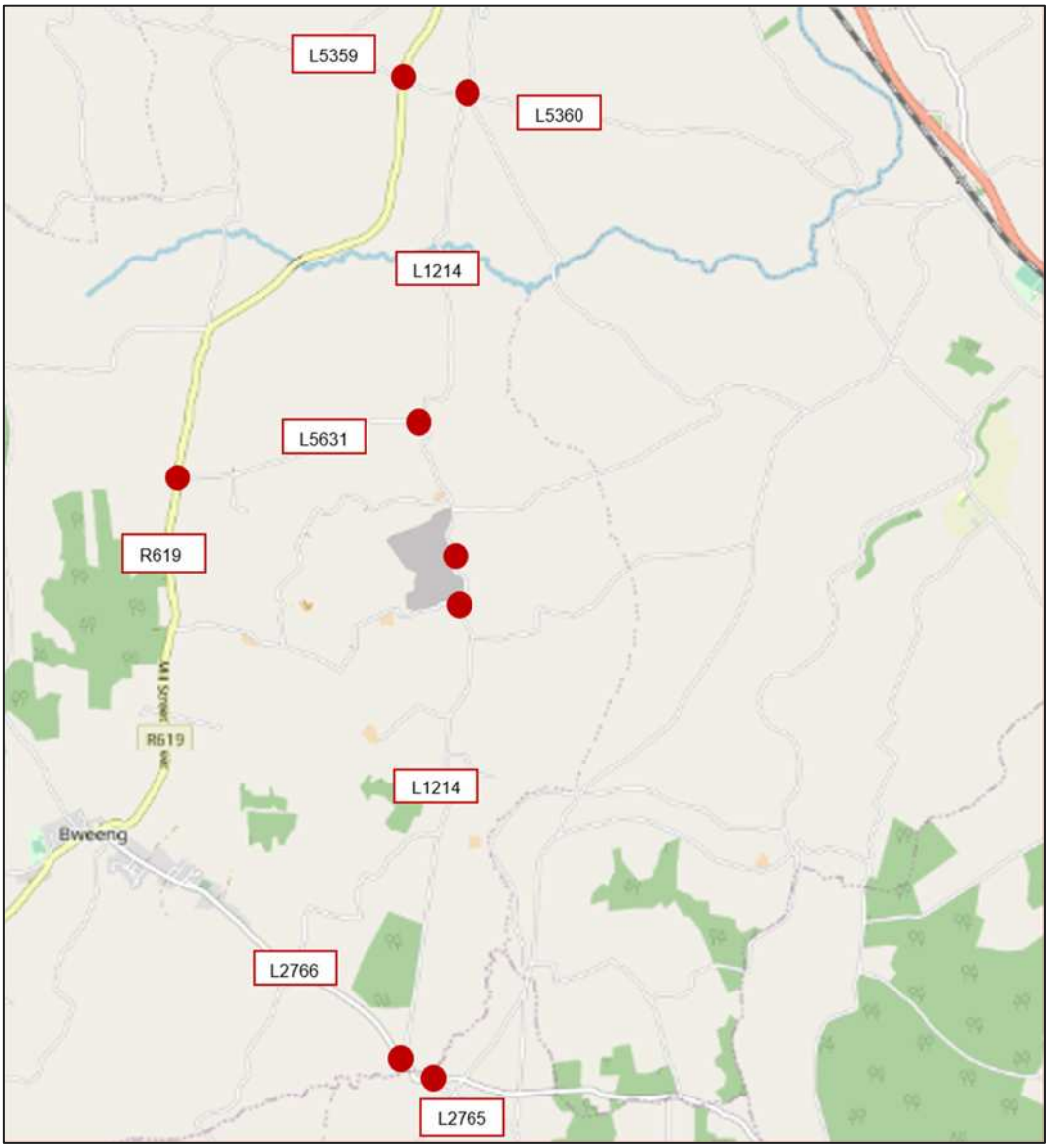
16:00 - 17:00 (PM Peak)

- Junction 8 - L1214 & L5362 T-junction

11:30 - 12:30 (AM Peak) and

16:15 - 17:15 (PM Peak)

Figure 14-3: Surrounding Road Network Layout



14.30 The count data for each site has been converted to Annual Average Daily Traffic (AADT) values using the methodology described in "Expansion Factors for Short Period Traffic Counts" (Unit 16.2 NRA Project Appraisal Guidelines, August 2012). Annexes A to C of the above document were used in the expansion of traffic counts to AADT's.

14.31 A combined factor of 0.779 was arrived at by combining the individual hourly factors for the count duration. This factor was then used to determine the 24-hour traffic flow. This

was then converted to a Weekly Average Daily Traffic (WADT) using an index of 0.96 for the Tuesday traffic count. Finally, this was converted to AADT using an index of 0.98 for the month of April. These factors were used to calculate the AADT for the four junctions. These factors were used to calculate the AADTs for each arm of the junctions.

Table 14-3: AADT at Junction 1- Kilpadder Cross

Hour Ending	R619 (N)	L5360 (E)	R619 (S)	L5360(W)
08:00	145	6	147	8
09:00	163	14	171	10
10:00	127	11	138	22
11:00	96	9	98	11
12:00	107	8	113	10
13:00	87	12	94	13
14:00	90	6	99	11
15:00	118	10	127	11
16:00	130	10	138	8
17:00	188	17	196	9
18:00	199	13	212	18
19:00	133	13	144	12
Period Total	1,583	129	1,677	143
Period Total HGVs	142	8	156	16
% HGVs	8.97%	6.20%	9.30%	11.19%
Total AADT	1,912	156	2,025	173

Table 14-4: AADT at Junction 2 – Pendy's Cross

Hour Ending	L1214 (N)	L5364(E)	L1214 (S)	L5360(W)
08:00	42	24	24	6
09:00	44	28	35	15
10:00	60	38	36	12
11:00	36	21	25	8
12:00	30	25	17	6
13:00	53	33	35	11
14:00	46	29	21	6
15:00	52	36	24	12
16:00	44	29	23	10
17:00	47	32	37	22
18:00	71	48	39	16
19:00	38	47	23	22
Period Total	563	390	339	146

Hour Ending	L1214 (N)	L5364(E)	L1214 (S)	L5360(W)
Period Total HGVs	39	34	26	15
% HGVs	6.93%	8.72%	7.67%	10.27%
Total AADT	680	471	409	176

Table 14-5: AADT at Junction 3 – Glannoge Cross

Hour Ending	R619 (N)	L5361 (E)	R619 (S)	Local Access
08:00	149	11	142	0
09:00	169	11	168	2
10:00	113	6	112	5
11:00	102	3	97	2
12:00	105	6	101	2
13:00	91	7	90	0
14:00	78	10	78	0
15:00	110	7	107	2
16:00	132	10	126	2
17:00	177	14	168	3
18:00	190	11	185	2
19:00	129	15	124	4
Period Total	1,545	111	1,498	24
Period Total HGVs	173	36	145	0
% HGVs	11.20%	32.43%	9.68%	0.00%
Total AADT	1,866	134	1,809	29

Table 14-6: AADT at Junction 4 – Tobergal Bridge

Hour Ending	L1214-38 (S)	L5361 (W)	L1214-10 (N)
08:00	16	9	17
09:00	18	11	21
10:00	22	9	23
11:00	22	6	16
12:00	17	3	14
13:00	25	7	26
14:00	13	1	14
15:00	19	10	21
16:00	23	15	18
17:00	26	8	20
18:00	32	10	28
19:00	14	7	11

Hour Ending	L1214-38 (S)	L5361 (W)	L1214-10 (N)
Period Total	247	96	229
Period Total HGVs	59	40	27
% HGVs	24%	42%	12%
Total AADT	298	116	277

Table 14-7: AADT at Junction 5 – Coolfadda Junction

Hour Ending	L1213	L1214-62	L1265
08:00	109	32	131
09:00	126	34	150
10:00	70	15	83
11:00	54	18	68
12:00	61	21	78
13:00	61	25	84
14:00	70	17	81
15:00	85	25	100
16:00	101	23	112
17:00	96	27	105
18:00	142	29	167
19:00	109	29	130
Period Total	1,084	295	1,289
Period Total HGVs	52	105	141
% HGVs	5%	36%	11%
Total AADT	1,309	356	1,557

Table 14-8: AADT at Junction 6 – Ahadallane Junction

Hour Ending	L2766 E	L2765	L2766 W
08:00	125	14	131
09:00	133	21	150
10:00	78	11	83
11:00	60	18	68
12:00	66	12	78
13:00	65	27	84
14:00	68	21	81
15:00	82	20	100
16:00	104	14	112
17:00	94	17	105
18:00	142	25	167

Hour Ending	L2766 E	L2765	L2766 W
19:00	116	24	130
Period Total	1,133	224	1,289
Period Total HGVs	127	22	141
% HGVs	11%	10%	11%
Total AADT	1,368	271	1,557

Table 14-9: AADT at Junction 7 – Quarry Access

Hour Ending	L1214-38 S	Quarry Access	L1214-38 N
08:00	20	17	15
09:00	19	14	19
10:00	21	15	20
11:00	24	11	21
12:00	27	12	17
13:00	25	10	23
14:00	13	11	12
15:00	24	17	19
16:00	22	9	21
17:00	17	13	24
18:00	28	7	31
19:00	15	1	16
Period Total	255	137	238
Period Total HGVs	107	89	52
% HGVs	42%	65%	22%
Total AADT	308	165	287

Table 14-10: AADT at Junction 8 – Proposed Road Closure

Hour Ending	L214 S	L5362	L1214 N
08:00	21	1	20
09:00	22	3	19
10:00	21	0	21
11:00	24	2	24
12:00	26	3	27
13:00	24	3	25
14:00	13	0	13
15:00	25	1	24
16:00	21	1	22
17:00	18	1	17

Hour Ending	L214 S	L5362	L1214 N
18:00	27	1	28
19:00	16	1	15
Period Total	258	17	255
Period Total HGVs	109	2	107
% HGVs	42%	12%	42%
Total AADT	312	21	308

Key Characteristics of the Proposed Development

14.32 The proposed application relates to the continuation and extension of the current operations at the existing Breedon Quarry located in the townland of Carrigcleena More, approximately 3km northeast of Bweeng town, 6km southwest of Mallow town, and approximately 23km northwest of Cork City.

14.33 The lands surrounding the subject site can be characterised as rural, with land uses in the area comprising agriculture, and single house residential.

14.34 The proposed application is expected to extend the life of the quarry without affecting the currently material extraction rate. It will include the following works:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities.
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over an extraction area of c. 3.7 hectares.
- Realignment of a section of the existing local road to the south of the proposed extension area.
- Overburden storage area.
- Operation landscaping including perimeter screening berms around the proposed extension area.
- All related ancillary site works for a period of 20 years and a further 2 years to complete final restoration of the site.

14.35 The development will utilise existing access from the L1214 local road approximately 850m south of its junction with the L5361 and 750m north of its junction with the L2766. The operations at the quarry include the extraction and processing of stone.

Road Realignment

14.36 To permit the proposed southern extension of the quarry, an application for an extinguishment of the Public Rights of Way will be required (as provisioned in the Roads Act, 1993, Section 73) on a section of approximately 260m of local road located to the south of the existing quarry. It is proposed that a new road (see Figure 14-4) will be provided to replace the existing section of road being removed, which shall maintain vehicle, pedestrian, and cycle access for users of the existing Local Road.

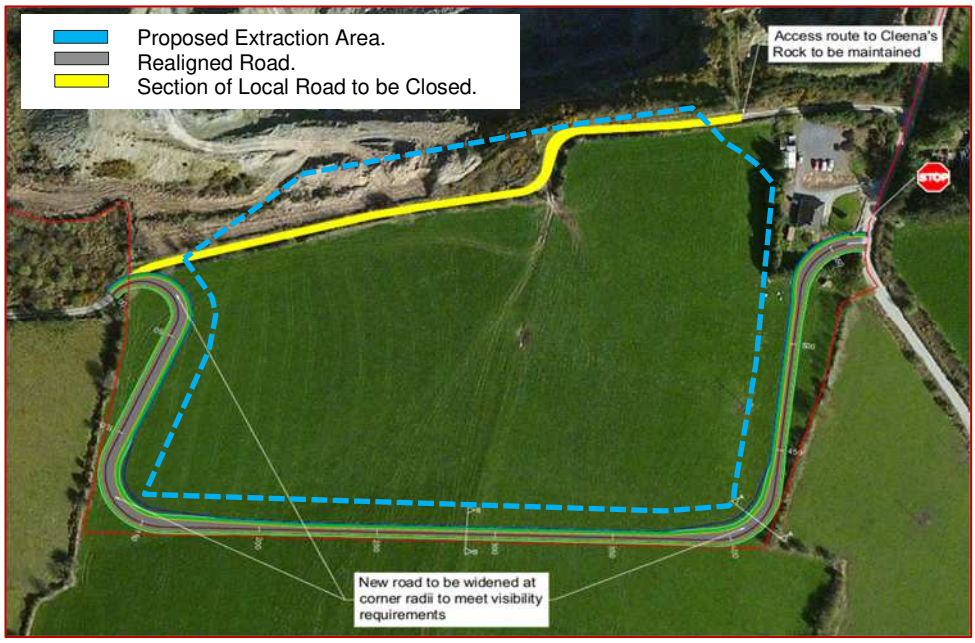
14.37 Vehicular traffic using the existing local road is low, averaging 20 vehicles per day. Pedestrian and cyclist numbers are also low given the condition of the road (i.e. narrow cross section) and its remote location. A Public Consultation Day was held in Bweeng on

the 30th June 2022, where proposals were presented to members of the local community. Proposals relating to the realignment of the local road received predominantly positive feedback.

14.38 Access to Cleena's Rock, which is an existing amenity on the existing local road, shall be retained for public access. Additionally, the realigned road will include a wider cross section to meet visibility requirements, and a bound pavement surface to support safer pedestrian and cycle movement.

14.39 As access to the existing local road is being maintained through the provision of a new realigned route, the impacts to the local road network are imperceptible. It should also be noted that this local road is not currently used, nor will it be used, by development traffic.

Figure 14-4: Realigned Local Road



14.40 The new road shall have a 3m paved width, which matches the existing local road, and verges ranging from 1-2m on either side of the new paved road. The design width of the realigned road will be increased from 3m to 6m in sections to support passing at horizontal curves, and to maximise forward stopping sight distances. This represents a significant improvement over the existing local road width and alignment.

14.41 The realigned road shall include full pavement construction, with over the edge drainage provided along its length. The design of both the pavement and drainage provision shall be undertaken following consultation with Cork County Council's Road's Department.

14.42 The layout provided in Figure 14-4 is a concept design that was prepared by PMCE to support the Public Consultation process in June 2022. The concept design, following the planning stage, shall be fully developed in accordance with TII design publications at the detail design stage, and subject to review by Cork County Council.

14.43 In relation to sight lines, the detail design shall be developed to achieve the following, in consultation with Cork County Council:

1 Sight lines of 80m to be provided, 3m back from the edge of the public road where the proposed new road meets the L-1214. The Applicant shall prepare drawings showing these sight lines, ensuring no object or structure greater than 1 metre is

within the sight distance triangle. These plans shall be submitted for Cork County Council review and approval.

2 The design shall be developed to support sight lines for right turning vehicles onto this proposed new road of 80m to the front and rear of vehicles turning right, ensuring no object or structure greater than 1 metre is within the sight distance triangle.

Potential Effects

14.44 The following sections assess the potential effects of the proposed quarry development under each of the following three headings. Trip and traffic details applicable to this phase and development are considered in Sections 14.6.1 and 14.6.5.

- **Link Capacity**: Link capacity is defined as the probability that the road network can accommodate a certain level of traffic demand and is built on the concept of network reserve capacity. Refer to Sections 14.6.3.
- **Junction Capacity**: Junction performance is measured as a ratio between the flow and capacity (RFC). The capacity analysis has been carried out for each weekday for a period of 12-hours, for each of the assessment years 2025, 2030 and 2040. A rural junction with an RFC below 0.85 is considered to be operating within capacity, and an RFC of 0.85 indicates a junction operating at capacity. Refer to Section 14.6.4.
- **Road Safety**: The continued use of the proposed development site access may give rise to road safety problems if not correctly maintained. Refer to Section 14.6.5.

Derived Trips

14.45 The site is estimated to export up to 275,000 tonnes of material from the site annually.

14.46 In determining the daily traffic volumes associated with the development an average of 42 loads per day arriving to, and departing from, the site has been calculated based on the following assumptions:

- The facility would operate for 50 weeks per year.
- Material would be transported from the site in 24 tonne loads.
- The facility would operate for 5.5 days per week (Monday to Saturday) inclusive.
- The facility opening times will be 07:00 to 18:00 on Monday to Friday and 07:00 to 14:00 on Saturday.

14.47 Table 14.11 below summarises the calculation of daily trips to/from the quarry from the average annual import, export, and extraction rates. Table 14.12 details the trip distribution that has been applied to the development traffic as part of the junction capacity analysis.

Table 14-11: Summary of Exported Material Daily Trips in Opening Year and Beyond

Exported Quarried Material (based upon maximum extraction rate / annum)	
Quantity per annum	275,000
Quantity per week	5,500
(50 operational weeks / year)	
Loads per week	229

Exported Quarried Material (based upon maximum extraction rate / annum)	
(24 tonnes / load)	
Loads per Day	42
(5.5 working days / week)	

Table 14-12: Summary of Predicted Daily Trips in Opening Year and Beyond

Development	Type of Traffic	Daily Trips	
		Arrivals	Departures
Quarry	**Transportation of Material (HGVs)**	42	42
	Other Site Processes (Concrete / block yard)	23	23
	Staff (LVs)	10	10
	Misc (LVs)	3	3
	Total	78	78

Potential Effects: Staff Trips

14.48 The site currently employs 5 directly, with a further 5 sub-contractors on-site on a regular basis. It is not anticipated that these numbers will increase. Staff / sub-contractor movements will generate 10 trips inbound in the morning and 10 trips outbound in the evening peak. Staff / sub-contractor car movements have been distributed in accordance with the existing light vehicle distribution at the site access. A conservative approach was taken as it was considered that these trips would coincide with the AM and PM Peaks.

Potential Effects: Miscellaneous Trips

14.49 A total of 6 trips have been assumed to occur daily to cater for possible miscellaneous trips associated with the site. These miscellaneous trips allow for deliveries to the quarry (e.g. fuel). It is considered that these trips would coincide with either peak hour.

Potential Effects: Concrete batching plant/Block yard Facility Trips

14.50 Planning permission is in place for a concrete batching plant and block yard at the quarry. The concrete plant has been installed and is operational, whilst the block plant has not been constructed to date. For the purpose of a robust assessment, it has been assumed that 46 trips will occur daily in accordance with the granted planning permission for the concrete plant and block yard (notwithstanding the fact that the block plant has not yet been installed). The trips generated by these operations have been added to the background traffic for this traffic assessment for the Opening Year, the Opening Year +5 and the Opening Year +15.

Summary of Operational Derived Quarry Development Trips

14.51 The total daily trips associated with the quarry operation accounts for 156 movements daily, 130 of which relate to HGV's (83.3%). These numbers are arrived at by summing the following components:

- 84 daily truck movements enter and exit the site (exporting material).

- 46 daily truck movements enter and exit the site (concrete batching plant and block yard).
- 20 staff trips daily.
- 6 miscellaneous trips daily.

Trip Assessment

14.52 The assignment of the development traffic on the adjacent road network is based on an assessment of the existing traffic flows at the proposed development access derived from the traffic count data.

14.53 Heavy vehicle traffic will be departing the quarry to and from the site along the L1214 and the L5361 to the north and west towards the R619 Regional Road. Light vehicle traffic departing the quarry will be split with 55% of traffic travelling to the south on the L1214 and 45% of traffic travelling to the north on the L1214. Existing traffic patterns have been maintained for the distribution of traffic to the surrounding network. Traffic assignments are illustrated in Figure 14 5 and Figure 14 6 below.

Figure 14-5: Assignment of quarry development traffic throughout the network (HGVs)

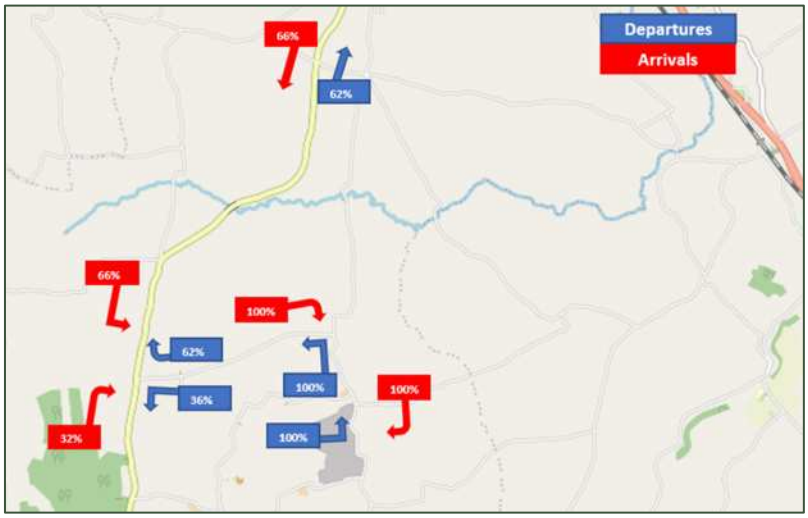
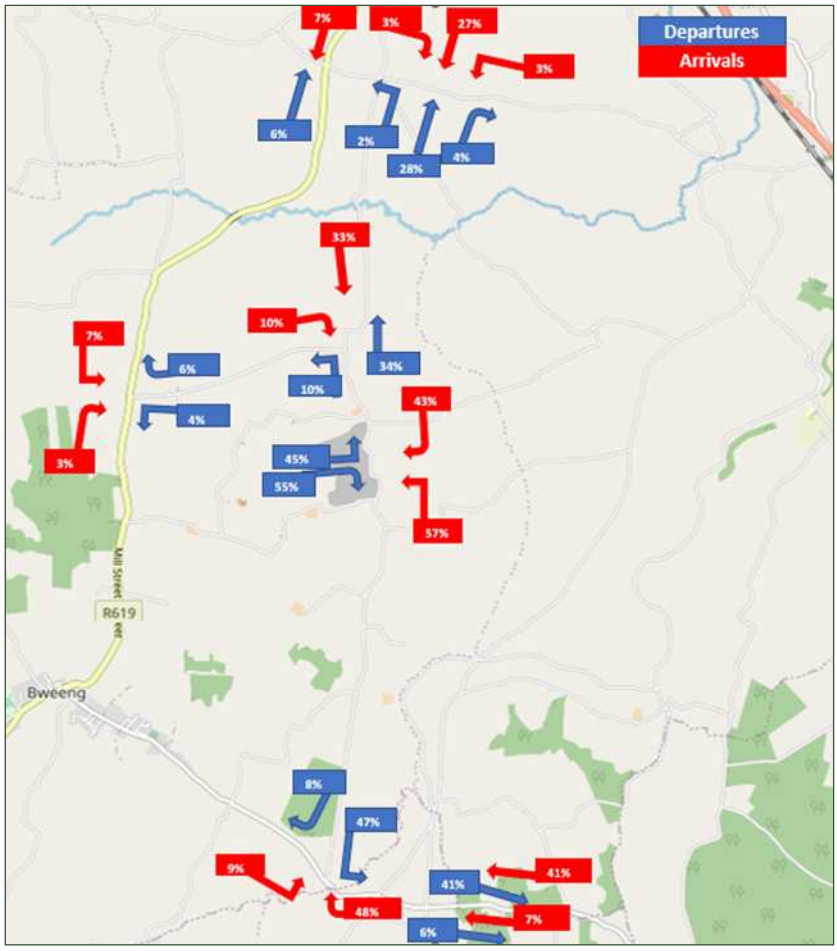


Figure 14-6: Assignment of quarry development traffic throughout the network (LVs)



Link Capacity Assessment

14.54 The TII Publications document reference DN-GEO-03031 (October 2017) provides guidance on recommended rural road layouts in its Table 6/1. It advises that the capacity of a Type 3 Single Carriageway Road with 6.0m cross-section is 5,000 AADT for a Level of Service D. The L1214, adjacent to the quarry, has an average cross-section width of approximately 7.0m with no hard shoulders present. Therefore, the L1214 is considered to be most similar to the Type 3 Single Carriageway cross-section in this document with a capacity of 5,000 AADT for Level of Service D.

14.55 The combined background and Site Traffic volumes, outlined in Table 14.13 in each of the assessment years is less than the LOS D capacity of 5,000 AADT for a Type 3 Single Carriageway. It is considered that the L1214 will operate within capacity for each of the assessment years. Table 4 2 indicates that the traffic associated with the proposed development represents between 33.04% and 27.09% of the total traffic on the L1214 during the assessment years 2024 to 2040.

Table 14-13: Combined AADT for Each Assessment Year (L1214)

	Assessment Year			
	Base Year	**2025**	**2030**	**2040**
Background Traffic	308	316	361	420
Additional Development Traffic	-	156	156	156
Combined Traffic (Background + Additional Dev. Traffic)	308	472	517	576
Additional Traffic as % of Combined Traffic	-	33.04%	30.15%	27.09%

14.56 It is concluded that the L1214 will have sufficient link capacity for each of the future assessment years with, and without, the Proposed Development. The effect on link capacity will therefore be Imperceptible.

Junction Capacity Analysis

Potential Effects: Location: Junction 3: Glannoge Cross

14.57 A summary of the junction capacity analysis results for Glannoge Cross is shown in Table 14.14. The results indicate that the junction will continue to operate within capacity for each of the assessment years 2025, 2030 and 2040. The effect on the local road network is therefore **Imperceptible**.

Table 14-14: Summary of Junction Capacity Analysis at Glannoge Cross

	12 Hours (07:00 – 19:00)			
	Queue (Veh)	**Delay (s)**	**RFC**	**LOS**
Stream	**2025 Without Development**			
L5361- R619 South	0.0	11.11	0.01	0.0
L5361- R619 North/Local access	0.0	15.07	0.03	0.0
R619 North	0.0	6.77	0.01	0.0
Local Access- R619 North	0.0	6.73	0.01	0.0
Local Access- R619 South/L5361	0.0	8.31	0.01	0.0
R619 South	0.0	10.20	0.01	0.0
Stream	**2025 With Development**			
L5361- R619 South	0.0	11.79	0.02	0.0
L5361- R619 North/Local access	0.1	15.05	0.05	0.1
R619 North	0.0	6.76	0.01	0.0
Local Access- R619 North	0.0	6.74	0.01	0.0
Local Access- R619 South/L5361	0.0	8.37	0.01	0.0
R619 South	0.0	10.17	0.02	0.0

	12 Hours (07:00 – 19:00)			
	Queue (Veh)	Delay (s)	RFC	LOS
Stream	**2030 Without Development**			
L5361- R619 South	0.0	11.15	0.01	0.0
L5361- R619 North/Local access	0.0	15.20	0.04	0.0
R619 North	0.0	6.72	0.02	0.0
Local Access- R619 North	0.0	6.76	0.01	0.0
Local Access- R619 South/L5361	0.0	8.38	0.01	0.0
R619 South	0.0	10.19	0.02	0.0
Stream	**2030 With Development**			
L5361- R619 South	0.0	11.87	0.02	0.0
L5361- R619 North/Local access	0.1	15.31	0.05	0.1
R619 North	0.0	6.71	0.02	0.0
Local Access- R619 North	0.0	6.77	0.01	0.0
Local Access- R619 South/L5361	0.0	8.44	0.01	0.0
R619 South	0.0	10.15	0.02	0.0
Stream	**2040 Without Development**			
L5361- R619 South	0.0	11.21	0.02	0.0
L5361- R619 North/Local access	0.1	15.37	0.04	0.1
R619 North	0.0	6.66	0.02	0.0
Local Access- R619 North	0.0	6.80	0.01	0.0
Local Access- R619 South/L5361	0.0	8.46	0.01	0.0
R619 South	0.0	10.18	0.02	0.0
Stream	**2040 With Development**			
L5361- R619 South	0.0	11.96	0.02	0.0
L5361- R619 North/Local access	0.1	15.59	0.06	0.1
R619 North	0.0	6.65	0.02	0.0
Local Access- R619 North	0.0	6.8	0.01	0.0
Local Access- R619 South/L5361	0.0	8.52	0.01	0.0
R619 South	0.0	10.13	0.03	0.0

Potential Effects: Location: Junction 4: Tobergal Bridge

14.58 A summary of the junction capacity analysis results for this junction is shown in Table 14.15. The results indicate that the junction will continue to operate within capacity for each of the assessment years 2025, 2030 and 2040. The effect on the local road network is therefore Imperceptible.

Table 14-15: Summary of Traffic Analysis at Tobergal Bridge

	12 Hours (07:00 – 19:00)		
	Queue (Veh)	Delay (s)	RFC
Stream	**2025 Without Development (Opening Year)**		
L5361- L1214 North	0.0	8.67	0.03
L5361- L1214 South	0.0	15.40	0.03
L1214 South	0.0	11.87	0.02
Stream	**2025 With Development (Opening Year)**		
L5361- L1214 North	0.0	7.23	0.02
L5361- L1214 South	0.1	16.16	0.06
L1214 South	0.0	11.92	0.02
Stream	**2030 Without Development**		
L5361- L1214 North	0.0	8.93	0.03
L5361- L1214 South	0.1	15.88	0.04
L1214 South	0.0	12.11	0.02
Stream	**2030 With Development**		
L5361- L1214 North	0.0	7.63	0.03
L5361- L1214 South	0.1	16.25	0.06
L1214 South – L5361/L1214 North	0.0	12.16	0.02
Stream	**2040 Without Development**		
L5361- L1214 North	0.0	9.22	0.04
L5361- L1214 South	0.1	16.33	0.05
L1214 South	0.0	12.28	0.03
Stream	**2040 With Development**		
L5361- L1214 North	0.0	8.10	0.04
L5361- L1214 South	0.1	16.49	0.07
L1214 South	0.0	12.33	0.03

Potential Effects: Location: Junction 7: Junction of Quarry Access Junction

14.59 A summary of the junction capacity analysis results for this junction is shown in Table 14.16. The results indicate that the junction will continue to operate within capacity for each of the assessment years 2025, 2030 and 2040. The effect on the local road network is therefore Imperceptible.

Table 14-16: Summary of Traffic Analysis at Quarry Access

	12 Hours (07:00 – 19:00)		
	Queue (Veh)	**Delay (s)**	**RFC**
Stream	**2025 Without Development (Opening Year)**		
Quarry Access- L1214 North	0.0	10.50	0.03
Quarry Access- L1214 South	0.0	6.67	0.01
L1214 North	0.0	12.34	0.03
Stream	**2030**		
Quarry Access- L1214 North	0.0	10.51	0.03
Quarry Access- L1214 South	0.0	6.68	0.01
L1214 North	0.0	12.35	0.03
Stream	**2040**		
Quarry Access- L1214 North	0.0	10.52	0.03
Quarry Access- L1214 South	0.0	6.69	0.01
L1214 North	0.0	12.36	0.03

Potential Effects: Road Safety

Potential Effects: Road Safety: Sightlines

14.60 The entrance to the quarry is located on an unnamed local road south of the crossroads junction. The Quarry Access Road continues north of the quarry access towards Mallow and south of the quarry towards Cork City. The posted speed limit on this road is 80kph.

14.61 Visibility to the north and south of the quarry access is limited by the horizontal alignment of the local road. However, the horizontal alignment and narrow road cross section passively control vehicle speeds on the local road. Whilst the sightlines at the access fall short of the requirements noted in TII Publications document “Rural Link Design” (DN-GEO-03031), these geometric constraints, coupled with the low traffic volumes on the local road, have resulted in a safe quarry access that has no recorded collisions. The existing access shall be retained and can be expected to continue providing a safe access for quarry traffic.

14.62 The proposed, realigned, road shall form a junction with the L1214 at the apex of an existing horizontal curve on the local road to ensure sightline requirements (80m) can be met to the north and south of the new junction. Where necessary, vegetation shall be cleared to maintain sightline requirements in both directions.

14.63 The design width of the realigned road has been increased in sections to support passing at horizontal curves, and to maximise forward stopping sight distances. This represents a significant improvement over the existing local road width and alignment.

14.64 Therefore, the effect on the local road network is considered to be **Imperceptible**.

Potential Effects: Road Safety: Public Transport

14.65 There are no public transport provisions in the vicinity of the site due to its rural location.

Potential Effects: Road Safety: Parking

14.66 The site contains c. 20 parking spaces. This parking provision is sufficient for the number of staff / sub-contractors working on site and also for any miscellaneous trips that may occur. Therefore, the effect on the local road network is considered to be **Imperceptible**.

Potential Effects: Pedestrians and Cyclists

14.67 There are no footpaths or cycle provisions in the vicinity of the site. The absence of these facilities at this location is not connected with the operation of the site. Therefore, the effect on the local road network is considered to be **Imperceptible**.

Potential Effects: Road Safety Summary

14.68 A review of the local road network in terms of Road Safety has not identified any existing or potential safety issues that may give rise to road collisions. The proposed quarry development will therefore have an **Imperceptible** effect on road safety.

Mitigation and Management

14.69 No significant effects were identified with the proposed development, and therefore no mitigation measures are proposed.

Monitoring

14.70 During this phase, if required by the Local Authority, a Construction (Demolition) Traffic Management Plan will be in place for the relevant work areas. Monitoring of this phase will be regulated through adherence to this plan.

Residual Effects

14.71 The residual effects are deemed **Not Significant.**

Cumulative Effects

The Project – Quarry Development

14.72 The cumulative effects from the Project are deemed Not Significant, in line with the potential effects already assessed in Section 14.6.

The Project and Other Offsite Projects

14.73 The cumulative effects are deemed **Not Significant** between the Project and other offsite Projects.

Do-Nothing Scenario

14.74 If the proposed development does not proceed, the existing traffic on the surrounding road network can be expected to continue growing at the expected growth rates. The impact of future background traffic on the surrounding junctions are indicated in the 'Without Development' results in the Junction Capacity Assessment tables.

Difficulties Encountered

14.75 There were no particular difficulties encountered during the compilation of this chapter.

References

- Environmental Protection Agency (2022) 'Guidelines on the information to be contained in Environmental Impact Assessment Reports'. Available at: https://www.epa.ie/publications/monitoring--assessment/assessment/EIAR_Guidelines_2022_Web.pdf (Accessed: 23 rd November 2023).
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- Transport Infrastructure Ireland (2021) 'Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections'. Available at: https://www.tiipublications.ie/library/PE-PAG-02017-03.pdf (Accessed: 23 rd November 2023).

Appendix 14-A Traffic and Transport Assessment (TTA)

Breedon Materials Ltd, t/a Breedon Ireland

Quarry Development at Carrigcleena More, Bweeng, Co. Cork

Traffic and Transport Assessment

P·M·C·E

November 2024

Breedon Materials, Ltd t/a Breedon Ireland

Quarry Development at Carrigcleena More, Bweeng, Co. Cork

Traffic and Transport Assessment

Document Ref:	P21-019-RP-003

Rev	Prepared By	Reviewed By	Approved By	Issue Date	Reason for Revision
2.0	AP	AP	TAG	26th November 2024	Final Report
1.0	AMG	AP	TAG	12th August 2024	Draft Report

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Executive Summary

PMCE Ltd was commissioned by the Breedon Materials Ltd., trading as Breedon Ireland, to undertake a review of the traffic impacts associated with a proposed development at Carrigcleena More, Bweeng, Co. Cork.

The proposed development relates to the continued operation and extension of the existing Breedon quarry located northeast of the town of Bweeng. The proposed development is expected to extend the life of the quarry without affecting the material extraction rate of up to 275,000 tonnes per year.

The quarry is located approximately 3km northeast of Bweeng town, 6km southwest of Mallow town, and approximately 23km northwest of Cork City. Quarry traffic will utilise an existing access from L1214 approximately 850m south of its junction with L5361, and 750m north of its junctions with L2766.

The “Traffic and Transport Assessment Guidelines” published by Transport Infrastructure Ireland recommend the assessment of traffic in the Base Year, for the Opening Year, the Opening Year +5 years and the Opening Year +15 years. The assessment years for the impact assessment are therefore 2024 for the Base Year, 2025 for the Opening Year, 2030 and 2040 for the Future Assessment Years.

An assessment of link capacity on the L1214 was undertaken for 2025, 2030 and 2040. It was determined that the road will continue to operate within capacity for each of the assessment years 2025, 2030 and 2040.

Junction Capacity Analysis was undertaken at the junctions between the L1214 & Quarry Access, Tobergal Bridge, and Glannoge Cross. The results of the Junction Capacity Analysis indicate that junctions assessed will operate within capacity for each of the assessment years 2025 (Opening year), 2030, and 2040.

An application for an extinguishment of the Public Right of Way will be required (as provisioned in the Roads Act, 1993, Section 73) on a section of approximately 260m of the local road situated to the south of the existing quarry to facilitate the quarry extension. It is proposed that a new road will be provided to replace the existing section of road being removed, which shall maintain vehicle, pedestrian, and cycle access for users of the existing Local Road.

As access to the existing local road is being maintained through the provision of a new realigned route, the impacts to the local road network are negligible. It is noted that this local road is not currently used, nor will it be used, by development traffic.

This Traffic and Transport Assessment concludes that junctions within the vicinity of the development shall continue to operate within capacity for each of the assessment years 2025, 2030 and 2040.

Glossary of Terms

Road Network:	The existing and proposed public and private roads within the study area.
Traffic Growth:	The normal expected growth in traffic over time.
Trip:	One movement, in or out of the study area by foot, cycle or vehicle.
Thresholds:	Minimum intervention levels at which Transport and Traffic Assessments are to be conducted.
Generated Trips:	Additional trips made as a result of the presence of a development.
Peak Time:	Time of day at which the transport demands from a development are greatest.
Capacity Calculations:	Standardised methods of estimating traffic capacity on links and at junctions.
Trip Distribution:	The estimated directional distribution of the estimated traffic at each junction in the study area.
Trip Assignment:	The final estimated flows of traffic for each direction of travel at each junction and along each link within the study area.
TRICS:	A database containing empirically obtained trip generation data for a wide range of different types of developments.
AADT:	Annual Average Daily Traffic – The mean daily traffic volume over the course of a year on a particular route.
Level of Service:	Level of Service (LOS) is a measure of the capacity of a road related to the average vehicular speed and level of congestion on the road. It is ranges from LOS A to LOS F, with A representing free flow and F representing stop/start traffic. LOS C represents stable flow conditions.

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1 Introduction

1.1 General

PMCE Ltd were commissioned by Breedon Materials Ltd., trading as Breedon Ireland, to undertake a review of the traffic impacts associated with the proposed continued operation and extension to the existing Breedon quarry located at Carrigcleena More, Bweeng, Co. Cork.

1.2 Information Reviewed

In preparing this report reference has been made to the following documents:

- Traffic Count Survey Data, collected by Traffinomics on the 30th April 2024
- Transport Infrastructure Ireland (TII) Publications document PE-PDV-02045, "Traffic and Transport Assessment Guidelines" (May 2014) published by TII
- TII Publications document PE-PAG-02017, "Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections" (October 2021) published by TII
- TII Publications document PE-PAG-02039, "Project Appraisal Guidelines for National Roads Unit 16.1 - Expansion Factors for Short Period Traffic Counts" (October 2016) published by TII
- TII Publications document DN-GEO-03031, "Rural Road Link Design" (June 2017, May 2023) published by TII
- TII Publications document DN-GEO-03060, "Geometric Design of Junctions (priority junctions, direct accesses, roundabouts, grade-separated and compact grade-separated junctions)" (May 2023) published by TII

1.3 Scope

The objective of this report is to examine the traffic implications associated with the proposed development in terms of its integration with existing traffic in the area. The report determines and quantifies the extent of additional trips generated by the development, and the impact on operational performance of such trips on the local road network.

1.4 Methodology

The methodology adopted for this appraisal and report involved, in brief:

- **Site Visit:** Site visits were undertaken on the 31st October 2018, the 30th June 2022 and the 29th November 2023. The weather was dry and the ground surface was dry on each occasion.

- **Trip Generation and Trip Assignment**: This is used to derive trip rates for a 12-hour period and to assign such trips to the surrounding road network according to which direction of travel vehicles will travel to/from the Breedon Quarry in Carrigcleena More, Bweeng, Co. Cork.

- **Link Capacity Assessment**: To obtain an AADT value for the main roads linking the Breedon Quarry in at Carrigcleena More, Bweeng, Co. Cork to the surrounding network.

- **Junction Capacity Assessment**: The traffic count data was used to develop a Junctions 9 model for the assessed junctions.

- **Future Year Assessments**: The estimated future year volumes on the study area network, as a result of the increase in background traffic and any site related traffic, was used to assess the future operational performance of the junctions and surrounding road network for 2025 (assumed year of opening) and at two future assessment years, the opening year +5 (2030) and the opening year +15 (2040).

1.5 Location plan

Figure 1-1 shows the proposed development of the Breedon Quarry at Carrigcleena More, Bweeng, Co. Cork and surrounding area.

FIGURE 1-1: LOCATION PLAN

2 Existing Conditions

2.1 The Site

The proposed development relates to the continued operation and extension to the existing Breedon quarry located in the townland of Carrigcleena More, approximately 3km northeast of Bweeng town, 6km southwest of Mallow town, and approximately 23km northwest of Cork City.

The lands surrounding the subject site can be characterised as rural, with land uses in the area comprising agriculture, and single house residential.

The proposed application is expected to extend the life of the quarry without affecting the current material extraction rate. It will include the following works:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities.
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over an extraction area of c. 3.7 hectares.
- Realignment of a section of the existing local road to the south of the proposed extension area.
- Overburden storage area.
- Landscaping including perimeter screening berms around the proposed extension area.
- All related ancillary site works for a period of 20 years and a further 2 years to complete final restoration of the site.

The development will utilise existing accesses from L1214 local road approximately 850m south of its junction with L5361 and 750m north of its junction with L2766. Operations at the existing quarry include the extraction and processing of stone and the production of readymix concrete. A concrete block plant is also permitted but has not been constructed to date.

2.2 Existing Road Network

2.2.1 L1214

The L1214 road is a local road linking Upper Dromahane to the L2766 local road south-east of Bweeng. The L1214 is approximately 8km long, running in a north to south direction. In the vicinity of the site, The L1214 is approximately 6m wide with no road markings, footpaths or hard strips. The speed limit of the L1214 in the vicinity of the site is 80km/h.

2.2.2 L5361

The L5361 local road is north of the site. The L5361 links the R619 regional road, approximately 1.6 km north-west of the site (from the nearest point), and the L1214 local road. The L5361 is approximately 1.8km long, running in a south-west to north-east direction. The L5361 is approximately 5m wide with small sections of hard strips and no footpaths or road markings. The speed limit of the L5361 is 80km/h.

2.2.3 L2766

The L2766 local road south of the site links the L1214 to the L2765 local road and Bweeng to the south-east and north-west, respectfully. The L2766 is approximately 7km long, running in a north-west to south-east direction. The L2766 is approximately 5m wide with no footpaths or hard strips. There are clear traffic warning signs for junctions along the L2766. The speed limit of the L2766 is 80km/h.

2.3 Traffic Volumes

Classified 12-Hour Junction Turning Counts (JTCs) were carried out on the 30th of April 2024, by Traffinomics Ltd., at a total of 8No junctions along the designated haul routes between the quarry site and the surrounding road network. The counts were carried out between 7:00am and 7:00pm, with this time period encompassing the peak hours on the adjacent National and Local Roads network. Surveyed vehicles were broken down into five categories as follows:

- Cars
- LGV's (Light Goods Vehicles)
- OGV1 (Two and three axle goods vehicles)
- OGV2 (Four and five axle goods vehicles)
- Buses

The detailed results of the traffic survey are summarised in Appendix B. The morning and evening peak hours have been established as:

- **Junction 1: L5360/R619/L5359 crossroads junction (referred to as the 'Kilpadder Cross' in this report) -** 08:15 - 09:15 (AM Peak) and 16:30 - 17:30 (PM Peak);
- **Junction 2: L5360/L5364/L1214 crossroads junction (referred to as the 'Pendy' s Cross' in this report) -** 08:45 - 09:45 (AM Peak) and 17:00 - 18:00 (PM Peak)
- **Junction 3: L5361 & R619 staggered junction (referred to as the 'Glannoge Cross' in this report)** - 08:00 - 09:00 (AM Peak) and 16:30 - 17:30 (PM Peak)
- **Junction 4: L1214 & L5361 T-junction (referred to as the 'Tobergal Bridge' in this report)** - 08:45 - 09:45 (AM Peak) and 16:45 - 17:45 (PM Peak)
- **Junction 5: L2766 & L1214 T-junction (referred to as the 'Coolfadda Junction' in this report)** - 08:00 - 09:00 (AM Peak) and 17:00 - 18:00 (PM Peak)
- **Junction 6: L2766 & L2765 T-junction (referred to as the 'Ahadallane Junction' in this report)** - 08:00 - 09:00 (AM Peak) and 17:00 - 18:00 (PM Peak)
- **Junction 7: L1214 & Quarry Access T-junction (referred to as the 'Quarry Access' in this report)** - 11:30 - 12:30 (AM Peak) and 17:00 - 18:00 (PM Peak)
- **Junction 8: L1214 & L5362 T-junction (referred to as the 'L5362 Junction' in this report)** - 11:15 - 12:15 (AM Peak) and 17:00 - 18:00 (PM Peak)

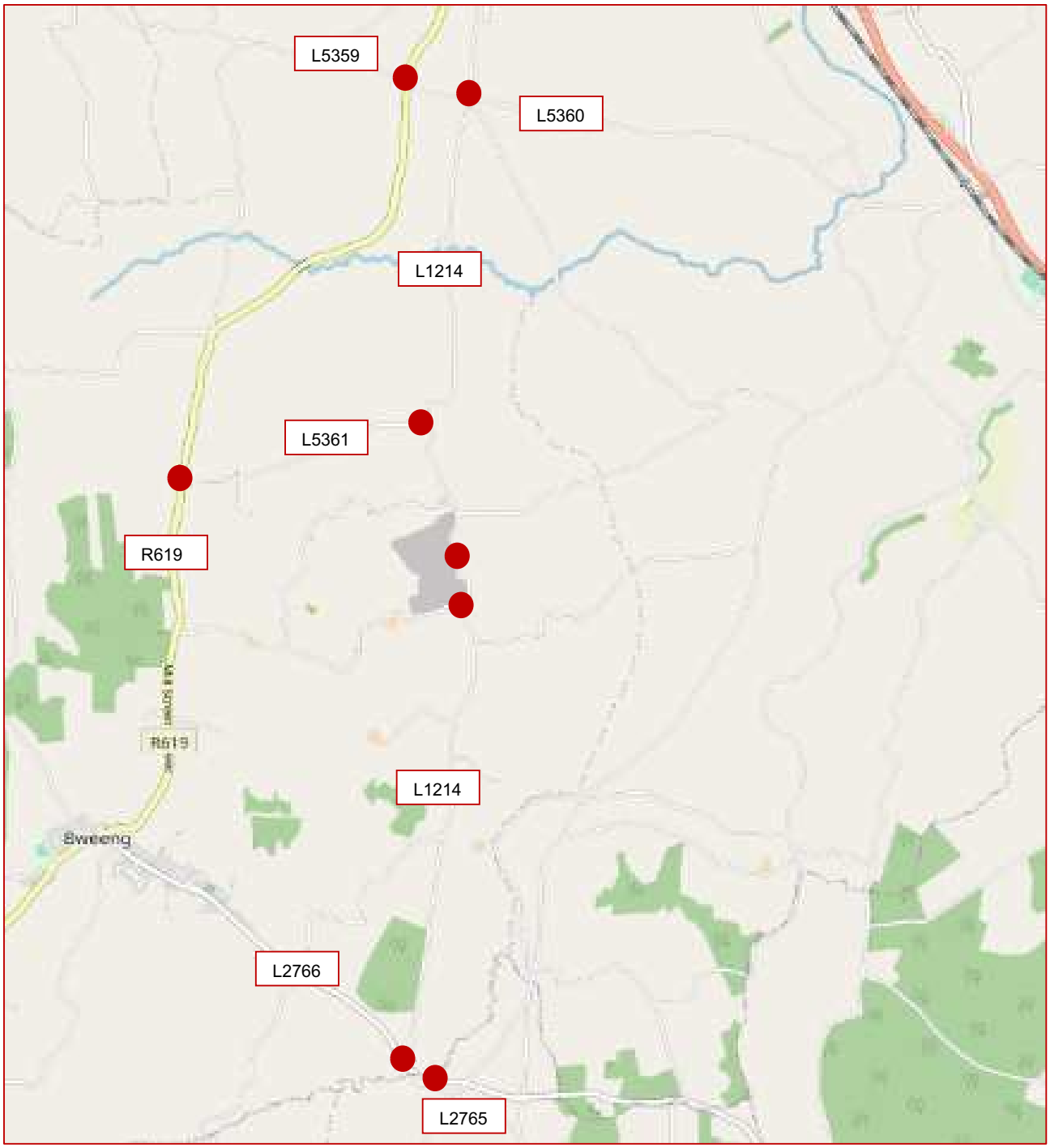

FIGURE 2-1: SURROUNDING ROAD NETWORK LAYOUT

The traffic count data for each site has been converted to Annual Average Daily Traffic (AADT) values using the methodology described in "Expansion Factors for Short Period Traffic Counts" (Unit 16.1 NRA Project Appraisal Guidelines, October 2016). Appendices A to C of the above document were used in the expansion of traffic counts to AADTs. The AADT was calculated to determine the percentage increase in traffic volumes on the surrounding road network as a result of the trips generated by the proposed development.

A combined factor of 0.779 was arrived at by combining the individual hourly factors for the count duration. This factor was then used to determine the 24-hour traffic flow. This was then converted to a Weekly Average Daily Traffic (WADT) using an index of 0.96 for the Tuesday traffic count. Finally, this was converted to AADT using an index of 0.98 for the month of April. These factors were used to calculate the AADT for each junction.

The resulting AADT figures at each junction are provided in Appendix C.

3 Proposed Development

3.1 Trip Generation & Distribution

3.1.1 General

The proposed application is in relation to the continuation, and extension, of the current operation at the existing Breedon Quarry located in the townland of Carrigcleena More, northwest of Cork City.

The development will utilise existing accesses from the L1214 local road approximately 850m south of its junction with the L5361 and 750m north of its junction with the L2766. The operations at the quarry include the extraction and processing of stone.

The proposed application is expected to extend the life of the quarry without affecting the currently material extraction rate. Therefore, for the purpose of this assessment, existing traffic movements to/from the quarry which relate to the various existing operations at the site have been removed from the background traffic. Once the background traffic was expanded for the future assessment years the traffic generated by all operations at the proposed development, both in relation to the proposed extension and existing operations, was added for each year.

An application for an extinguishment of the Public Right of Way will be required (as provisioned in the Roads Act, 1993, Section 73) on a section of approximately 260m of the local road situated to the south of the existing quarry to facilitate the quarry extension. It is proposed that a new road will be provided to replace the existing section of road being removed, which shall maintain vehicle, pedestrian, and cycle access for users of the existing Local Road.

Vehicular traffic using the existing local road is low, averaging 20 vehicles per day. Pedestrian and cyclist numbers are also low given the condition of the road (i.e. narrow cross section) and its remote location. A Public Consultation Day was held in Bweeng on the 30th June 2022, where proposals were presented to members of the local community. Proposals relating to the realignment of the local road received predominantly positive feedback.

Access to Cleena's Rock, which is an existing local amenity, shall be retained for public access. Additionally, the realigned road will include a wider cross section to meet visibility requirements, and a bound pavement surface to support safer pedestrian and cycle movement.

As access to the existing local road is being maintained through the provision of a new realigned route, the impacts to the local road network are negligible. It should also be noted that this local road is not currently used, nor will it be used, by development traffic.

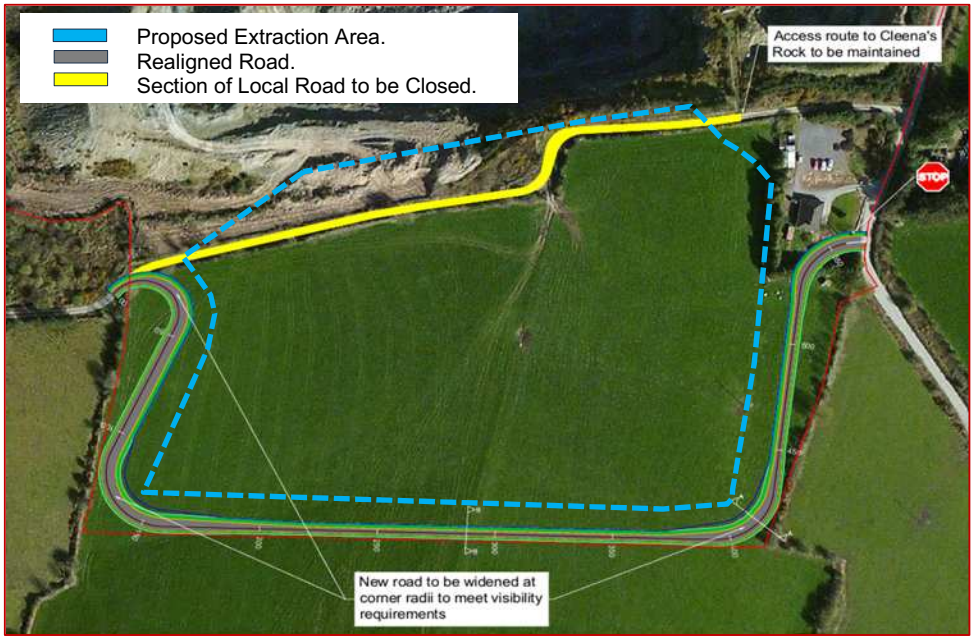

FIGURE 3-1 REALIGNED LOCAL ROAD

The new road shall have a 3m paved width, which matches the existing local road, and verges ranging from 1-2m on either side of the new paved road. The design width of the realigned road will be increased from 3m to 6m in sections to support passing at horizontal curves, and to maximise forward stopping sight distances. This represents a significant improvement over the existing local road width and alignment.

The realigned road shall include full pavement construction, with over the edge drainage provided along its length. The design of both the pavement and drainage provision shall be undertaken following consultation with Cork County Council's Road's Department.

The layout provided in Figure 3-1 is a concept design that was prepared by PMCE to support the Public Consultation process in June 2022. The concept design, following the planning stage, shall be fully developed in accordance with TII design publications at the detail design stage, and subject to review by Cork County Council.

In relation to sight lines, the detail design shall be developed to achieve the following, in consultation with Cork County Council:

1. Sight lines of 80m to be provided, 3m back from the edge of the public road where the proposed new road meets the L-1214. The Applicant shall prepare drawings showing these sight lines, ensuring no object or structure greater than 1 metre is within the sight distance triangle. These plans shall be submitted for Cork County Council review and approval.

2. The design shall be developed to support sight lines for right turning vehicles onto this proposed new road of 80m to the front and rear of vehicles turning right, ensuring no object or structure greater than 1 metre is within the sight distance triangle.

3.1.2 Quarry Operations

The site is estimated to export up to 275,000 tonnes of material from the site annually.

In determining the daily traffic volumes associated with the development an average of 42 loads per day arriving to, and departing from, the site has been calculated based on the following criteria:

- The facility will operate for 50 weeks per year.
- Material will be transported from the site in 24 tonne loads on average.
- The facility will operate for 5.5 days per week (Monday to Saturday) inclusive.
- The facility opening times will be 07:00 to 18:00 on Monday to Friday and 07:00 to 14:00 on Saturday.

Table 3.1 below summarises the calculation of daily trips to/from the quarry from the average annual import, export, and extraction rates.

TABLE 3.1: SUMMARY OF PREDICTED DAILY TRIPS IN OPENING YEAR AND BEYOND

Development	Type of Traffic	Daily Trips		
		Total amount	Capacity per Load	Daily Loads
Quarry	Exported Quarried Material	275,000	24	42

	Trips
Total Daily Trips	84

3.1.3 Staff Trips

The site currently employs 5 staff members directly, with a further 5 sub-contractors on-site on a regular basis. It is not anticipated that these numbers will increase. Staff/sub-contractor movements will generate 10 trips inbound in the morning and 10 trips outbound in the evening peak. Staff/sub-contractor car movements have

been distributed in accordance with the existing light vehicle distribution at the site access. A conservative approach was taken as it was considered that these trips would coincide with the AM and PM Peaks.

3.1.4 Miscellaneous Trips

A total of 6 trips have been assumed to occur daily to cater for possible miscellaneous trips associated with the site. These miscellaneous trips allow for deliveries to the quarry (e.g. fuel). It is considered that these trips would coincide with either peak hour.

3.1.5 Concrete batching plant/Block yard Facility Trips

Planning permission is in place for a concrete batching plant and block yard at the quarry. The concrete plant has been installed and is operational, whilst the block plant has not been constructed to date. For the purpose of a robust assessment, it has been assumed that 46 trips will occur daily in accordance with the granted planning permission for the concrete plant and block yard (notwithstanding the fact that the block yard has not yet been installed). The trips generated by these operations have been added to the background traffic for this traffic assessment for the Opening Year, the Opening Year +5 and the Opening Year +15.

3.1.6 Derived Trip Rate

The total daily trips associated with the quarry operation accounts for 156 movements daily, 130 of which relate to HGV's (83.3%). These numbers are arrived at by summing the following components:

- 84 daily truck movements enter and exit the site (exporting material).
- 46 daily truck movements enter and exit the site (concrete batching plant and block yard).
- 20 staff trips daily.
- 6 miscellaneous trips daily.

3.1.7 Trip Distribution & Composition

Appendix A contains extracts from the TRICS database regarding the forecast daily arrivals/departures distribution for quarry sites. By inspection, it can be seen that the pattern of arrivals/departures is consistent with a short turn around within the sites, e.g. that vehicles generally arrive and depart within a short time period, likely to be less than an hour.

The distribution of the development traffic on the adjacent road network is based on an assessment of the existing traffic flows at the site access derived from the traffic count data. Table 3.2 details the trip distribution that has been applied to the development traffic as part of the junction capacity analysis.

TABLE 3.2: SUMMARY OF PREDICTED DAILY TRIPS IN OPENING YEAR AND BEYOND

Development	Type of Traffic	Daily Trips	
		Arrivals	Departures
Quarry	Transportation of Material (HGVs)	42	42
	Other Site Processes (Concrete plant, block yard)	23	23
	Staff (LVs)	10	10
	Misc (LVs)	3	3
Total		78	78

3.2 Trip Assignment

The assignment of the development traffic on the adjacent road network is based on an assessment of the existing traffic flows at the proposed development access derived from the traffic count data.

Heavy vehicle traffic will be departing the quarry to and from the site along the L1214 and the L5361 to the north and west towards the R619 Regional Road. Traffic assignments are illustrated in Figure 3-2.

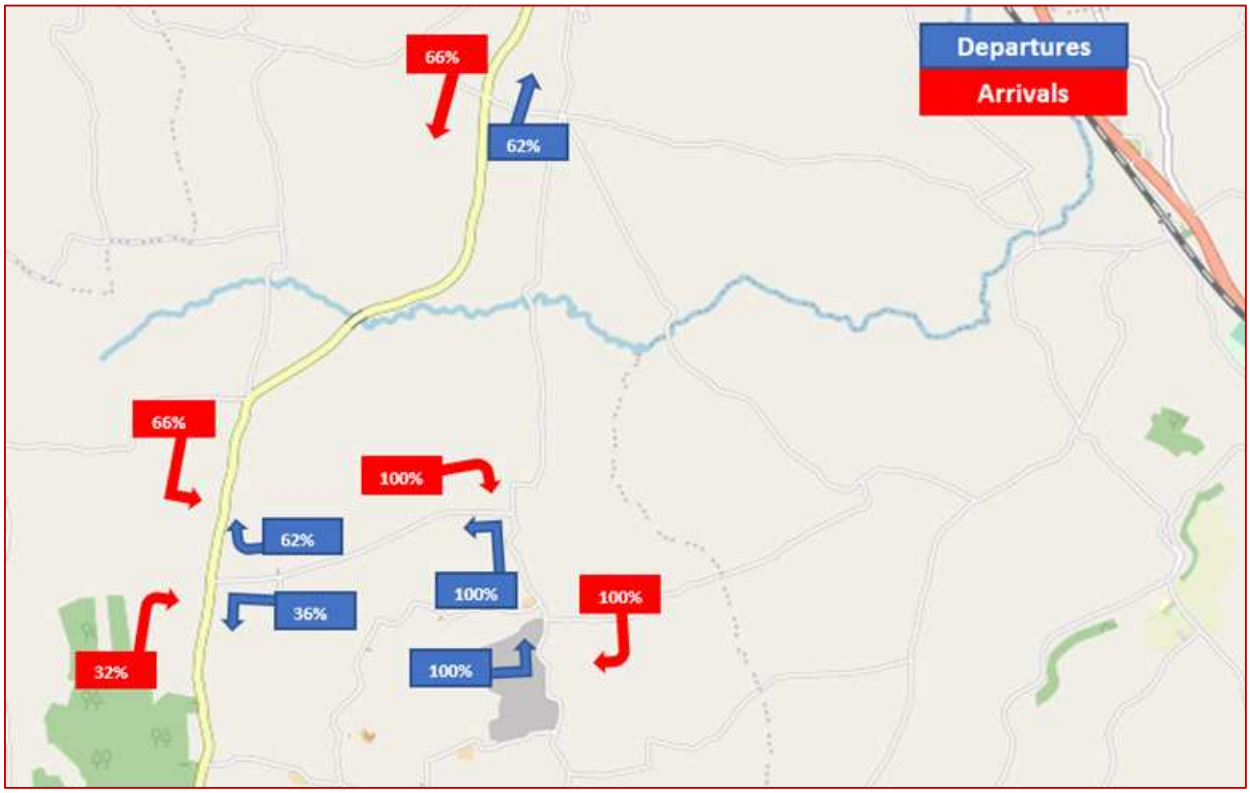

FIGURE 3-2: ASSIGNMENT OF QUARRY DEVELOPMENT TRAFFIC THROUGHOUT THE NETWORK (HGVS)

Light vehicle traffic departing the quarry will be split with 55% of traffic travelling to the south on the L1214 and 45% of traffic travelling to the north on the L1214. Existing traffic patterns have been maintained for the distribution of traffic to the surrounding network. Traffic assignments are illustrated in Figure 3-3.

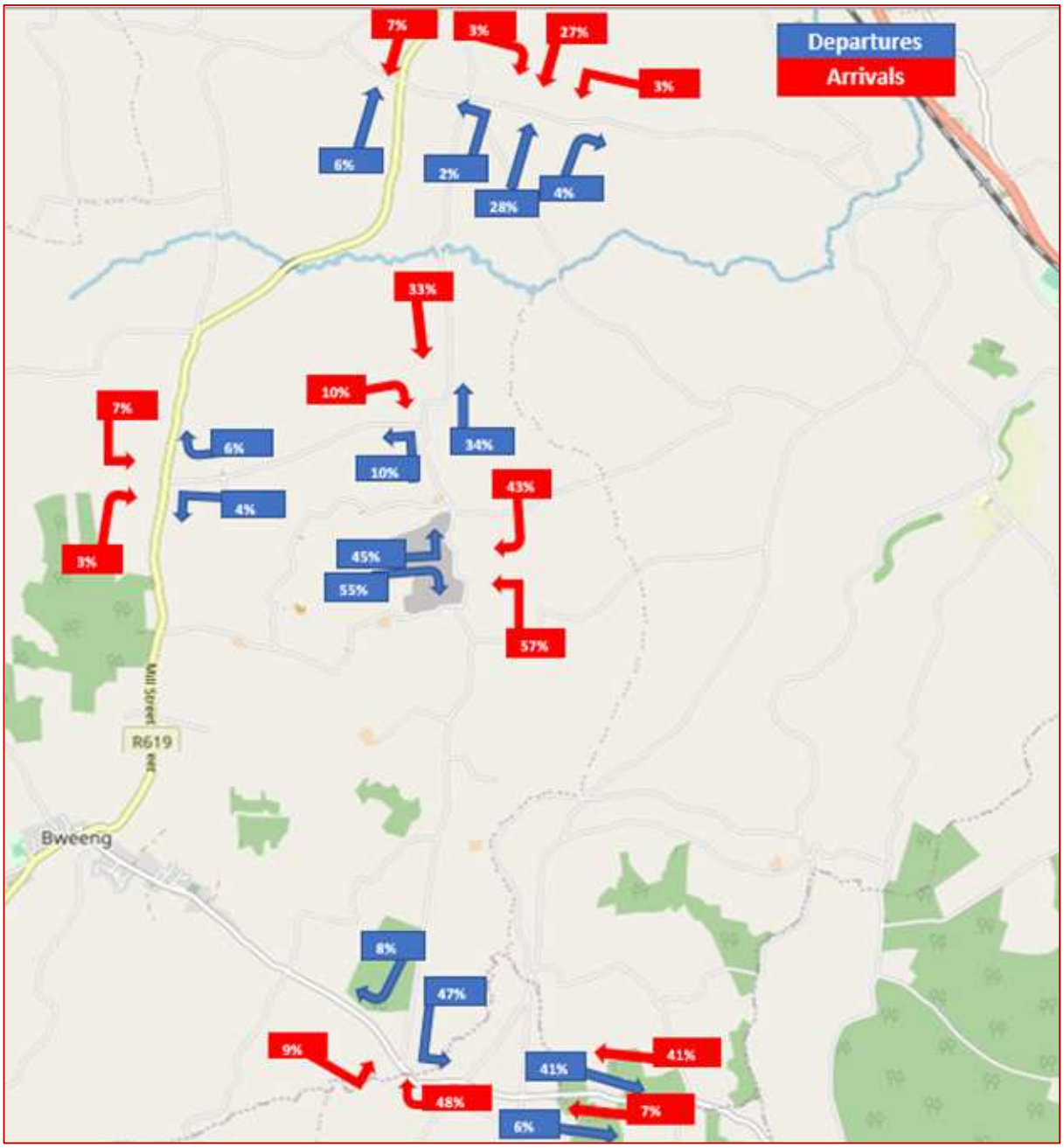

FIGURE 3-3: ASSIGNMENT OF QUARRY DEVELOPMENT TRAFFIC THROUGHOUT THE NETWORK (LVS)

3.3 Scope of Assessment

The Breedon quarry at Carrigcleena More, Co. Cork, will result in an increase in the traffic volumes at junctions within the road network in the vicinity of the proposed development. Section 2.1 of the "Traffic and Transport Assessment Guidelines" published by Transport Infrastructure Ireland recommends that in an urban or congested setting that a traffic assessment should cover all roads and junctions where the development traffic exceeds 5% of the existing or background traffic. Figure 3-4 outlines the distributed development traffic as a percentage of the background traffic on the adjacent road network.

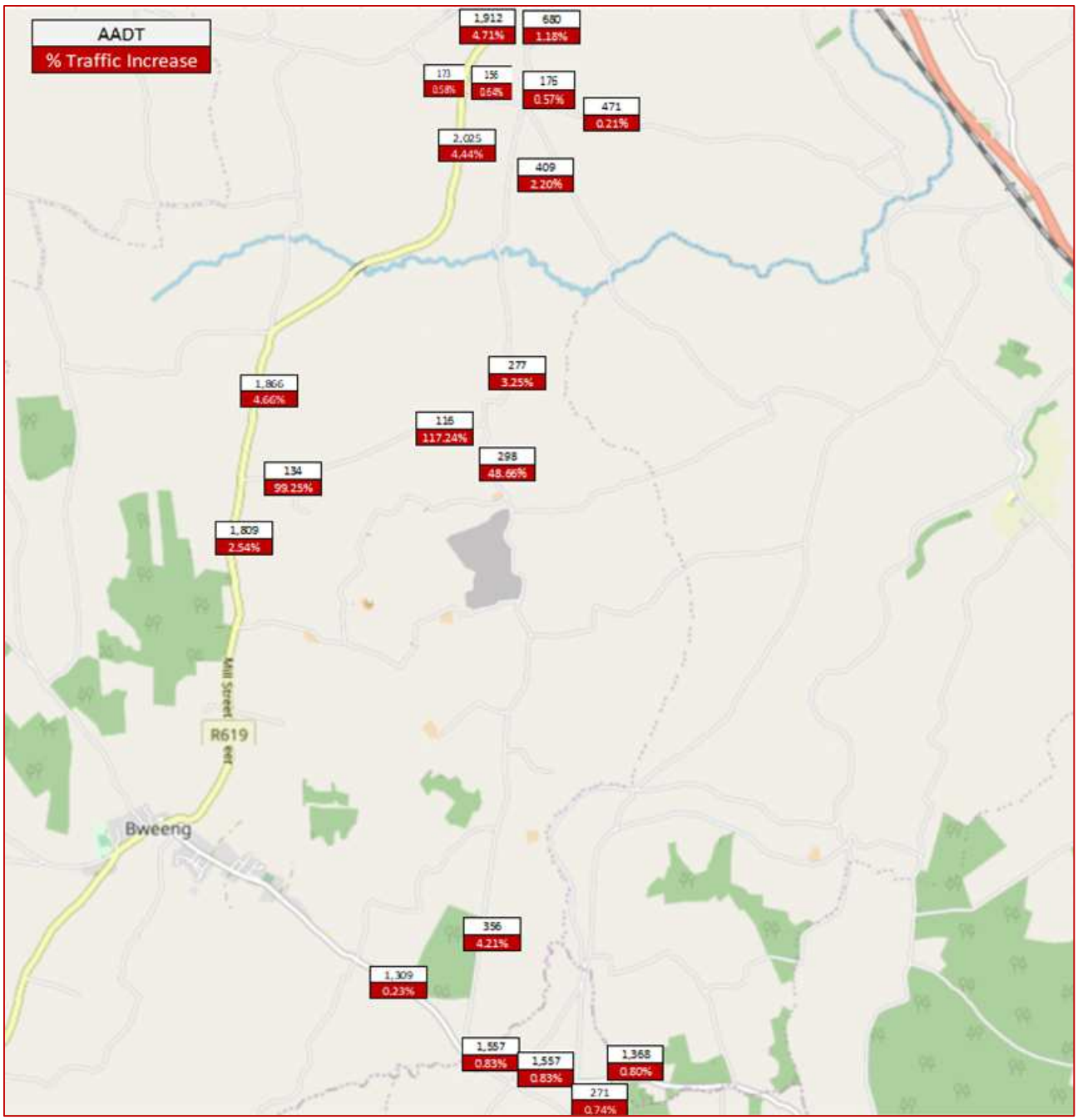

FIGURE 3-4 AADT AND DEVELOPMENT TRAFFIC AS A PERCENTAGE OF EXISTING TRAFFIC

As a result, this Traffic and Transport Assessment shall undertake a capacity assessment of the following junctions:

- Glannoge Cross
- Tobergal Bridge
- Quarry Access Junction

4 Road Impacts

4.1 Assessment Years

The “Traffic and Transport Assessment Guidelines” published by Transport Infrastructure Ireland recommend the assessment of traffic in the Opening Year, for the Opening Year +5 years and the Opening Year +15 years.

The assessment years for the Traffic and Transport assessment are therefore 2025 for the Opening Year, 2030 and 2040 for the Future Assessment Years.

4.2 Traffic Growth

The "Project Appraisal Guidelines - Unit 5.3 – Travel Demand Projections (PE-PAG-02017)" published by TII in October 2021 has been used to determine future year traffic flows on the network from the 2024 traffic count data.

Table 4-1 contains a summary of the traffic growth factors published in the "Project Appraisal Guidelines". For this assessment, a central growth scenario has been adopted (a ‘central’ growth scenario was assumed given the site location and scale).

TABLE 4-1: FUTURE YEAR TRAFFIC GROWTH FIGURES (CO. CORK- EXCLUDING METROPOLITAN AREA)

Year	Low Growth		Central Growth		High Growth	
	LV	HV	LV	HV	LV	HV
2016-2030	1.0173	1.0361	**1.0189**	**1.0377**	1.0223	1.0411
2030-2040	1.0067	1.0141	**1.0087**	**1.0160**	1.0124	1.0197

4.3 Link Capacity Assessment

L1214 Local Road

The TII Publications document reference DN-GEO-03031 (June 2017) provides guidance on recommended rural road layouts in its Table 6/1. It advises that the capacity of a Type 3 Single Carriageway Road with 6.0m cross-section is 5,000 AADT for a Level of Service D. The L1214, adjacent to the quarry, has an average cross-section width of approximately 7.0m with no hard shoulders present. Therefore, the L1214 is considered to be most similar to the Type 3 Single Carriageway cross-section in this document with a capacity of 5,000 AADT for Level of Service D.

The combined background and Site Traffic volumes, outlined in Table 4-2 in each of the assessment years is less than the LOS D capacity of 5,000 AADT for a Type 3 Single Carriageway. It is considered that the L1214 will operate within capacity for each of the assessment years. Table 4-2 indicates that the traffic associated with the proposed development represents between 33.04% and 27.09% of the total traffic on the L1214 during the assessment years 2024 to 2040.

TABLE 4-2: COMBINED AADT FOR EACH ASSESSMENT YEAR (L1214)

	Assessment Year			
	Base Year	2025	2030	2040
Background Traffic	308	316	361	420
Additional Development Traffic	-	156	156	156
Combined Traffic (Background + Additional Dev. Traffic)	308	472	517	576
Additional Traffic as % of Combined Traffic	-	33.04%	30.15%	27.09%

4.4 Junction Capacity Analysis

The capacity of the surveyed junctions was assessed using the Transport Research Laboratory's (TRL) Junctions 9 computer programme.

Junction performance is measured as a ratio between the flow and capacity (RFC). The capacity analysis has been carried out for each weekday for a period of 12-hours, for each of the assessment years 2025, 2030 and 2040. A rural junction with an RFC below 0.85 is considered to be operating within capacity, and an RFC of 0.85 indicates a junction operating at capacity.

A rural junction with an RFC below 0.85 is considered to be operating within capacity, and an RFC of 0.85 indicates a junction operating at capacity.

The capacity of a stream or arm of a junction refers to the maximum flow of vehicles entering the junction, within a given time period and is based on the formula given in LR942 (Kimber, 1980). The formulae describing the theoretical capacity of a junction were derived empirically and have a ±15% confidence interval. Consequently, the standard approach to junction capacity analysis, for priority-controlled junctions, uses an RFC of 0.85 to describe the theoretical maximum capacity, however in reality there may be additional capacity above this level.

Where the flow on an arm, in a given time period, exceeds the theoretical capacity this will result in increased time to traverse the junction, leading to delays and queues forming. In normal operation queues forming at a junction will dissipate over time as the volume of vehicles arriving at the junction fall below the available capacity.

The capacity of a junction can also be measured by its Level of Service (LOS). The LOS is denoted by a letter ranging from A – F. The following list describes the traffic conditions on a road network for each Level of Service:

- **LOS A:** Free-flow traffic with individual users virtually unaffected by the presence of others in the traffic stream (free-flow)
- **LOS B:** Stable traffic flow with a high degree of freedom to select speed and operating conditions but with some influence from other users (reasonably free flow)
- **LOS C:** Restricted flow that remains stable but with significant interactions with others in the traffic stream. The general level of comfort and convenience declines noticeably at this level (stable flow)
- **LOS D:** High-density flow in which speed and freedom to manoeuvre are severely restricted and comfort and convenience have declined even though flow remains stable (approaching unstable flow)
- **LOS E:** Unstable flow at, or near, capacity levels with poor levels of comfort and convenience (unstable flow)
- **LOS F:** Forced traffic flow in which the amount of traffic approaching a point exceeds the amount that can be served. This is characterised by stop-and-go waves, poor travel times and low comfort and convenience (forced or breakdown flow)

It is therefore considered that a junction operating at a LOS E is close to, or at, capacity and a junction operating at LOS F is considered to be above capacity.

The detailed junction capacity analysis outputs for the analysed junctions, for each of the assessment years, are contained within Appendix D to this report.

4.4.1 Junction 3: Glannoge Cross

A summary of the junction capacity analysis results for Glannoge Cross is shown in Table 4-3. The results indicate that the junction will continue to operate within capacity for each of the assessment years 2025, 2030 and 2040.

TABLE 4-3: SUMMARY OF JUNCTION CAPACITY ANALYSIS AT GLANNOGE CROSS

	12 Hours (07:00 – 19:00)		
	Queue (Veh)	Delay (s)	RFC
Stream	**2025 Without Development (Opening Year)**		
L5361- R619 South	0.0	11.11	0.01
L5361- R619 North/Local access	0.0	15.07	0.03
R619 North	0.0	6.77	0.01
Local Access- R619 North	0.0	6.73	0.01
Local Access- R619 South/L5361	0.0	8.31	0.01
R619 South	0.0	10.20	0.01
Stream	**2025 With Development (Opening Year)**		
L5361- R619 South	0.0	11.79	0.02
L5361- R619 North/Local access	0.1	15.05	0.05
R619 North	0.0	6.76	0.01
Local Access- R619 North	0.0	6.74	0.01
Local Access- R619 South/L5361	0.0	8.37	0.01
R619 South	0.0	10.17	0.02
Stream	**2030 Without Development**		
L5361- R619 South	0.0	11.15	0.01
L5361- R619 North/Local access	0.0	15.20	0.04
R619 North	0.0	6.72	0.02
Local Access- R619 North	0.0	6.76	0.01
Local Access- R619 South/L5361	0.0	8.38	0.01
R619 South	0.0	10.19	0.02
Stream	**2030 With Development**		
L5361- R619 South	0.0	11.87	0.02
L5361- R619 North/Local access	0.1	15.31	0.05
R619 North	0.0	6.71	0.02
Local Access- R619 North	0.0	6.77	0.01
Local Access- R619 South/L5361	0.0	8.44	0.01
R619 South	0.0	10.15	0.02
Stream	**2040 Without Development**		
L5361- R619 South	0.0	11.21	0.02
L5361- R619 North/Local access	0.1	15.37	0.04
R619 North	0.0	6.66	0.02
Local Access- R619 North	0.0	6.80	0.01
Local Access- R619 South/L5361	0.0	8.46	0.01
R619 South	0.0	10.18	0.02
Stream	**2040 With Development**		
L5361- R619 South	0.0	11.96	0.02
L5361- R619 North/Local access	0.1	15.59	0.06

R619 North	0.0	6.65	0.02
Local Access- R619 North	0.0	6.8	0.01
Local Access- R619 South/L5361	0.0	8.52	0.01
R619 South	0.0	10.13	0.03

4.4.2 Junction 4: Tobergal Bridge

A summary of the junction capacity analysis results for this junction is shown in Table 4-4. The results indicate that the junction will continue to operate within capacity for each of the assessment years 2025, 2030 and 2040.

TABLE 4-4: SUMMARY OF TRAFFIC ANALYSIS AT TOBERGAL BRIDGE

	12 Hours (07:00 – 19:00)		
	Queue (Veh)	**Delay (s)**	**RFC**
Stream	**2025 Without Development (Opening Year)**		
L5361- L1214 North	0.0	8.67	0.03
L5361- L1214 South	0.0	15.40	0.03
L1214 South	0.0	11.87	0.02
Stream	**2025 With Development (Opening Year)**		
L5361- L1214 North	0.0	7.23	0.02
L5361- L1214 South	0.1	16.16	0.06
L1214 South	0.0	11.92	0.02
Stream	**2030 Without Development**		
L5361- L1214 North	0.0	8.93	0.03
L5361- L1214 South	0.1	15.88	0.04
L1214 South	0.0	12.11	0.02
Stream	**2030 With Development**		
L5361- L1214 North	0.0	7.63	0.03
L5361- L1214 South	0.1	16.25	0.06
L1214 South – L5361/L1214 North	0.0	12.16	0.02
Stream	**2040 Without Development**		
L5361- L1214 North	0.0	9.22	0.04
L5361- L1214 South	0.1	16.33	0.05
L1214 South	0.0	12.28	0.03
Stream	**2040 With Development**		
L5361- L1214 North	0.0	8.10	0.04
L5361- L1214 South	0.1	16.49	0.07
L1214 South	0.0	12.33	0.03

4.4.3 Junction 7: Junction of Quarry Access Junction

A summary of the junction capacity analysis results for this junction is shown in Table 4-5. The results indicate that the junction will continue to operate within capacity for each of the assessment years 2025, 2030 and 2040.

Table 4-5: Summary of Traffic Analysis at Quarry Access

	12 Hours (07:00 – 19:00)		
	Queue (Veh)	Delay (s)	RFC
Stream	**2025**		
Quarry Access- L1214 North	0.0	10.50	0.03
Quarry Access- L1214 South	0.0	6.67	0.01
L1214 North	0.0	12.34	0.03
Stream	**2030**		
Quarry Access- L1214 North	0.0	10.51	0.03
Quarry Access- L1214 South	0.0	6.68	0.01
L1214 North	0.0	12.35	0.03
Stream	**2040**		
Quarry Access- L1214 North	0.0	10.52	0.03
Quarry Access- L1214 South	0.0	6.69	0.01
L1214 North	0.0	12.36	0.03

5 Road Safety

5.1 Sightlines

The entrance to the quarry is located on an unnamed local road south of the crossroads junction. The Quarry Access Road continues north of the quarry access towards Mallow and south of the quarry towards Cork City. The posted speed limit on this road is 80kph.

Visibility to the north and south of the quarry access is limited by the horizontal alignment of the local road. However, the horizontal alignment and narrow road cross section passively control vehicle speeds on the local road. Whilst the sightlines at the access fall short of the requirements noted in TII Publications document “Rural Link Design” (DN-GEO-03031), these geometric constraints, coupled with the low traffic volumes on the local road, have resulted in a safe quarry access that has no recorded collisions. The existing access shall be retained, and can be expected to continue providing a safe access for quarry traffic.

The proposed, realigned, road shall form a junction with the L1214 at the apex of an existing horizontal curve on the local road to ensure sightline requirements (>80m) can be met to the north and south of the new junction. Where necessary, vegetation shall be cleared to maintain sightline requirements in both directions. See section 3.1.1 for further information in relation to the new realigned road.

The design width of the realigned road has been increased in sections to support passing at horizontal curves, and to maximise forward stopping sight distances. This represents a significant improvement over the existing local road width and alignment.

5.2 Parking

The existing site contains c. 20 parking spaces and is considered sufficient for the number of staff/sub-contractors working on site and also for any miscellaneous trips that may occur.

5.3 Public Transport

There are no public transport provisions in the vicinity of the site due to its rural location.

5.4 Pedestrians & Cyclists

There are no footpaths or cycle provisions in the vicinity of the site.

6 Conclusions

The Traffic and Transport Assessment makes the following conclusions:

1) Link capacity analysis was carried out on the L1214 within the vicinity of the site.
    - It was determined that the link road assessed will continue to operate within capacity for each of the assessment years 2025 (Opening year), 2030 and 2040.

2) Junction Capacity Analysis was undertaken at the junctions between the L1214 & Quarry Access, Tobergal Bridge, and Glannoge Cross. The results of the Junction Capacity Analysis indicate that all of the junctions assessed will operate within capacity for each of the assessment years 2025 (Opening year), 2030, and 2040 with, and without, the quarry.

3) An application for an extinguishment of the Public Right of Way will be required (as provisioned in the Roads Act, 1993, Section 73) on a section of approximately 260m of the local road situated to the south of the existing quarry to facilitate the quarry extension. It is proposed that a new road will be provided to replace the existing section of road being removed, which shall maintain vehicle, pedestrian, and cycle access for users of the existing Local Road.

4) The sightlines at the access fall short of the requirements noted in TII Publications document “Rural Link Design” (DN-GEO-03031). However, the local road’s horizontal alignment and narrow road cross section passively control vehicle speeds to a level well below the posted speed limit. These geometric constraints, coupled with low traffic volumes on the local road, have resulted in a safe quarry access that has no recorded collisions. The existing access shall be retained and can be expected to continue providing a safe access for quarry traffic.

5) There is sufficient parking provision within the quarry site to accommodate parking for all staff, and visitors, to the site.

6) The results of this traffic and transport assessment have determined that the development will have a negligible impact on traffic flows on the existing road network due to the low volumes of traffic being generated from it.

Appendix A – TRICS Output

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 02 - EMPLOYMENT
Category : H - QUARRY
TOTAL VEHICLES

Selected regions and areas:

03	SOUTH WEST		
	DC	DORSET	1 days
05	EAST MIDLANDS		
	NN	NORTH NORTHAMPTONSHIRE	1 days
08	NORTH WEST		
	GM	GREATER MANCHESTER	1 days
09	NORTH		
	DH	DURHAM	1 days
	HP	HARTLEPOOL	1 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Primary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: Site area
Actual Range: 10.00 to 40.00 (units: hect)
Range Selected by User: 10.00 to 40.00 (units: hect)

Parking Spaces Range: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 19/09/90 to 04/05/23

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Tuesday	2 days
Wednesday	2 days
Friday	1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	5 days
Directional ATC Count	0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaking using machines.

Selected Locations:

Edge of Town	1
Free Standing (PPS6 Out of Town)	4

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Out of Town	4
No Sub Category	1

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Inclusion of Servicing Vehicles Counts:

Servicing vehicles Included	X days - Selected
Servicing vehicles Excluded	6 days - Selected

Secondary Filtering selection:

Use Class:

B2	5 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order (England) 2020 has been used for this purpose, which can be found within the Library module of TRICS®.

Filter by Site Operations Breakdown:
All Surveys Included

Population within 500m Range:
All Surveys Included

Population within 1 mile:

1,000 or Less	1 days
1,001 to 5,000	2 days
5,001 to 10,000	2 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

25,001 to 50,000	1 days
50,001 to 75,000	2 days
75,001 to 100,000	1 days
125,001 to 250,000	1 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	4 days
1.1 to 1.5	1 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

Not Known	2 days
No	3 days

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	5 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1 DC-02-H-02 STONE QUARRY DORSET
SOUTHWELL STREET
NEAR PORTLAND
SOUTHWELL
Free Standing (PPS6 Out of Town)
Out of Town
Total Site area: 40.00 hect
Survey date: WEDNESDAY *03/09/97* *Survey Type: MANUAL*

2 DH-02-H-01 LIMESTONE QUARRY DURHAM
STONYBECK LANE
NEAR DURHAM
BISHOP MIDDLEHAM
Free Standing (PPS6 Out of Town)
Out of Town
Total Site area: 10.00 hect
Survey date: TUESDAY *02/12/08* *Survey Type: MANUAL*

3 GM-02-H-01 STONE QUARRY GREATER MANCHESTER
GEORGE'S LANE
HORWICH

Edge of Town
No Sub Category
Total Site area: 17.00 hect
Survey date: FRIDAY *09/08/91* *Survey Type: MANUAL*

4 HP-02-H-01 QUARRY HARTLEPOOL
HART VILLAGE
HARTLEPOOL

Free Standing (PPS6 Out of Town)
Out of Town
Total Site area: 22.80 hect
Survey date: TUESDAY *09/11/10* *Survey Type: MANUAL*

5 NN-02-H-01 GRAVEL QUARRY NORTH NORTHAMPTONSHIRE
WOLLASTON ROAD
BOZEAT
WELLINGBOROUGH
Free Standing (PPS6 Out of Town)
Out of Town
Total Site area: 14.50 hect
Survey date: WEDNESDAY *26/11/08* *Survey Type: MANUAL*

This section provides a list of all survey sites and days in the selected set. For each individual survey site, it displays a unique site reference code and site address, the selected trip rate calculation parameter and its value, the day of the week and date of each survey, and whether the survey was a manual classified count or an ATC count.

TRIP RATE for Land Use 02 - EMPLOYMENT/H - QUARRY
TOTAL VEHICLES
Calculation factor: 1 hect
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. AREA	Trip Rate	No. Days	Ave. AREA	Trip Rate	No. Days	Ave. AREA	Trip Rate
00:00 - 00:30									
00:30 - 01:00									
01:00 - 01:30									
01:30 - 02:00									
02:00 - 02:30									
02:30 - 03:00									
03:00 - 03:30									
03:30 - 04:00									
04:00 - 04:30									
04:30 - 05:00									
05:00 - 05:30									
05:30 - 06:00									
06:00 - 06:30									
06:30 - 07:00									
07:00 - 07:30	5	20.86	0.393	5	20.86	0.153	5	20.86	0.546
07:30 - 08:00	5	20.86	0.249	5	20.86	0.211	5	20.86	0.460
08:00 - 08:30	5	20.86	0.230	5	20.86	0.163	5	20.86	0.393
08:30 - 09:00	5	20.86	0.201	5	20.86	0.221	5	20.86	0.422
09:00 - 09:30	5	20.86	0.259	5	20.86	0.240	5	20.86	0.499
09:30 - 10:00	5	20.86	0.268	5	20.86	0.192	5	20.86	0.460
10:00 - 10:30	5	20.86	0.153	5	20.86	0.173	5	20.86	0.326
10:30 - 11:00	5	20.86	0.182	5	20.86	0.182	5	20.86	0.364
11:00 - 11:30	5	20.86	0.173	5	20.86	0.163	5	20.86	0.336
11:30 - 12:00	5	20.86	0.173	5	20.86	0.153	5	20.86	0.326
12:00 - 12:30	5	20.86	0.105	5	20.86	0.153	5	20.86	0.258
12:30 - 13:00	5	20.86	0.153	5	20.86	0.163	5	20.86	0.316
13:00 - 13:30	5	20.86	0.192	5	20.86	0.201	5	20.86	0.393
13:30 - 14:00	5	20.86	0.230	5	20.86	0.240	5	20.86	0.470
14:00 - 14:30	5	20.86	0.249	5	20.86	0.211	5	20.86	0.460
14:30 - 15:00	5	20.86	0.221	5	20.86	0.259	5	20.86	0.480
15:00 - 15:30	5	20.86	0.192	5	20.86	0.182	5	20.86	0.374
15:30 - 16:00	5	20.86	0.182	5	20.86	0.125	5	20.86	0.307
16:00 - 16:30	4	22.45	0.156	4	22.45	0.134	4	22.45	0.290
16:30 - 17:00	4	22.45	0.134	4	22.45	0.156	4	22.45	0.290
17:00 - 17:30	4	22.45	0.067	4	22.45	0.111	4	22.45	0.178
17:30 - 18:00	4	22.45	0.033	4	22.45	0.234	4	22.45	0.267
18:00 - 18:30	4	22.45	0.011	4	22.45	0.089	4	22.45	0.100
18:30 - 19:00	4	22.45	0.011	4	22.45	0.011	4	22.45	0.022
19:00 - 19:30									
19:30 - 20:00									
20:00 - 20:30									
20:30 - 21:00									
21:00 - 21:30									
21:30 - 22:00									
22:00 - 22:30									
22:30 - 23:00									
23:00 - 23:30									
23:30 - 24:00									
Total Rates:			4.217			4.120			8.337

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

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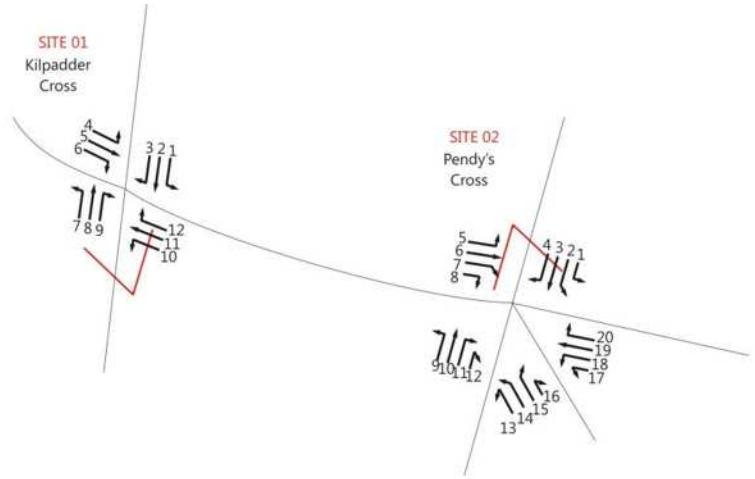
Parameter summary

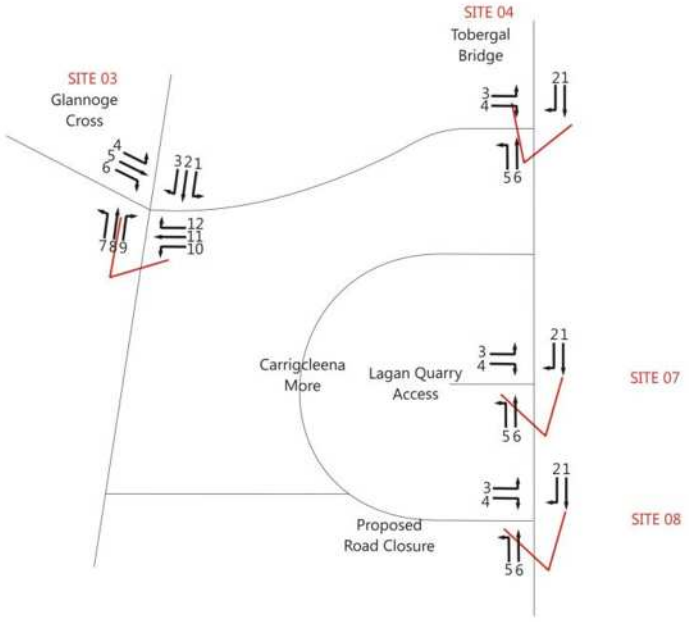
Trip rate parameter range selected:	10.00 to 40.00 (units: hect)
Survey date date range:	19/09/90 - 04/05/23
Number of weekdays (Monday-Friday):	5
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	1
Surveys manually removed from selection:	0

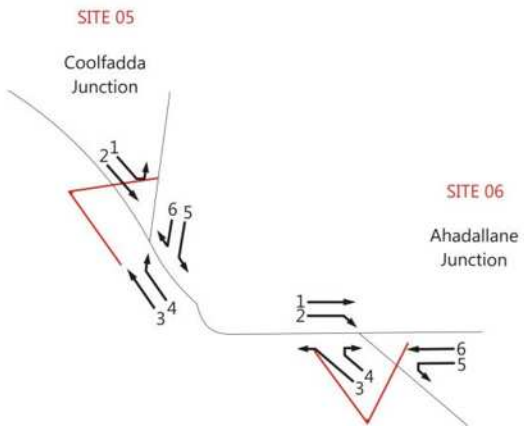
This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are show. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

Appendix B – Traffic Survey Data

Site Locations/Movement Numbering







Job number: TRA/24/051	Job Date: 30th April 2024	Drawing No: TRA/24/051-02	traffinomics.ie
Client: PMCE	Job Day: Tuesday	Author: SPW	

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS

TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 01 DATE: 30th April 2024

LOCATION R619/L5359/L5360 DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	0	0	0	0	0	0	0	9	2	0	2	0	13	16	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	11	3	0	2	0	16	19	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	9	4	0	4	1	18	24	0	0	1	0	0	1	2
07:45	0	0	0	0	0	0	0	19	2	1	2	1	25	29	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	48	11	1	10	2	72	88	0	0	1	0	0	1	2
08:00	0	0	0	0	0	0	0	12	6	0	1	0	19	20	0	0	0	0	0	0	0
08:15	0	1	0	0	0	1	1	13	1	0	0	0	14	14	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	10	2	0	1	1	14	16	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	16	6	1	0	0	23	24	0	0	0	0	0	0	0
H/TOT	0	1	0	0	0	1	1	51	15	1	2	1	70	74	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	9	3	0	1	0	13	14	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	6	5	1	2	0	14	17	1	0	0	0	0	1	1
09:30	0	0	0	0	0	0	0	11	2	0	1	0	14	15	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	10	1	1	1	0	13	15	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	36	11	2	5	0	54	62	1	0	0	0	0	1	1
10:00	0	0	0	0	0	0	0	3	4	1	3	0	11	15	0	0	0	0	0	0	0
10:15	0	1	0	0	0	1	1	8	2	0	0	0	10	10	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	8	1	1	0	0	10	11	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	5	3	0	1	0	9	10	0	0	0	0	0	0	0
H/TOT	0	1	0	0	0	1	1	24	10	2	4	0	40	46	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	6	2	1	2	0	11	14	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	7	3	0	1	0	11	12	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	19	2	0	1	0	22	23	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	9	1	0	1	0	11	12	1	1	0	0	0	2	2
H/TOT	0	0	0	0	0	0	0	41	8	1	5	0	55	62	1	1	0	0	0	2	2
12:00	0	0	0	0	0	0	0	8	1	1	0	0	10	11	1	0	0	0	0	1	1
12:15	0	0	0	0	0	0	0	10	0	1	2	0	13	16	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	8	1	0	0	0	9	9	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	5	1	0	1	0	7	8	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	31	3	2	3	0	39	44	1	0	0	0	0	1	1

13:00	0	0	0	0	0	0	0	10	0	0	0	0	10	10	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	14	0	0	1	1	16	18	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	3	1	0	0	0	4	4	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	18	3	0	3	0	24	28	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	45	4	0	4	1	54	60	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	9	1	1	4	0	15	21	1	0	0	0	0	1	1
14:15	0	0	0	0	0	0	0	6	0	0	0	0	6	6	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	5	4	0	0	0	9	9	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	10	1	0	2	0	13	16	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	30	6	1	6	0	43	51	1	0	0	0	0	1	1
15:00	0	0	0	0	0	0	0	13	2	0	0	1	16	17	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	12	2	0	3	0	17	21	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	10	1	0	1	0	12	13	0	0	0	0	0	0	0
15:45	0	1	0	0	0	1	1	16	4	0	0	0	20	20	0	0	0	0	0	0	0
H/TOT	0	1	0	0	0	1	1	51	9	0	4	1	65	71	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	24	4	0	0	0	28	28	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	10	2	2	3	1	18	24	0	0	0	0	1	1	2
16:30	1	0	0	0	0	1	1	21	2	1	2	0	26	29	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	14	4	1	3	0	22	26	1	0	0	0	0	1	1
H/TOT	1	0	0	0	0	1	1	69	12	4	8	1	94	107	1	0	0	0	1	2	3
17:00	0	0	0	0	0	0	0	33	1	0	3	0	37	41	1	0	0	0	0	1	1
17:15	0	0	0	0	0	0	0	22	4	1	1	0	28	30	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	21	2	0	0	0	23	23	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	23	3	0	0	0	26	26	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	99	10	1	4	0	114	120	1	0	0	0	0	1	1
18:00	0	0	0	0	0	0	0	17	4	0	0	0	21	21	0	0	0	0	0	0	0
18:15	0	1	0	0	0	1	1	12	4	0	0	0	16	16	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	11	2	0	0	0	13	13	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	9	2	0	0	0	11	11	0	0	0	0	0	0	0
H/TOT	0	1	0	0	0	1	1	49	12	0	0	0	61	61	0	0	0	0	0	0	0
P/TOT	1	4	0	0	0	5	5	574	111	15	55	6	761	846	6	1	1	0	1	9	11

SITE: 01 DATE: 13th April 2021

LOCATION R619/L5359/L5360 DAY: Tuesday

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	2	0	0	0	0	2	2
H/TOT	1	0	0	0	0	1	1	1	0	0	0	0	1	1	2	0	0	0	0	2	2
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	3	0	0	0	0	3	3	0	0	0	0	0	0	0
09:00	2	0	0	0	0	2	2	2	1	0	0	0	3	3	2	0	0	0	0	2	2
09:15	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	1	0	0	1	2
H/TOT	2	0	0	0	0	2	2	4	1	0	0	0	5	5	2	0	1	0	0	3	4
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
10:30	0	0	0	0	0	0	0	0	2	0	0	0	2	2	1	0	0	0	0	1	1
10:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	1	2	0	0	0	3	3	2	0	0	0	0	2	2
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	1	0	0	0	0	1	1	0	0	1	0	0	1	2	1	0	0	0	0	1	1
11:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	1	0	0	2	3
11:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	2	0	1	0	0	3	4	1	1	1	0	0	3	4
12:00	0	0	0	0	0	0	0	2	1	0	0	0	3	3	1	0	0	0	0	1	1
12:15	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	3
H/TOT	0	0	0	0	0	0	0	3	2	0	0	0	5	5	2	0	0	1	0	3	4

13:00	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
13:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1	1
13:30	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
H/TOT	1	0	0	0	0	1	1	1	1	0	0	0	2	2	0	1	0	1	0	2	3
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
14:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1
14:30	0	0	0	0	0	0	0	3	0	0	0	0	3	3	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	3	0	0	0	0	3	3	1	0	0	1	0	2	3
15:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	0	0	0	2	2
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	1	0	0	0	0	1	1	2	0	0	1	0	3	4
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0
17:30	1	0	0	0	0	1	1	1	0	0	0	0	1	1	3	0	0	0	0	3	3
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
H/TOT	1	0	0	0	0	1	1	2	2	0	0	0	4	4	3	1	0	0	0	4	4
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	0	0	0	0	2	2
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	2	0	0	0	0	2	2	2	0	0	0	0	2	2
P/TOT	8	0	0	0	0	8	8	27	8	1	0	0	36	37	17	3	2	4	0	26	32

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS

TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 01 DATE: 13th April 2021

LOCATION: R619/L5359/L5360 DAY: Tuesday

	MOVEMENT 7							MOVEMENT 8							MOVEMENT 9						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	0	0	0	0	0	0	0	9	4	0	1	0	14	15	0	1	0	0	0	1	1
07:15	0	0	0	0	0	0	0	17	2	0	1	0	20	21	0	1	0	0	0	1	1
07:30	0	0	0	0	0	0	0	15	3	0	0	0	18	18	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	9	6	1	3	0	19	23	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	50	15	1	5	0	71	78	0	2	0	0	0	2	2
08:00	0	0	0	0	0	0	0	18	3	0	1	0	22	23	0	0	0	0	0	0	0
08:15	1	0	0	0	0	1	1	22	6	0	1	0	29	30	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	19	5	0	2	1	27	31	0	0	0	0	0	0	0
08:45	2	0	0	0	0	2	2	13	0	0	1	0	14	15	1	0	0	0	0	1	1
H/TOT	3	0	0	0	0	3	3	72	14	0	5	1	92	100	1	0	0	0	0	1	1
09:00	4	0	0	0	0	4	4	21	5	1	2	0	29	32	1	0	0	0	0	1	1
09:15	3	0	0	0	0	3	3	15	3	0	2	0	20	23	0	0	0	0	0	0	0
09:30	1	0	0	0	0	1	1	9	1	0	0	0	10	10	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	8	0	2	1	0	11	13	0	0	0	0	0	0	0
H/TOT	8	0	0	0	0	8	8	53	9	3	5	0	70	78	1	0	0	0	0	1	1
10:00	0	0	0	0	0	0	0	16	2	0	1	0	19	20	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	9	1	0	1	0	11	12	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	9	1	0	1	0	11	12	0	0	0	0	0	0	0
10:45	0	0	0	1	0	1	2	8	3	1	2	0	14	17	0	0	0	0	0	0	0
H/TOT	0	0	0	1	0	1	2	42	7	1	5	0	55	62	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	9	4	1	0	0	14	15	1	0	0	0	0	1	1
11:15	0	0	0	0	0	0	0	7	2	1	0	0	10	11	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	13	2	0	1	1	17	19	0	0	0	0	0	0	0
11:45	1	0	0	0	0	1	1	7	1	0	0	0	8	8	1	0	0	0	0	1	1
H/TOT	1	0	0	0	0	1	1	36	9	2	1	1	49	52	2	0	0	0	0	2	2
12:00	1	0	0	0	0	1	1	10	4	0	1	0	15	16	1	0	0	0	0	1	1
12:15	0	0	0	0	0	0	0	6	2	0	2	0	10	13	0	0	0	0	0	0	0
12:30	1	0	0	0	0	1	1	7	2	0	1	0	10	11	1	0	0	0	0	1	1
12:45	0	0	0	0	0	0	0	6	2	0	3	0	11	15	0	0	0	0	0	0	0
H/TOT	2	0	0	0	0	2	2	29	10	0	7	0	46	55	2	0	0	0	0	2	2

13:00	0	0	1	0	0	1	2	10	0	2	0	0	12	13	1	0	0	0	0	1	1
13:15	0	0	0	0	0	0	0	8	0	0	0	0	8	8	0	0	0	0	0	0	0
13:30	0	1	0	0	0	1	1	6	0	0	0	0	6	6	0	0	0	0	0	0	0
13:45	2	0	0	1	0	3	4	7	1	0	1	0	9	10	1	0	0	0	0	1	1
H/TOT	2	1	1	1	0	5	7	31	1	2	1	0	35	37	2	0	0	0	0	2	2
14:00	1	0	0	0	0	1	1	10	3	1	2	0	16	19	0	0	1	0	0	1	2
14:15	2	0	0	0	0	2	2	12	2	0	1	0	15	16	1	0	0	0	0	1	1
14:30	0	0	0	0	0	0	0	17	2	1	0	0	20	21	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	16	3	1	2	0	22	25	1	0	0	0	0	1	1
H/TOT	3	0	0	0	0	3	3	55	10	3	5	0	73	81	2	0	1	0	0	3	4
15:00	0	0	0	1	0	1	2	14	3	1	1	0	19	21	1	0	0	0	0	1	1
15:15	0	0	0	0	0	0	0	7	3	0	0	0	10	10	1	0	0	0	0	1	1
15:30	0	0	0	0	0	0	0	18	2	0	0	0	20	20	0	2	0	0	0	2	2
15:45	0	0	0	0	0	0	0	11	2	0	1	0	14	15	0	0	0	0	0	0	0
H/TOT	0	0	0	1	0	1	2	50	10	1	2	0	63	66	2	2	0	0	0	4	4
16:00	0	0	0	0	0	0	0	13	2	0	1	0	16	17	0	0	0	0	0	0	0
16:15	0	0	0	1	0	1	2	15	2	0	0	0	17	17	3	0	1	0	0	4	5
16:30	0	0	0	0	0	0	0	13	6	1	1	1	22	25	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	25	8	1	1	1	36	39	0	1	0	0	0	1	1
H/TOT	0	0	0	1	0	1	2	66	18	2	3	2	91	98	3	1	1	0	0	5	6
17:00	4	1	0	0	0	5	5	13	7	0	0	0	20	20	0	1	0	0	0	1	1
17:15	0	0	0	0	0	0	0	23	6	0	1	0	30	31	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	15	2	0	2	0	19	22	0	1	0	0	0	1	1
17:45	0	0	0	0	0	0	0	13	0	1	0	0	14	15	2	0	0	0	0	2	2
H/TOT	4	1	0	0	0	5	5	64	15	1	3	0	83	87	2	2	0	0	0	4	4
18:00	1	0	0	0	0	1	1	14	4	0	1	0	19	20	1	1	0	0	0	2	2
18:15	0	0	0	0	0	0	0	19	4	0	1	0	24	25	1	0	0	0	0	1	1
18:30	1	0	0	0	0	1	1	11	1	0	0	0	12	12	0	0	0	0	0	0	0
18:45	2	0	0	0	0	2	2	14	2	0	0	0	16	16	0	0	0	0	0	0	0
H/TOT	4	0	0	0	0	4	4	58	11	0	2	0	71	74	2	1	0	0	0	3	3
P/TOT	27	2	1	4	0	34	40	606	129	16	44	4	799	868	19	8	2	0	0	29	30

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS

TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 01 DATE: 13th April 2021

LOCATION R619/L5359/L5360 DAY: Tuesday

	MOVEMENT 10							MOVEMENT 11							MOVEMENT 12							PCU's Through Junction
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44
07:45	0	0	0	0	0	0	0	1	1	0	0	1	3	4	0	0	0	0	0	0	0	60
H/TOT	0	0	0	0	0	0	0	1	1	0	0	1	3	4	0	0	0	0	0	0	0	177
08:00	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	46
08:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	49
08:30	2	0	1	0	0	3	4	1	0	0	0	0	1	1	0	0	0	0	0	0	0	51
08:45	0	0	0	0	0	0	0	0	1	0	0	1	2	3	0	0	0	0	0	0	0	46
H/TOT	4	0	1	0	0	5	6	2	1	0	0	1	4	5	0	0	0	0	0	0	0	192
09:00	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0	0	60
09:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46
09:30	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	27
09:45	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32
H/TOT	1	0	1	0	0	2	3	1	2	0	0	0	3	3	0	0	0	0	0	0	0	166
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36
10:15	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	25
10:30	0	0	0	0	0	0	0	3	0	0	0	0	3	3	0	0	0	0	0	0	0	29
10:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	32
H/TOT	0	0	0	0	0	0	0	3	2	0	0	0	5	5	0	0	0	0	0	0	0	122
11:00	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46
11:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26
H/TOT	2	0	1	0	0	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	131
12:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	36
12:15	1	0	0	0	0	1	1	2	0	0	0	0	2	2	0	0	0	0	0	0	0	34
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27
H/TOT	2	0	0	0	0	2	2	2	0	0	0	0	2	2	1	0	0	0	0	1	1	118

13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28
13:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
13:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	47
H/TOT	1	0	0	0	0	1	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	115
14:00	0	1	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	48
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33
14:45	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44
H/TOT	2	1	0	0	0	3	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0	151
15:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	34
15:30	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	37
15:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	38
H/TOT	2	0	0	0	0	2	2	2	0	0	0	0	2	2	0	0	0	0	0	0	0	155
16:00	3	0	0	0	0	3	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0	49
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51
16:30	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	57
16:45	0	1	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	71
H/TOT	3	2	0	0	0	5	5	2	0	0	0	0	2	2	0	0	0	0	0	0	0	228
17:00	1	0	0	0	0	1	1	2	0	0	0	0	2	2	0	0	0	0	0	0	0	72
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	63
17:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	52
17:45	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45
H/TOT	1	1	0	0	0	2	2	3	0	0	0	0	3	3	0	0	0	0	0	0	0	231
18:00	0	1	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	46
18:15	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	49
18:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	27
18:45	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	31
H/TOT	2	1	0	0	0	3	3	4	0	0	0	0	4	4	0	0	0	0	0	0	0	154
P/TOT	20	5	3	0	0	28	30	21	7	0	0	2	30	32	1	0	0	0	0	1	1	1939

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS

TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 02 DATE: 30th April 2024

LOCATION: Pendy's Cross DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3							MOVEMENT 4						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	2	0	0	0	2	2	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	1	0	0	0	1	1	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	0	0	1	1	2
07:45	0	1	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	0	1	0	0	0	1	1	2	2	0	0	0	4	4	1	3	0	0	1	5	6	0	0	0	0	1	1	2
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0	0
08:15	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
08:30	0	0	1	0	0	1	2	1	0	0	0	0	1	1	1	0	1	0	1	3	5	2	0	0	0	0	2	2
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	1	0	6	7	0	0	0	0	0	0	0
H/TOT	2	0	1	0	0	3	4	1	0	0	0	0	1	1	4	5	1	1	1	12	15	2	0	0	0	0	2	2
09:00	1	0	1	0	0	2	3	2	1	0	0	1	4	5	0	0	0	0	1	1	2	0	0	0	0	0	0	0
09:15	1	1	0	0	0	2	2	0	0	0	0	0	0	0	2	1	0	0	0	3	3	1	0	0	0	0	1	1
09:30	0	1	0	0	0	1	1	4	0	0	0	0	4	4	2	0	0	0	1	3	4	0	0	0	0	0	0	0
09:45	0	1	0	0	0	1	1	0	0	0	0	0	0	0	3	1	1	0	0	5	6	0	0	0	0	0	0	0
H/TOT	2	3	1	0	0	6	7	6	1	0	0	1	8	9	7	2	1	0	2	12	15	1	0	0	0	0	1	1
10:00	2	0	0	0	0	2	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	5	5	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0	0
10:45	3	0	0	0	0	3	3	0	0	1	0	0	1	2	2	1	0	0	0	3	3	0	0	0	0	0	0	0
H/TOT	5	0	0	0	0	5	5	1	0	1	0	0	2	3	6	4	0	0	0	10	10	0	0	0	0	0	0	0
11:00	1	0	0	0	0	1	1	3	0	0	0	0	3	3	2	0	0	0	0	2	2	0	0	0	0	0	0	0
11:15	2	0	0	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
11:30	1	0	0	0	0	1	1	1	2	0	0	0	3	3	1	2	0	0	0	3	3	0	0	0	0	0	0	0
11:45	1	0	0	0	0	1	1	2	0	0	0	0	2	2	2	0	0	0	0	2	2	0	0	0	0	0	0	0
H/TOT	5	0	0	0	0	5	5	6	2	0	0	0	8	8	6	2	0	0	0	8	8	0	0	0	0	0	0	0
12:00	2	0	1	0	0	3	4	0	0	1	0	0	1	2	0	0	1	0	0	1	2	0	0	0	0	0	0	0
12:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	4	1	0	0	0	5	5	1	0	0	0	0	1	1
12:30	2	1	0	0	0	3	3	1	0	0	0	0	1	1	1	1	0	0	0	2	2	0	0	0	0	0	0	0
12:45	0	1	0	0	0	1	1	1	0	0	0	0	1	1	2	1	0	1	0	4	5	0	0	0	0	0	0	0
H/TOT	5	2	1	0	0	8	9	2	0	1	0	0	3	4	7	3	1	1	0	12	14	1	0	0	0	0	1	1

13:00	1	1	0	0	0	2	2	0	0	0	0	0	0	0	6	0	0	0	0	6	6	0	0	0	0	0	0	0
13:15	3	0	0	0	0	3	3	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
13:30	3	0	0	0	0	3	3	0	0	0	0	0	0	0	2	0	0	0	0	2	2	1	0	0	0	0	1	1
13:45	2	0	0	0	0	2	2	0	1	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	9	1	0	0	0	10	10	1	1	0	0	0	2	2	10	0	0	0	0	10	10	1	0	0	0	0	1	1
14:00	1	0	0	0	0	1	1	0	1	0	0	0	1	1	4	1	0	0	0	5	5	0	0	0	0	0	0	0
14:15	1	0	0	0	0	1	1	2	0	0	0	0	2	2	2	0	0	0	0	2	2	0	0	0	0	0	0	0
14:30	2	2	0	0	0	4	4	1	0	0	0	0	1	1	2	1	1	0	0	4	5	0	0	0	0	0	0	0
14:45	2	0	1	0	0	3	4	1	0	0	0	0	1	1	1	1	1	0	0	3	4	1	0	0	0	0	1	1
H/TOT	6	2	1	0	0	9	10	4	1	0	0	0	5	5	9	3	2	0	0	14	15	1	0	0	0	0	1	1
15:00	3	1	0	0	0	4	4	2	0	0	0	0	2	2	1	2	0	0	1	4	5	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0	0	2	2	0	0	0	0	0	0	0
15:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0	0
15:45	0	1	0	0	0	1	1	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	4	2	0	0	0	6	6	5	1	0	0	0	6	6	3	4	0	0	1	8	9	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	2	0	0	0	0	2	2	3	1	0	1	0	5	6	2	0	0	0	0	2	2
16:15	1	0	0	0	1	2	3	0	0	0	0	0	0	0	3	0	0	0	2	5	7	1	0	0	0	0	1	1
16:30	0	1	0	0	0	1	1	0	0	0	0	0	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0	0
16:45	1	0	0	0	0	1	1	0	1	0	0	0	1	1	1	1	0	0	0	2	2	0	0	0	0	0	0	0
H/TOT	2	1	0	0	1	4	5	2	1	0	0	0	3	3	11	2	0	1	2	16	19	3	0	0	0	0	3	3
17:00	1	0	1	0	0	2	3	2	0	0	0	0	2	2	4	2	0	0	0	6	6	1	0	0	0	0	1	1
17:15	3	1	0	0	0	4	4	2	1	0	0	0	3	3	4	0	0	0	0	4	4	0	0	0	0	0	0	0
17:30	2	1	0	0	0	3	3	0	0	0	0	0	0	0	3	1	0	0	0	4	4	0	0	0	0	0	0	0
17:45	5	0	0	0	0	5	5	3	0	0	0	0	3	3	4	1	0	0	0	5	5	0	0	0	0	0	0	0
H/TOT	11	2	1	0	0	14	15	7	1	0	0	0	8	8	15	4	0	0	0	19	19	1	0	0	0	0	1	1
18:00	2	0	0	0	0	2	2	1	0	0	0	0	1	1	2	0	0	0	0	2	2	0	0	0	0	0	0	0
18:15	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
18:30	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
18:45	1	0	1	0	0	2	3	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	5	0	1	0	0	6	7	4	0	0	0	0	4	4	5	0	0	0	0	5	5	0	0	0	0	0	0	0
P/TOT	56	14	6	0	1	77	81	41	10	2	0	1	54	56	84	32	5	3	7	131	144	10	0	0	0	1	11	12

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS
TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 02 DATE: 30th April 2024

LOCATION: Pendy's Cross DAY: Tuesday

	MOVEMENT 5							MOVEMENT 6							MOVEMENT 7							MOVEMENT 8						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	2	1	0	0	0	0	1	1
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
08:45	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	5	0	0	0	0	5	5	0	0	0	0	0	0	0	0	1	0	0	0	1	1
09:00	2	0	0	0	0	2	2	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	1	0	0	0	1	1
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	2	0	0	0	0	2	2	2	0	0	0	0	2	2	1	0	0	0	0	1	1	1	1	0	0	0	2	2
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0	1	1
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	3	3	0	1	0	0	0	1	1
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	3	0	0	0	0	3	3	0	0	1	0	0	1	2	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	1	0	0	0	1	1
12:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	2	1	0	0	0	3	3	1	0	0	0	0	1	1	0	1	0	0	0	1	1

13:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0
13:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	2	0	0	0	0	2	2	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1
14:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	3	0	0	0	0	3	3	1	0	1	0	0	2	3	1	0	0	0	0	1	1	1	0	0	0	0	1	1
15:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	1	1	0	0	0	2	2
H/TOT	1	0	0	0	0	1	1	2	1	0	0	0	3	3	1	0	0	0	0	1	1	1	1	0	0	0	2	2
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	1	0	0	0	1	1	4	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
16:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1
H/TOT	0	1	0	0	0	1	1	5	0	0	0	0	5	5	1	0	0	0	0	1	1	3	0	0	0	0	3	3
17:00	0	1	0	0	0	1	1	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0
17:30	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1
H/TOT	1	2	0	0	0	3	3	3	1	0	0	0	4	4	0	1	0	0	0	1	1	1	0	0	0	0	1	1
18:00	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0
18:15	2	1	0	0	0	3	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	2	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	2	1	0	0	0	3	3	2	1	2	0	0	5	6	0	0	2	0	0	2	3	0	0	0	0	0	0	0	0
P/TOT	12	4	0	0	0	16	16	25	4	3	0	0	32	34	7	6	3	0	0	16	18	8	5	0	0	0	13	13

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS

TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 02 DATE: 30th April 2024

LOCATION: Pendy's Cross DAY: Tuesday

	MOVEMENT 9							MOVEMENT 10							MOVEMENT 11							MOVEMENT 12						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	0	0	0	0	0	0	0	1	0	0	0	1	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	1	1	0	0	1	3	4	0	0	0	0	0	0	0	0	1	0	0	0	1	1
07:45	0	1	0	0	0	1	1	6	2	0	0	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	1	0	0	0	1	1	10	4	0	0	2	16	18	0	0	0	0	0	0	0	0	1	0	0	0	1	1
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	6	1	0	0	0	7	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	1	0	0	0	0	1	1	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	1	1	2	7	0	0	0	0	7	7	0	1	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	1	0	0	0	1	2	3	15	1	0	0	0	16	16	1	1	0	0	0	2	2	0	0	0	0	0	0	0
09:00	1	0	0	0	0	1	1	5	0	0	0	0	5	5	1	0	0	0	0	1	1	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	3	1	0	0	0	4	4	0	0	0	0	0	0	0	0	1	0	0	0	1	1
09:30	0	0	0	0	0	0	0	5	1	0	0	0	6	6	0	0	0	0	0	0	0	1	0	0	0	0	1	1
09:45	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	14	3	0	0	0	17	17	1	0	0	0	0	1	1	1	1	0	0	0	2	2
10:00	0	0	0	0	0	0	0	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	1	0	0	0	1	1
10:30	1	0	0	0	0	1	1	4	1	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	1	0	0	0	1	1	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	1	1	0	0	0	2	2	8	3	0	0	0	11	11	0	0	0	0	0	0	0	0	1	0	0	0	1	1
11:00	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	1	0	1	0	0	2	3	1	1	0	0	0	2	2	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	4	1	1	0	0	6	7	2	1	0	0	0	3	3	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	3	0	0	0	0	3	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	4	0	1	0	0	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	5	2	0	0	0	7	7	1	0	0	0	0	1	1	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	1	1	1	0	0	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	13	3	2	0	0	18	19	2	0	0	0	0	2	2	0	0	0	0	0	0	0

13:00	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1		
13:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
13:45	0	0	0	0	0	0	0	5	1	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
H/TOT	0	0	0	0	0	0	0	8	1	0	0	0	9	9	0	0	0	0	0	0	0	0	1	0	0	0	1	1		
14:00	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
14:15	0	0	0	0	0	0	0	0	2	0	0	0	2	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0		
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
14:45	0	0	0	0	0	0	0	1	3	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
H/TOT	0	0	0	0	0	0	0	1	6	0	0	0	7	7	1	0	0	0	0	1	1	0	0	0	0	0	0	0		
15:00	0	0	0	0	0	0	0	2	2	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
15:15	0	0	0	0	0	0	0	3	1	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
15:30	0	0	0	0	0	0	0	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
15:45	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
H/TOT	0	0	0	0	0	0	0	10	3	0	0	0	13	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
16:00	0	0	0	0	0	0	0	2	1	0	0	0	3	3	0	0	0	1	0	1	2	0	0	0	0	0	0	0		
16:15	0	0	0	0	0	0	0	3	1	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
16:30	0	0	0	0	0	0	0	3	2	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
16:45	1	0	0	0	0	1	1	0	0	0	1	0	1	2	0	0	0	0	0	0	0	2	0	0	0	0	2	2		
H/TOT	1	0	0	0	0	1	1	8	4	0	1	0	13	14	0	0	0	1	0	1	2	2	0	0	0	0	2	2		
17:00	1	0	0	0	0	1	1	1	2	0	0	0	3	3	0	1	0	0	0	1	1	0	0	0	0	0	0	0		
17:15	0	0	0	0	0	0	0	1	1	0	0	0	2	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0		
17:30	1	0	0	0	0	1	1	4	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
17:45	0	0	0	0	0	0	0	2	2	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
H/TOT	2	0	0	0	0	2	2	8	5	0	0	0	13	13	1	1	0	0	0	2	2	0	0	0	0	0	0	0		
18:00	0	1	0	0	0	1	1	1	1	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
18:15	0	0	0	0	0	0	0	3	0	0	0	0	3	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0		
18:30	0	0	0	0	0	0	0	3	0	0	0	0	3	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0		
18:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
H/TOT	1	1	0	0	0	2	2	7	1	0	0	0	8	8	2	0	0	0	0	2	2	0	0	0	0	0	0	0		
P/TOT	7	3	0	0	1	11	12	106	35	3	1	2	147	152	10	3	0	1	0	14	15	3	4	0	0	0	7	7		

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS

TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 02 DATE: 30th April 2024

LOCATION: Pendy's Cross DAY: Tuesday

	MOVEMENT 13							MOVEMENT 14							MOVEMENT 15							MOVEMENT 16						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	4	4	1	0	0	0	0	1	1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0	0	8	8	1	0	0	0	0	1	1
08:00	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	1	0	0	0	0	1	1	3	2	0	0	0	5	5	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
09:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	0	1	0	0	0	1	1	4	1	0	0	0	5	5	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	1	0	0	1	2	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	1	1	0	0	0	2	2	1	0	1	0	0	2	3	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	1	0	0	0	0	1	1	2	1	0	0	0	3	3	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0	1	1
H/TOT	0	0	0	0	0	0	0	2	0	0	0	0	2	2	5	1	0	0	0	6	6	0	1	0	0	0	1	1

13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	4	4	0	1	0	0	0	1	1	
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	0	0	0	2	2	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	4	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	1	0	0	0	0	1	1	6	1	0	0	0	7	7	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3	1	0	0	0	0	1	1	
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	5	1	0	0	0	0	1	1	
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	2	0	0	0	3	3	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	2	0	0	0	2	2	2	2	0	0	0	4	4	0	0	0	0	0	0	0	0
17:00	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0
H/TOT	0	1	0	0	0	1	1	0	0	0	0	0	0	0	4	1	0	0	0	5	5	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	1	0	0	1	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0
18:45	1	0	0	0	0	1	1	0	1	2	0	0	3	4	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	0	1	4	0	0	5	7	3	1	0	0	0	4	4	0	0	0	0	0	0	0	0
P/TOT	2	1	0	0	0	3	3	5	5	4	0	0	14	16	42	12	1	0	0	55	56	2	2	0	0	0	4	4	

SITE: 02 DATE: 30th April 2024

LOCATION: Pendy's Cross DAY: Tuesday

	MOVEMENT 17							MOVEMENT 18							MOVEMENT 19							MOVEMENT 20							PCU's Through Junction
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	9
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	11
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	12
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	2	0	0	0	0	2	2	21
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	7	0	0	0	0	7	7	53
08:00	0	0	0	0	0	0	0	0	0	0	1	0	1	2	1	0	0	0	0	1	1	2	1	0	0	1	4	5	13
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0	1	1	17
08:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	1	0	0	2	3	0	0	0	0	0	0	0	18
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20
H/TOT	0	0	0	0	0	0	0	1	0	0	1	0	2	3	2	1	1	0	0	4	5	2	2	0	0	1	5	6	68
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0	1	1	25
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3	16
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	2	0	0	0	0	2	2	23
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3	15
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2	3	8	1	0	0	0	9	9	78
10:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	8
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	13
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	13
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	14
H/TOT	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6	6	47
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	9
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	15
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1	1	10
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	3	2	1	0	0	0	3	3	41
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1	1	19
12:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	20
12:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	3	0	0	0	0	3	3	20
12:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14
H/TOT	1	0	0	0	0	1	1	1	1	0	0	0	2	2	2	0	0	0	0	2	2	4	0	0	0	0	4	4	72

13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	3	4	10
13:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0	1	1	3	0	0	0	0	3	3	14
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	16
H/TOT	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0	1	1	6	1	1	0	0	8	9	53
14:00	0	0	0	0	0	0	0	0	0	1	0	0	1	2	1	1	0	0	0	2	2	1	0	0	0	0	1	1	15
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	3	0	0	0	0	3	3	21
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	20
H/TOT	0	0	0	0	0	0	0	0	0	1	0	0	1	2	2	1	0	0	0	3	3	5	1	0	0	0	6	6	65
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3	19
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	10
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	13
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	1	0	0	1	2	15
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3	3	0	2	0	0	5	6	56
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16
16:15	0	0	0	0	0	0	0	1	0	0	0	0	1	1	2	0	0	0	0	2	2	0	0	0	0	0	0	0	23
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	1	0	0	0	0	1	1	19
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	1	1	0	0	0	2	2	18
H/TOT	0	0	0	0	0	0	0	1	0	0	0	0	1	1	5	1	0	0	0	6	6	2	1	0	0	0	3	3	76
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	3	3	2	0	0	0	0	2	2	26
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	18
17:30	0	0	2	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	4	5	23
17:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	1	0	0	0	1	1	1	0	0	0	0	1	1	25
H/TOT	0	0	2	0	0	2	3	1	0	0	0	0	1	1	3	1	0	0	0	4	4	6	0	2	0	0	8	9	92
18:00	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1	16
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	4	0	0	0	0	4	4	20
18:30	0	0	0	0	0	0	0	2	0	0	1	0	3	4	1	0	0	0	0	1	1	2	0	0	0	0	2	2	17
18:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1	1	1	0	0	0	0	1	1	19
H/TOT	0	0	0	0	0	0	0	3	1	0	1	0	5	6	5	0	0	0	0	5	5	8	0	0	0	0	8	8	71
P/TOT	2	0	2	0	0	4	5	8	2	1	2	0	13	16	24	6	3	0	0	33	35	59	7	5	0	1	72	76	769

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS

TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 03 DATE: 30th April 2024

LOCATION: Glannoge Cross DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	0	0	0	0	0	0	0	10	5	0	3	0	18	22	0	0	0	0	0	0	0
07:15	1	0	0	0	0	1	1	15	4	0	1	0	20	21	0	0	0	0	0	0	0
07:30	2	0	0	1	0	3	4	10	3	0	4	1	18	24	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	14	3	1	2	0	20	23	0	0	0	0	0	0	0
H/TOT	3	0	0	1	0	4	5	49	15	1	10	1	76	91	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	12	5	1	1	0	19	21	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	15	3	0	0	0	18	18	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	11	2	0	1	0	14	15	0	0	0	0	0	0	0
08:45	1	0	0	0	1	2	3	15	2	2	0	0	19	20	0	0	0	0	0	0	0
H/TOT	1	0	0	0	1	2	3	53	12	3	2	0	70	74	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	9	6	1	0	0	16	17	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	2	6	1	2	0	11	14	1	0	0	0	0	1	1
09:30	0	0	0	0	0	0	0	7	3	0	1	0	11	12	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	8	0	0	1	0	9	10	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	26	15	2	4	0	47	53	1	0	0	0	0	1	1
10:00	0	0	0	0	0	0	0	5	6	1	2	0	14	17	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	6	1	1	1	0	9	11	1	0	0	0	0	1	1
10:30	0	0	1	0	0	1	2	9	0	1	0	0	10	11	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	11	2	0	1	0	14	15	0	0	0	0	0	0	0
H/TOT	0	0	1	0	0	1	2	31	9	3	4	0	47	54	1	0	0	0	0	1	1
11:00	0	0	0	0	0	0	0	4	3	2	2	0	11	15	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	5	2	0	0	0	7	7	0	0	0	0	0	0	0
11:30	0	0	1	0	0	1	2	14	2	1	1	0	18	20	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	11	2	1	1	0	15	17	0	0	0	0	0	0	0
H/TOT	0	0	1	0	0	1	2	34	9	4	4	0	51	58	0	0	0	0	0	0	0
12:00	1	0	0	0	0	1	1	9	2	0	0	0	11	11	0	0	0	0	0	0	0
12:15	0	0	1	0	0	1	2	10	1	1	2	0	14	17	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	8	1	1	0	0	10	11	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	7	0	0	2	0	9	12	0	0	0	0	0	0	0
H/TOT	1	0	1	0	0	2	3	34	4	2	4	0	44	50	0	0	0	0	0	0	0

13:00	1	0	0	0	0	1	1	7	0	0	0	0	7	7	0	0	0	0	0	0	0
13:15	1	0	0	0	0	1	1	11	1	0	1	1	14	16	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	4	1	0	0	0	5	5	0	0	0	0	0	0	0
13:45	1	0	0	0	0	1	1	10	2	0	2	0	14	17	0	0	0	0	0	0	0
H/TOT	3	0	0	0	0	3	3	32	4	0	3	1	40	45	0	0	0	0	0	0	0
14:00	1	0	0	0	0	1	1	10	2	0	5	0	17	24	0	0	0	0	0	0	0
14:15	0	0	1	0	0	1	2	4	1	0	1	0	6	7	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	2	2	0	0	0	4	4	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	8	2	0	2	0	12	15	0	0	0	0	0	0	0
H/TOT	1	0	1	0	0	2	3	24	7	0	8	0	39	49	0	0	0	0	0	0	0
15:00	0	0	1	0	1	2	4	11	2	0	0	0	13	13	1	0	0	0	0	1	1
15:15	0	0	0	1	0	1	2	11	3	0	4	0	18	23	0	0	0	0	0	0	0
15:30	1	0	0	0	0	1	1	10	0	0	0	0	10	10	0	0	0	0	0	0	0
15:45	0	0	1	0	0	1	2	12	5	0	1	0	18	19	0	0	0	0	0	0	0
H/TOT	1	0	2	1	1	5	8	44	10	0	5	0	59	66	1	0	0	0	0	1	1
16:00	1	1	0	0	0	2	2	18	4	0	0	0	22	22	1	0	0	0	0	1	1
16:15	0	0	1	0	0	1	2	9	2	2	2	1	16	21	0	1	0	0	0	1	1
16:30	1	0	0	1	0	2	3	12	4	0	2	0	18	21	0	0	0	0	0	0	0
16:45	0	0	1	0	0	1	2	16	4	0	2	0	22	25	0	0	0	0	0	0	0
H/TOT	2	1	2	1	0	6	8	55	14	2	6	1	78	88	1	1	0	0	0	2	2
17:00	1	0	1	0	0	2	3	19	3	0	3	0	25	29	1	0	0	0	0	1	1
17:15	0	0	0	0	0	0	0	26	3	1	2	0	32	35	0	0	0	0	0	0	0
17:30	2	0	0	0	0	2	2	18	3	0	0	0	21	21	0	0	0	0	0	0	0
17:45	0	0	1	0	0	1	2	20	1	0	0	0	21	21	0	0	0	0	0	0	0
H/TOT	3	0	2	0	0	5	6	83	10	1	5	0	99	106	1	0	0	0	0	1	1
18:00	1	0	0	0	0	1	1	12	4	0	0	0	16	16	0	0	0	0	0	0	0
18:15	1	1	0	0	0	2	2	11	2	0	0	0	13	13	2	0	0	0	0	2	2
18:30	0	0	1	0	0	1	2	7	2	0	0	0	9	9	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	8	1	0	0	1	10	11	1	0	0	0	0	1	1
H/TOT	2	1	1	0	0	4	5	38	9	0	0	1	48	49	3	0	0	0	0	3	3
P/TOT	17	2	11	3	2	35	46	503	118	18	55	4	698	783	8	1	0	0	0	9	9

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS

TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 03 DATE: 30th April 2024

LOCATION: Glannoge Cross DAY: Tuesday

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
09:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1
09:15	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	1	1	0	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	1	1
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P/TOT	7	2	0	0	0	9	9	0	1	0	0	0	1	1	2	0	0	0	0	2	2

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS
TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 03 DATE: 30th April 2024

LOCATION: Glannoge Cross DAY: Tuesday

	MOVEMENT 7							MOVEMENT 8							MOVEMENT 9						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	0	0	0	0	0	0	0	12	3	0	0	0	15	15	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	15	2	0	1	0	18	19	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	11	2	0	0	0	13	13	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	11	3	2	2	0	18	22	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	49	10	2	3	0	64	69	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	21	2	1	0	0	24	25	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	17	3	0	1	0	21	22	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	21	4	0	1	0	26	27	1	0	0	0	0	1	1
08:45	1	0	0	0	0	1	1	17	2	0	2	0	21	24	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	76	11	1	4	0	92	98	1	0	0	0	0	1	1
09:00	0	0	0	0	0	0	0	22	3	0	0	0	25	25	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	8	1	1	1	0	11	13	1	0	0	0	0	1	1
09:30	0	0	0	0	0	0	0	8	1	2	0	0	11	12	0	0	0	1	0	1	2
09:45	0	0	0	0	0	0	0	9	2	1	2	0	14	17	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	47	7	4	3	0	61	67	1	0	0	1	0	2	3
10:00	0	0	0	0	0	0	0	10	1	0	0	0	11	11	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	11	0	0	1	0	12	13	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	7	1	0	1	0	9	10	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	11	4	1	2	0	18	21	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	39	6	1	4	0	50	56	0	0	0	0	0	0	0
11:00	0	1	0	0	0	1	1	8	1	1	0	0	10	11	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	11	2	1	0	0	14	15	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	14	0	0	1	1	16	18	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	7	1	1	0	0	9	10	0	0	0	0	0	0	0
H/TOT	0	1	0	0	0	1	1	40	4	3	1	1	49	53	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	11	2	0	0	0	13	13	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	6	1	0	2	0	9	12	1	0	0	0	0	1	1
12:30	0	0	0	0	0	0	0	7	2	0	2	0	11	14	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	5	2	1	2	0	10	13	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	29	7	1	6	0	43	51	1	0	0	0	0	1	1

13:00	0	0	0	0	0	0	0	6	0	1	0	0	7	8	2	0	0	0	0	2	2
13:15	0	0	0	0	0	0	0	8	1	2	0	0	11	12	0	1	0	0	0	1	1
13:30	0	0	0	0	0	0	0	4	0	1	0	0	5	6	1	0	0	0	0	1	1
13:45	0	0	0	0	0	0	0	8	0	0	2	0	10	13	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	26	1	4	2	0	33	38	3	1	0	0	0	4	4
14:00	0	0	0	0	0	0	0	10	3	1	2	0	16	19	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	9	2	0	0	0	11	11	1	0	0	0	0	1	1
14:30	0	0	0	0	0	0	0	16	2	1	0	0	19	20	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	15	1	0	3	0	19	23	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	50	8	2	5	0	65	73	1	0	0	0	0	1	1
15:00	0	0	0	0	0	0	0	11	2	1	1	0	15	17	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	13	3	0	0	0	16	16	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	14	6	0	0	0	20	20	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	10	2	0	1	0	13	14	1	0	0	0	0	1	1
H/TOT	0	0	0	0	0	0	0	48	13	1	2	0	64	67	1	0	0	0	0	1	1
16:00	0	0	0	0	0	0	0	14	4	0	1	0	19	20	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	14	2	1	2	0	19	22	1	0	0	0	0	1	1
16:30	0	0	0	0	0	0	0	11	8	1	1	1	22	25	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	18	6	1	1	0	26	28	0	1	0	0	0	1	1
H/TOT	0	0	0	0	0	0	0	57	20	3	5	1	86	95	1	1	0	0	0	2	2
17:00	0	0	0	0	0	0	0	15	6	0	1	0	22	23	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	27	6	0	1	0	34	35	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	9	1	0	1	0	11	12	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	13	2	0	0	0	15	15	1	0	0	0	0	1	1
H/TOT	0	0	0	0	0	0	0	64	15	0	3	0	82	86	1	0	0	0	0	1	1
18:00	0	0	0	0	0	0	0	17	5	1	1	0	24	26	1	0	0	0	0	1	1
18:15	0	0	0	0	0	0	0	18	2	0	0	0	20	20	1	0	0	0	0	1	1
18:30	0	0	0	0	0	0	0	11	1	0	0	0	12	12	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	12	1	0	0	0	13	13	2	0	0	0	0	2	2
H/TOT	0	0	0	0	0	0	0	58	9	1	1	0	69	71	4	0	0	0	0	4	4
P/TOT	1	1	0	0	0	2	2	583	111	23	39	2	758	822	14	2	0	1	0	17	18

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS

TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 03 DATE: 30th April 2024

LOCATION: Glannoge Cross DAY: Tuesday

	MOVEMENT 10							MOVEMENT 11							MOVEMENT 12							PCU's Through Junction
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	39
07:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	44
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	44
07:45	0	1	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	47
H/TOT	1	1	0	0	0	2	2	0	0	0	0	0	0	0	4	0	0	1	0	5	6	173
08:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	3	44
08:30	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46
08:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	0	1	3	5	54
H/TOT	2	0	0	1	0	3	4	0	0	0	0	0	0	0	2	0	1	1	1	5	8	190
09:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45
09:15	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0	0	1	1	32
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	28
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27
H/TOT	1	0	0	0	0	1	1	0	1	0	0	0	1	1	2	0	0	0	0	2	2	131
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	3	31
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	3	115
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	27
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	24
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	41
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	28
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	0	0	4	5	120
12:00	2	0	0	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	1	1	28
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	26
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25
H/TOT	2	0	0	0	0	2	2	0	0	0	0	0	0	0	1	0	1	0	0	2	3	110

13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
13:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1	1	32
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	31
H/TOT	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	2	2	93
14:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	0	0	1	1	47
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	26
14:45	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	39
H/TOT	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0	1	1	0	0	2	3	132
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	36
15:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	2	44
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	31
15:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38
H/TOT	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	2	0	0	2	3	149
16:00	0	0	0	1	0	1	2	0	0	0	0	0	0	0	1	0	1	0	0	2	3	50
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	46
16:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	50
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	3	58
H/TOT	1	0	0	1	0	2	3	0	0	0	0	0	0	0	2	0	2	0	0	4	5	204
17:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	58
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	70
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	37
17:45	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	42
H/TOT	3	0	0	0	0	3	3	0	0	0	0	0	0	0	1	0	1	0	0	2	3	206
18:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	1	0	0	1	2	46
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	38
18:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	26
18:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	1	0	0	2	3	31
H/TOT	3	0	0	0	0	3	3	0	0	0	0	0	0	0	2	0	2	0	0	4	5	140
P/TOT	17	1	1	2	0	21	24	0	1	0	0	0	1	1	17	3	13	2	1	36	46	1764

TRAFFINOMICS LIMITED

LAGAN QUARRY, BWEENG II TRAFFIC COUNTS **APRIL 2024**

MANUAL CLASSIFIED JUNCTION TURNING COUNTS **TRA/24/051**

SITE: 04 DATE: 30th April 2024

LOCATION: Tobergal Bridge DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	1	0	0	0	1	1
07:15	0	1	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1
07:30	0	0	0	0	1	1	2	0	0	0	0	0	0	0	0	1	0	0	0	1	1
07:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	0	0	1	1
H/TOT	2	2	0	0	1	5	6	0	1	0	0	0	1	1	1	3	0	0	0	4	4
08:00	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
08:15	0	0	0	1	0	1	2	0	0	0	0	0	0	0	1	0	0	0	0	1	1
08:30	2	0	1	0	0	3	4	0	0	0	0	0	0	0	1	0	0	0	0	1	1
08:45	1	2	0	0	0	3	3	0	1	0	0	0	1	1	2	0	0	0	1	3	4
H/TOT	4	2	1	1	0	8	10	1	1	0	0	0	2	2	4	0	0	0	1	5	6
09:00	0	0	0	1	0	1	2	1	0	0	0	1	2	3	0	0	0	0	0	0	0
09:15	1	1	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	2	0	0	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	1	1
09:45	1	0	1	0	0	2	3	1	1	0	0	0	2	2	0	0	0	0	0	0	0
H/TOT	4	1	1	1	0	7	9	2	1	0	0	1	4	5	1	0	0	0	0	1	1
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	4	4	0	0	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:00	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	2	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	5	3	0	0	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:00	1	0	1	0	0	2	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0
12:15	2	2	0	0	0	4	4	0	0	0	0	0	0	0	2	0	0	0	0	2	2
12:30	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
12:45	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	6	3	1	0	0	10	11	2	0	0	0	0	2	2	2	0	0	0	0	2	2

13:00	4	0	0	1	0	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	1	0	0	0	0	1	1	1	0	0	0	0	1	1	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	5	0	0	1	0	6	7	1	0	0	0	0	1	1	0	0	0	0	0	0	0
14:00	3	0	1	0	0	4	5	1	0	0	0	0	1	1	0	0	0	0	0	0	0
14:15	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	1	1	2
14:30	1	1	1	0	0	3	4	1	0	0	0	0	1	1	1	0	0	0	0	1	1
14:45	0	0	1	0	0	1	2	2	0	0	0	0	2	2	0	0	0	0	0	0	0
H/TOT	6	1	3	0	0	10	12	4	0	0	0	0	4	4	1	0	0	0	1	2	3
15:00	1	0	0	0	0	1	1	0	2	0	0	0	2	2	0	1	0	0	0	1	1
15:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	1	1	0	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	1	1
15:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	3	1	0	0	0	4	4	1	2	0	0	0	3	3	1	1	0	0	0	2	2
16:00	3	0	0	1	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	2	0	0	0	1	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	2	0	0	0	0	2	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	7	0	1	1	1	10	13	1	0	0	0	0	1	1	0	0	0	0	0	0	0
17:00	2	0	0	0	0	2	2	0	0	0	0	1	1	2	1	0	0	0	0	1	1
17:15	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:30	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1
H/TOT	8	1	0	0	0	9	9	0	0	0	0	1	1	2	2	0	0	0	0	2	2
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	1	0	0	0	0	1	1	2	0	0	0	0	2	2	0	0	0	0	0	0	0
P/TOT	55	18	7	4	2	86	97	14	5	0	0	2	21	23	12	4	0	0	2	18	20

TRAFFINOMICS LIMITED

LAGAN QUARRY, BWEENG II TRAFFIC COUNTS **APRIL 2024**

MANUAL CLASSIFIED JUNCTION TURNING COUNTS **TRA/24/051**

SITE: 04 DATE: 30th April 2024

LOCATION Tobergal Bridge DAY: Tuesday

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6							PCU's Through Junction
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	
07:00	2	0	0	0	0	2	2	0	0	0	1	0	1	2	1	0	0	0	0	1	1	9
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	3
07:30	0	0	0	1	0	1	2	0	0	0	0	0	0	0	1	0	0	0	0	1	1	6
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	4	6
H/TOT	2	0	0	1	0	3	4	0	0	0	1	0	1	2	7	0	0	0	0	7	7	25
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
08:15	0	0	0	0	0	0	0	0	0	0	2	0	2	5	2	2	0	0	0	4	4	12
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
08:45	1	0	0	0	0	1	1	1	0	0	0	0	1	1	2	0	0	0	0	2	2	12
H/TOT	1	0	0	0	0	1	1	1	0	0	2	0	3	6	4	2	0	0	0	6	6	30
09:00	0	0	0	0	0	0	0	0	1	0	0	0	1	1	2	1	0	0	0	3	3	9
09:15	1	1	0	0	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	1	1	5
09:30	0	0	0	1	0	1	2	0	0	0	0	0	0	0	4	1	0	0	0	5	5	10
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	7
H/TOT	1	1	0	1	0	3	4	0	1	0	0	0	1	1	8	3	0	0	0	11	11	31
10:00	1	0	0	0	0	1	1	1	0	1	0	0	2	3	0	0	0	0	0	0	0	4
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	3	3	6
10:30	0	0	1	0	0	1	2	0	0	0	0	0	0	0	3	0	0	0	0	3	3	7
10:45	0	0	0	0	0	0	0	0	1	1	0	0	2	3	1	1	0	0	0	2	2	8
H/TOT	1	0	1	0	0	2	3	1	1	2	0	0	4	5	6	2	0	0	0	8	8	24
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
11:15	0	1	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	1	1	3
11:30	0	0	1	0	0	1	2	0	0	0	0	0	0	0	2	1	1	0	0	4	5	8
11:45	0	0	0	0	0	0	0	0	0	1	0	0	1	2	1	0	0	0	0	1	1	5
H/TOT	0	1	1	0	0	2	3	0	0	1	0	0	1	2	4	1	1	0	0	6	7	19
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	6
12:15	0	0	1	0	0	1	2	0	0	0	0	0	0	0	1	2	1	0	0	4	5	12
12:30	0	0	0	0	0	0	0	0	0	1	0	0	1	2	2	1	0	0	0	3	3	7
12:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	1	0	0	3	4	8
H/TOT	1	0	1	0	0	2	3	0	0	1	0	0	1	2	7	3	2	0	0	12	13	32

13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2	2
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	0	0	0	5	5	5
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	0	0	0	7	7	15
14:00	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	7
14:15	0	0	1	0	0	1	2	0	0	0	0	0	0	0	1	1	0	0	0	2	2	8
14:30	0	0	0	0	0	0	0	0	0	2	0	0	2	3	1	1	0	0	0	2	2	11
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	6
H/TOT	0	0	1	0	0	1	2	0	1	2	0	0	3	4	2	2	0	0	1	5	6	30
15:00	0	0	1	0	0	1	2	0	0	1	0	0	1	2	0	1	0	0	0	1	1	8
15:15	0	0	0	1	0	1	2	1	0	2	0	0	3	4	4	0	1	0	0	5	6	13
15:30	1	0	1	0	0	2	3	0	0	0	0	0	0	0	1	0	0	0	0	1	1	7
15:45	0	0	1	0	0	1	2	1	0	0	0	0	1	1	1	0	0	1	0	2	3	7
H/TOT	1	0	3	1	0	5	8	2	0	3	0	0	5	7	6	1	1	1	0	9	11	34
16:00	0	0	0	0	0	0	0	0	0	1	1	0	2	4	1	0	0	0	0	1	1	10
16:15	0	0	1	0	0	1	2	0	0	0	0	0	0	0	1	1	0	0	0	2	2	8
16:30	0	0	0	1	0	1	2	1	0	0	0	0	1	1	1	1	0	0	0	2	2	7
16:45	0	0	0	0	0	0	0	1	0	1	0	0	2	3	2	0	1	1	0	4	6	11
H/TOT	0	0	1	1	0	2	4	2	0	2	1	0	5	7	5	2	1	1	0	9	11	36
17:00	0	0	2	0	0	2	3	0	0	1	0	0	1	2	0	2	1	0	0	3	4	13
17:15	0	0	0	0	0	0	0	0	0	1	0	0	1	2	4	0	0	0	0	4	4	9
17:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	4	1	0	0	0	5	5	9
17:45	0	0	1	0	0	1	2	0	0	0	1	0	1	2	2	2	0	0	0	4	4	10
H/TOT	0	0	3	0	0	3	5	1	0	2	1	0	4	6	10	5	1	0	0	16	17	40
18:00	0	0	0	0	0	0	0	1	0	1	0	0	2	3	0	0	0	0	0	0	0	3
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	3
18:30	0	0	1	0	0	1	2	0	0	0	0	0	0	0	3	1	0	0	0	4	4	7
18:45	1	0	0	0	0	1	1	0	0	1	0	0	1	2	1	0	1	0	0	2	3	6
H/TOT	1	0	1	0	0	2	3	1	0	2	0	0	3	4	6	1	1	0	0	8	9	18
P/TOT	8	2	12	4	0	26	37	8	3	15	5	0	31	45	68	26	7	2	1	104	111	333

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS
TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 05 DATE: 30th April 2024

LOCATION Coolfadda Junction DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	0	0	0	0	0	0	0	19	5	0	0	0	24	24	2	2	0	0	0	4	4
07:15	0	0	0	0	0	0	0	16	9	0	0	1	26	27	3	0	0	0	0	3	3
07:30	0	0	0	0	0	0	0	14	3	0	0	0	17	17	6	1	0	0	0	7	7
07:45	1	0	0	0	0	1	1	18	2	0	0	0	20	20	3	0	0	0	0	3	3
H/TOT	1	0	0	0	0	1	1	67	19	0	0	1	87	88	14	3	0	0	0	17	17
08:00	0	0	0	0	0	0	0	17	2	0	0	0	19	19	8	2	0	0	0	10	10
08:15	0	0	0	0	0	0	0	13	3	1	0	0	17	18	6	0	0	0	0	6	6
08:30	0	0	0	0	0	0	0	18	3	0	0	0	21	21	11	2	0	0	0	13	13
08:45	2	0	0	0	0	2	2	22	4	1	2	0	29	32	4	2	0	0	0	6	6
H/TOT	2	0	0	0	0	2	2	70	12	2	2	0	86	90	29	6	0	0	0	35	35
09:00	0	0	0	0	0	0	0	16	3	1	0	0	20	21	4	2	0	0	0	6	6
09:15	0	0	0	0	0	0	0	6	2	0	0	0	8	8	4	1	1	0	0	6	7
09:30	0	0	0	0	0	0	0	6	2	0	0	0	8	8	9	1	0	0	0	10	10
09:45	0	0	0	0	0	0	0	4	1	0	0	0	5	5	3	3	0	0	0	6	6
H/TOT	0	0	0	0	0	0	0	32	8	1	0	0	41	42	20	7	1	0	0	28	29
10:00	0	0	0	0	0	0	0	4	0	0	0	0	4	4	4	0	0	0	0	4	4
10:15	1	0	0	0	0	1	1	4	0	1	1	0	6	8	4	0	0	0	0	4	4
10:30	0	0	0	0	0	0	0	9	1	1	0	0	11	12	4	3	0	0	0	7	7
10:45	0	0	0	0	0	0	0	11	1	1	0	0	13	14	1	2	0	0	0	3	3
H/TOT	1	0	0	0	0	1	1	28	2	3	1	0	34	37	13	5	0	0	0	18	18
11:00	0	0	0	0	0	0	0	5	0	1	0	0	6	7	3	0	1	0	0	4	5
11:15	2	0	0	0	0	2	2	2	0	1	0	0	3	4	7	2	2	0	0	11	12
11:30	0	0	0	0	0	0	0	6	3	0	0	0	9	9	8	1	0	0	0	9	9
11:45	0	0	0	0	0	0	0	7	2	1	0	0	10	11	5	1	0	1	0	7	8
H/TOT	2	0	0	0	0	2	2	20	5	3	0	0	28	30	23	4	3	1	0	31	34
12:00	0	0	0	0	0	0	0	7	0	1	0	0	8	9	5	0	0	0	0	5	5
12:15	0	0	0	0	0	0	0	3	2	0	0	0	5	5	5	2	1	1	0	9	11
12:30	0	0	0	0	0	0	0	5	2	1	0	0	8	9	11	0	0	0	0	11	11
12:45	0	0	0	0	0	0	0	6	2	0	0	0	8	8	5	1	0	0	0	6	6
H/TOT	0	0	0	0	0	0	0	21	6	2	0	0	29	30	26	3	1	1	0	31	33

13:00	0	0	0	0	0	0	0	8	1	0	1	0	10	11	6	1	0	0	0	7	7
13:15	0	0	0	0	0	0	0	4	0	0	1	0	5	6	14	2	2	0	0	18	19
13:30	0	1	0	0	0	1	1	5	1	0	0	1	7	8	4	0	0	0	0	4	4
13:45	0	0	0	0	0	0	0	5	1	0	0	0	6	6	8	2	0	0	0	10	10
H/TOT	0	1	0	0	0	1	1	22	3	0	2	1	28	32	32	5	2	0	0	39	40
14:00	0	0	0	0	0	0	0	9	2	0	0	0	11	11	7	1	1	0	0	9	10
14:15	0	0	0	0	0	0	0	9	1	0	0	0	10	10	6	3	0	1	0	10	11
14:30	0	0	0	0	0	0	0	4	0	0	0	0	4	4	12	1	2	0	0	15	16
14:45	3	0	0	0	0	3	3	9	2	1	0	0	12	13	8	0	0	1	0	9	10
H/TOT	3	0	0	0	0	3	3	31	5	1	0	0	37	38	33	5	3	2	0	43	47
15:00	1	0	0	0	0	1	1	9	0	0	0	0	9	9	13	4	0	0	0	17	17
15:15	0	0	0	0	0	0	0	7	0	0	0	0	7	7	9	4	1	0	0	14	15
15:30	0	0	0	0	0	0	0	5	0	0	0	0	5	5	15	4	0	0	0	19	19
15:45	2	0	0	0	0	2	2	5	2	0	0	0	7	7	13	4	0	0	0	17	17
H/TOT	3	0	0	0	0	3	3	26	2	0	0	0	28	28	50	16	1	0	0	67	68
16:00	0	0	0	0	1	1	2	6	2	0	0	0	8	8	11	2	0	0	1	14	15
16:15	0	0	0	0	0	0	0	7	2	1	0	0	10	11	8	1	0	0	0	9	9
16:30	2	0	0	0	0	2	2	5	1	0	0	0	6	6	23	2	0	0	0	25	25
16:45	1	0	0	0	1	2	3	5	1	0	0	0	6	6	7	2	0	0	0	9	9
H/TOT	3	0	0	0	2	5	7	23	6	1	0	0	30	31	49	7	0	0	1	57	58
17:00	1	0	0	0	0	1	1	9	1	0	0	0	10	10	24	4	0	0	0	28	28
17:15	0	0	0	0	0	0	0	7	2	0	0	0	9	9	14	6	2	0	0	22	23
17:30	0	0	0	0	0	0	0	8	2	1	0	0	11	12	18	4	0	0	0	22	22
17:45	1	0	0	0	0	1	1	7	2	0	0	0	9	9	22	7	0	0	0	29	29
H/TOT	2	0	0	0	0	2	2	31	7	1	0	0	39	40	78	21	2	0	0	101	102
18:00	0	0	0	0	0	0	0	4	0	2	0	0	6	7	18	7	0	0	0	25	25
18:15	1	0	0	0	0	1	1	7	4	0	0	0	11	11	14	1	1	0	0	16	17
18:30	0	0	0	0	0	0	0	5	1	0	0	0	6	6	9	3	0	0	0	12	12
18:45	1	0	0	0	0	1	1	7	1	1	0	0	9	10	17	2	1	0	0	20	21
H/TOT	2	0	0	0	0	2	2	23	6	3	0	0	32	34	58	13	2	0	0	73	74
P/TOT	19	1	0	0	2	22	24	394	81	17	5	2	499	516	425	95	15	4	1	540	554

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS
TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 05 DATE: 30th April 2024

LOCATION Coolfadda Junction DAY: Tuesday

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6							PCU's Through Junction
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
07:00	0	0	0	0	0	0	0	2	0	0	7	0	9	18	1	0	0	0	0	1	1	47
07:15	1	0	0	3	0	4	8	3	0	0	0	0	3	3	0	0	0	0	0	0	0	41
07:30	1	0	0	0	0	1	1	4	0	0	2	0	6	9	0	0	0	0	2	2	4	38
07:45	0	0	0	3	0	3	7	1	0	0	0	0	1	1	0	0	0	0	1	1	2	34
H/TOT	2	0	0	6	0	8	16	10	0	0	9	0	19	31	1	0	0	0	3	4	7	160
08:00	0	0	0	1	0	1	2	5	0	0	3	0	8	12	0	0	0	0	0	0	0	43
08:15	1	1	0	0	0	2	2	4	0	0	1	0	5	6	0	0	0	0	0	0	0	32
08:30	0	0	0	0	0	0	0	2	0	2	1	0	5	7	0	0	0	0	0	0	0	41
08:45	1	0	0	1	0	2	3	5	1	0	0	0	6	6	2	1	0	0	0	3	3	52
H/TOT	2	1	0	2	0	5	8	16	1	2	5	0	24	32	2	1	0	0	0	3	3	169
09:00	1	1	0	1	0	3	4	1	1	0	0	0	2	2	0	0	0	0	0	0	0	33
09:15	0	0	0	1	0	1	2	1	1	0	3	0	5	9	0	0	0	0	0	0	0	26
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18
09:45	1	0	0	1	0	2	3	0	0	0	1	0	1	2	1	0	0	0	0	1	1	18
H/TOT	2	1	0	3	0	6	10	2	2	0	4	0	8	13	1	0	0	0	0	1	1	94
10:00	0	0	0	1	0	1	2	2	0	1	0	0	3	4	0	0	0	0	0	0	0	14
10:15	0	0	0	0	0	0	0	1	0	0	3	0	4	8	0	0	0	0	0	0	0	21
10:30	1	1	0	1	0	3	4	2	0	0	0	0	2	2	0	0	0	0	0	0	0	25
10:45	0	2	0	1	0	3	4	0	0	0	0	0	0	0	1	0	0	0	0	1	1	22
H/TOT	1	3	0	3	0	7	11	5	0	1	3	0	9	13	1	0	0	0	0	1	1	81
11:00	0	0	0	2	0	2	5	0	2	0	1	0	3	4	0	0	0	0	0	0	0	20
11:15	3	0	0	1	0	4	5	2	0	0	0	0	2	2	0	0	0	0	0	0	0	25
11:30	0	0	0	1	0	1	2	0	0	0	3	0	3	7	0	0	0	0	0	0	0	27
11:45	1	0	0	1	0	2	3	1	0	0	1	0	2	3	0	0	0	0	0	0	0	25
H/TOT	4	0	0	5	0	9	16	3	2	0	5	0	10	17	0	0	0	0	0	0	0	97
12:00	3	1	1	2	0	7	10	0	1	0	0	0	1	1	0	0	0	0	0	0	0	25
12:15	0	1	0	0	0	1	1	2	0	1	1	0	4	6	0	1	0	0	0	1	1	24
12:30	1	0	2	0	0	3	4	2	1	0	0	0	3	3	0	0	0	0	0	0	0	27
12:45	0	0	0	2	0	2	5	2	0	0	1	0	3	4	0	0	0	0	0	0	0	23
H/TOT	4	2	3	4	0	13	20	6	2	1	2	0	11	14	0	1	0	0	0	1	1	98

13:00	1	0	0	0	0	1	1	3	0	0	1	0	4	5	1	0	0	0	0	1	1	26
13:15	0	0	0	1	0	1	2	3	0	0	2	0	5	8	1	0	0	0	0	1	1	36
13:30	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0	15
13:45	0	0	0	2	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21
H/TOT	1	0	0	3	0	4	8	6	0	0	4	0	10	15	2	0	0	0	0	2	2	98
14:00	0	0	0	1	0	1	2	1	0	0	0	0	1	1	0	0	0	0	1	1	2	26
14:15	2	0	0	1	0	3	4	1	0	1	3	0	5	9	0	0	0	0	0	0	0	35
14:30	0	1	1	2	0	4	7	0	0	0	1	0	1	2	1	0	0	0	0	1	1	30
14:45	1	1	0	0	0	2	2	1	0	1	1	0	3	5	0	0	0	0	0	0	0	33
H/TOT	3	2	1	4	0	10	16	3	0	2	5	0	10	18	1	0	0	0	1	2	3	124
15:00	0	0	0	1	0	1	2	2	0	0	0	0	2	2	0	0	0	0	0	0	0	31
15:15	3	0	0	0	0	3	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0	26
15:30	1	0	1	2	0	4	7	0	0	0	1	0	1	2	2	0	0	0	0	2	2	35
15:45	2	1	1	0	0	4	5	1	0	0	0	0	1	1	0	0	1	0	0	1	2	33
H/TOT	6	1	2	3	0	12	17	4	0	0	1	0	5	6	2	0	1	0	0	3	4	125
16:00	5	0	0	1	0	6	7	0	0	1	1	0	2	4	1	0	0	0	0	1	1	37
16:15	1	1	0	0	0	2	2	0	0	0	2	0	2	5	1	0	0	0	0	1	1	27
16:30	2	0	0	0	0	2	2	0	1	0	0	0	1	1	0	0	0	0	1	1	2	38
16:45	2	0	1	0	0	3	4	0	0	0	0	0	0	0	1	0	0	0	0	1	1	23
H/TOT	10	1	1	1	0	13	15	0	1	1	3	0	5	9	3	0	0	0	1	4	5	125
17:00	3	0	1	0	0	4	5	1	0	0	0	0	1	1	0	0	0	0	0	0	0	45
17:15	4	1	0	0	0	5	5	4	0	0	0	0	4	4	0	0	0	0	0	0	0	41
17:30	3	1	0	0	0	4	4	2	0	0	0	0	2	2	0	0	0	0	0	0	0	40
17:45	1	1	0	2	0	4	7	2	1	0	0	0	3	3	0	0	0	0	0	0	0	49
H/TOT	11	3	1	2	0	17	20	9	1	0	0	0	10	10	0	0	0	0	0	0	0	174
18:00	3	0	0	0	0	3	3	1	0	0	0	0	1	1	0	0	0	0	0	0	0	36
18:15	2	1	2	0	0	5	6	1	0	0	0	0	1	1	0	0	0	0	0	0	0	36
18:30	5	1	0	0	0	6	6	2	0	0	0	0	2	2	1	0	0	0	0	1	1	27
18:45	3	0	1	2	0	6	9	1	0	0	0	0	1	1	1	0	0	0	0	1	1	42
H/TOT	13	2	3	2	0	20	24	5	0	0	0	0	5	5	2	0	0	0	0	2	2	141
P/TOT	59	16	11	38	0	124	179	69	9	7	41	0	126	183	15	2	1	0	5	23	29	1484

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS
TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 06 DATE: 30th April 2024

LOCATION: Ahadallane Junction DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**
07:00	21	5	0	7	0	33	42	0	0	0	0	0	0	0	1	1	0	0	0	2	2
07:15	18	8	0	0	1	27	28	1	1	0	0	0	2	2	1	0	0	0	0	1	1
07:30	18	2	0	2	0	22	25	0	1	0	0	0	1	1	2	0	0	0	0	2	2
07:45	19	2	0	0	0	21	21	0	0	0	0	0	0	0	2	0	0	0	0	2	2
H/TOT	76	17	0	9	1	103	116	1	2	0	0	0	3	3	6	1	0	0	0	7	7
08:00	21	2	0	3	0	26	30	1	0	0	0	0	1	1	4	2	0	0	0	6	6
08:15	16	3	1	1	0	21	23	1	0	0	0	0	1	1	2	1	0	0	0	3	3
08:30	20	3	2	1	0	26	28	0	0	0	0	0	0	0	2	0	0	0	0	2	2
08:45	24	5	1	2	0	32	35	3	0	0	0	0	3	3	2	1	0	0	0	3	3
H/TOT	81	13	4	7	0	105	116	5	0	0	0	0	5	5	10	4	0	0	0	14	14
09:00	15	4	1	0	0	20	21	2	0	0	0	0	2	2	1	1	0	0	0	2	2
09:15	7	2	0	3	0	12	16	0	1	0	0	0	1	1	0	0	0	0	0	0	0
09:30	6	2	0	0	0	8	8	0	0	0	0	0	0	0	1	0	0	0	0	1	1
09:45	4	1	0	1	0	6	7	0	0	0	0	0	0	0	1	1	0	0	0	2	2
H/TOT	32	9	1	4	0	46	52	2	1	0	0	0	3	3	3	2	0	0	0	5	5
10:00	4	0	1	0	0	5	6	2	0	0	0	0	2	2	1	0	0	0	0	1	1
10:15	5	0	1	3	0	9	13	0	0	0	1	0	1	2	2	0	0	0	0	2	2
10:30	9	1	1	0	0	11	12	2	0	0	0	0	2	2	2	0	0	0	0	2	2
10:45	10	1	1	0	0	12	13	1	0	0	0	0	1	1	0	2	0	0	0	2	2
H/TOT	28	2	4	3	0	37	43	5	0	0	1	0	6	7	5	2	0	0	0	7	7
11:00	4	1	0	1	0	6	7	1	1	1	0	0	3	4	0	0	0	0	0	0	0
11:15	4	0	1	0	0	5	6	0	0	0	0	0	0	0	1	0	1	0	0	2	3
11:30	5	3	0	3	0	11	15	1	0	0	0	0	1	1	3	0	0	0	0	3	3
11:45	6	2	1	1	0	10	12	2	0	0	0	0	2	2	1	0	0	0	0	1	1
H/TOT	19	6	2	5	0	32	40	4	1	1	0	0	6	7	5	0	1	0	0	6	7
12:00	6	0	1	0	0	7	8	1	1	0	0	0	2	2	3	0	1	0	0	4	5
12:15	3	2	0	1	0	6	7	2	0	1	0	0	3	4	1	1	0	0	0	2	2
12:30	5	2	0	0	0	7	7	2	1	1	0	0	4	5	3	0	2	0	0	5	6
12:45	7	2	0	1	0	10	11	1	0	0	0	0	1	1	2	0	0	0	0	2	2
H/TOT	21	6	1	2	0	30	33	6	2	2	0	0	10	11	9	1	3	0	0	13	15

13:00	8	1	0	2	0	11	14	3	0	0	0	0	3	3	2	0	0	0	0	2	2
13:15	4	0	0	3	0	7	11	3	0	0	0	0	3	3	1	0	0	0	0	1	1
13:30	4	1	0	1	1	7	9	1	0	0	0	0	1	1	1	0	0	0	0	1	1
13:45	3	1	0	0	0	4	4	2	0	0	0	0	2	2	2	2	0	0	0	4	4
H/TOT	19	3	0	6	1	29	38	9	0	0	0	0	9	9	6	2	0	0	0	8	8
14:00	9	1	0	0	0	10	10	1	1	0	0	0	2	2	1	0	0	0	0	1	1
14:15	8	1	1	3	0	13	17	2	0	0	0	0	2	2	2	0	0	0	0	2	2
14:30	4	0	0	1	0	5	6	0	0	0	0	0	0	0	4	1	2	0	0	7	8
14:45	8	2	1	1	0	12	14	2	0	1	0	0	3	4	2	0	0	0	0	2	2
H/TOT	29	4	2	5	0	40	48	5	1	1	0	0	7	8	9	1	2	0	0	12	13
15:00	10	0	0	0	0	10	10	1	0	0	0	0	1	1	1	0	0	0	0	1	1
15:15	7	0	0	0	0	7	7	1	0	0	0	0	1	1	1	0	0	0	0	1	1
15:30	2	0	0	1	0	3	4	3	0	0	0	0	3	3	1	0	0	0	0	1	1
15:45	6	2	0	0	0	8	8	0	0	0	0	0	0	0	2	0	1	0	0	3	4
H/TOT	25	2	0	1	0	28	29	5	0	0	0	0	5	5	5	0	1	0	0	6	7
16:00	6	2	0	1	0	9	10	0	0	1	0	0	1	2	1	0	0	0	0	1	1
16:15	5	2	1	2	0	10	13	2	0	0	0	0	2	2	2	1	0	0	0	3	3
16:30	2	2	0	0	0	4	4	3	0	0	0	0	3	3	1	0	0	0	0	1	1
16:45	3	1	0	0	0	4	4	2	0	0	0	0	2	2	1	0	0	0	0	1	1
H/TOT	16	7	1	3	0	27	31	7	0	1	0	0	8	9	5	1	0	0	0	6	6
17:00	6	0	0	0	0	6	6	4	1	0	0	0	5	5	1	0	0	0	0	1	1
17:15	7	2	0	0	0	9	9	4	0	0	0	0	4	4	2	3	0	0	0	5	5
17:30	9	2	1	0	0	12	13	1	0	0	0	0	1	1	0	1	0	0	0	1	1
17:45	6	2	0	0	0	8	8	3	1	0	0	0	4	4	4	0	0	0	0	4	4
H/TOT	28	6	1	0	0	35	36	12	2	0	0	0	14	14	7	4	0	0	0	11	11
18:00	5	0	2	0	0	7	8	0	0	0	0	0	0	0	2	0	0	0	0	2	2
18:15	8	4	0	0	0	12	12	0	0	0	0	0	0	0	0	0	3	0	0	3	5
18:30	5	1	0	0	0	6	6	2	0	0	0	0	2	2	5	1	0	0	0	6	6
18:45	5	1	0	0	0	6	6	3	0	1	0	0	4	5	1	0	1	0	0	2	3
H/TOT	23	6	2	0	0	31	32	5	0	1	0	0	6	7	8	1	4	0	0	13	15
P/TOT	397	81	18	45	2	543	613	66	9	6	1	0	82	86	78	19	11	0	0	108	114

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS

TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 06 DATE: 30th April 2024

LOCATION Ahadallane Junction DAY: Tuesday

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6							PCU's Through Junction
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	
07:00	0	0	1	0	0	1	2	0	0	0	0	0	0	0	1	1	0	0	0	2	2	48
07:15	2	0	0	0	0	2	2	0	0	0	0	0	0	0	3	0	0	3	0	6	10	43
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	6	6	34
07:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	1	0	0	3	0	4	8	32
H/TOT	3	0	1	0	0	4	5	0	0	0	0	0	0	0	10	2	0	6	0	18	26	156
08:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	4	0	0	1	0	5	6	44
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	5	5	32
08:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	9	2	0	0	0	11	11	42
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	1	0	5	6	47
H/TOT	2	0	0	0	0	2	2	0	0	0	0	0	0	0	21	3	0	2	0	26	29	166
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	0	1	0	7	8	33
09:15	2	0	0	0	0	2	2	0	0	0	0	0	0	0	4	1	1	1	0	7	9	28
09:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	8	1	0	0	0	9	9	19
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	1	0	6	7	17
H/TOT	3	0	0	0	0	3	3	0	0	0	0	0	0	0	19	6	1	3	0	29	33	96
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	1	0	4	5	14
10:15	1	0	0	0	0	1	1	0	1	0	0	0	1	1	2	0	0	0	0	2	2	22
10:30	1	1	0	0	0	2	2	0	0	0	0	0	0	0	3	4	0	1	0	8	9	27
10:45	0	1	0	0	0	1	1	0	0	0	0	0	0	0	1	2	0	1	0	4	5	22
H/TOT	2	2	0	0	0	4	4	0	1	0	0	0	1	1	9	6	0	3	0	18	22	84
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	2	0	6	9	20
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	2	1	1	0	13	15	23
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	1	0	7	8	27
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	2	0	8	11	25
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	4	2	6	0	34	43	95
12:00	1	0	1	0	0	2	3	0	1	0	0	0	1	1	5	1	0	2	0	8	11	28
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	2	1	1	0	8	10	23
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	9	9	27
12:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	3	1	0	2	0	6	9	24
H/TOT	2	0	1	0	0	3	4	0	1	0	0	0	1	1	21	4	1	5	0	31	38	101

13:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	5	1	0	0	0	6	6	26
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	2	2	1	0	18	20	35
13:30	2	0	0	0	0	2	2	0	0	0	0	0	0	0	3	0	0	0	0	3	3	16
13:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	6	0	0	2	0	8	11	22
H/TOT	4	0	0	0	0	4	4	0	0	0	0	0	0	0	27	3	2	3	0	35	40	99
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	1	1	0	9	11	24
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	3	0	2	0	11	14	35
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	1	2	0	12	15	29
14:45	0	1	0	0	0	1	1	0	0	0	0	0	0	0	7	1	0	1	0	9	10	31
H/TOT	0	1	0	0	0	1	1	0	0	0	0	0	0	0	27	6	2	6	0	41	50	119
15:00	0	1	0	0	0	1	1	0	0	0	0	0	0	0	12	4	0	1	0	17	18	31
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	4	1	0	0	16	17	26
15:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	15	4	1	2	0	22	25	34
15:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	13	5	0	0	0	18	18	31
H/TOT	1	1	0	0	0	2	2	1	0	0	0	0	1	1	51	17	2	3	0	73	78	122
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	2	0	1	1	19	21	34
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	0	0	8	8	26
16:30	2	0	1	0	0	3	4	0	0	0	0	0	0	0	24	2	0	0	0	26	26	38
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	2	1	0	0	11	12	19
H/TOT	2	0	1	0	0	3	4	0	0	0	0	0	0	0	54	7	1	1	1	64	67	116
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	26	4	1	0	0	31	32	44
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	4	2	0	0	22	23	41
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	4	0	0	0	25	25	40
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	8	0	2	0	29	32	48
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	82	20	3	2	0	107	111	172
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	7	0	0	0	26	26	36
18:15	0	0	1	0	0	1	2	0	1	0	0	0	1	1	16	2	0	0	0	18	18	37
18:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	9	3	0	0	0	12	12	27
18:45	2	0	0	0	0	2	2	0	0	0	0	0	0	0	19	2	1	2	0	24	27	42
H/TOT	3	0	1	0	0	4	5	0	1	0	0	0	1	1	63	14	1	2	0	80	83	142
P/TOT	22	4	4	0	0	30	32	1	3	0	0	0	4	4	406	92	15	42	1	556	619	1467

SITE: 07 DATE: 30th April 2024

LOCATION: Lagan Cement Access DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	3	0	0	0	0	3	3	1	1	0	0	0	2	2	0	0	0	1	0	1	2
07:15	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0
07:30	0	0	0	0	1	1	2	0	0	0	1	0	1	2	1	0	0	0	0	1	1
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	3	0	0	0	1	4	5	1	2	0	1	0	4	5	1	0	0	1	0	2	3
08:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	0	2	0	2	5
08:30	1	0	0	0	0	1	1	1	0	1	0	0	2	3	0	0	0	0	0	0	0
08:45	2	1	0	0	0	3	3	0	1	0	0	0	1	1	0	0	1	0	0	1	2
H/TOT	4	1	0	0	0	5	5	1	1	1	1	0	4	6	0	0	1	2	0	3	6
09:00	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	0	0	0	0	0
09:15	2	1	0	0	0	3	3	0	0	0	0	0	0	0	1	0	0	0	0	1	1
09:30	1	1	0	0	0	2	2	1	0	0	1	0	2	3	1	0	0	0	0	1	1
09:45	0	0	1	0	0	1	2	1	0	0	0	0	1	1	0	1	0	0	0	1	1
H/TOT	3	2	1	0	0	6	7	2	0	0	2	0	4	7	2	1	0	0	0	3	3
10:00	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	1	0	0	0	1	1	0	2	0	0	0	2	2	1	0	0	0	0	1	1
10:45	1	1	1	0	0	3	4	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	4	2	1	0	0	7	8	1	2	0	0	0	3	3	1	0	0	0	0	1	1
11:00	2	0	0	0	0	2	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0
11:15	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	1	1	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:45	3	1	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	5	3	1	0	0	9	10	1	0	0	0	0	1	1	0	0	0	0	0	0	0
12:00	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:15	2	0	1	0	0	3	4	0	0	0	0	0	0	0	0	1	0	0	0	1	1
12:30	0	1	0	0	0	1	1	0	0	0	0	0	0	0	1	1	0	0	0	2	2
12:45	3	0	0	0	0	3	3	0	0	0	0	0	0	0	1	0	0	0	0	1	1
H/TOT	6	1	2	0	0	9	10	0	0	0	0	0	0	0	2	2	0	0	0	4	4

13:00	3	0	0	0	0	3	3	0	1	0	1	0	2	3	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0
13:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2
H/TOT	4	0	0	0	0	4	4	1	1	0	1	0	3	4	2	0	0	0	0	2	2
14:00	1	1	1	0	0	3	4	1	0	0	0	0	1	1	0	0	0	0	0	0	0
14:15	1	0	1	0	0	2	3	1	0	0	0	0	1	1	0	1	0	0	0	1	1
14:30	1	0	0	0	0	1	1	0	1	1	0	0	2	3	0	0	1	0	0	1	2
14:45	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	3	1	3	0	0	7	9	2	1	1	0	0	4	5	0	1	1	0	0	2	3
15:00	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0	0	1	0	0	1	2
15:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	2	0	0	0	0	2	2	0	1	0	0	0	1	1	0	0	0	0	0	0	0
15:45	0	0	1	0	0	1	2	0	0	0	0	0	0	0	1	0	0	1	0	2	3
H/TOT	4	0	2	0	0	6	7	0	1	0	0	0	1	1	1	0	1	1	0	3	5
16:00	3	0	0	0	0	3	3	0	0	0	1	0	1	2	0	1	0	0	0	1	1
16:15	1	0	0	0	1	2	3	1	0	0	0	0	1	1	0	1	0	0	0	1	1
16:30	0	0	1	0	0	1	2	0	0	0	1	0	1	2	1	1	0	0	0	2	2
16:45	2	0	0	0	0	2	2	0	0	0	0	0	0	0	1	1	0	1	0	3	4
H/TOT	6	0	1	0	1	8	10	1	0	0	2	0	3	6	2	4	0	1	0	7	8
17:00	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0	1	0	0	0	1	1
17:15	4	0	0	0	0	4	4	0	0	0	0	0	0	0	1	0	0	0	0	1	1
17:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	0	0	0	2	2
17:45	2	1	1	0	0	4	5	0	0	0	0	0	0	0	0	1	0	0	0	1	1
H/TOT	8	1	2	0	0	11	12	0	0	0	0	0	0	0	3	2	0	0	0	5	5
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
18:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	2	0	1	0	0	3	4	0	0	0	0	0	0	0	1	0	0	0	0	1	1
P/TOT	52	11	14	0	2	79	88	10	8	2	7	0	27	37	15	10	3	5	0	33	41

SITE: 07 DATE: 30th April 2024

LOCATION Lagan Cement Access DAY: Tuesday

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6							PCU's Through Junction
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	
07:00	0	0	0	3	0	3	7	0	0	0	0	0	0	0	1	0	0	0	0	1	1	15
07:15	1	0	0	0	0	1	1	0	0	0	3	0	3	7	1	0	0	0	0	1	1	10
07:30	0	0	0	2	0	2	5	0	0	0	0	0	0	0	1	0	0	0	0	1	1	11
07:45	0	0	0	1	0	1	2	0	0	0	1	0	1	2	2	0	0	0	0	2	2	7
H/TOT	1	0	0	6	0	7	15	0	0	0	4	0	4	9	5	0	0	0	0	5	5	43
08:00	0	0	0	3	0	3	7	0	0	0	2	0	2	5	0	0	0	0	0	0	0	13
08:15	0	0	0	1	0	1	2	0	0	0	1	0	1	2	3	1	0	0	0	4	4	16
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	5
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	8
H/TOT	0	0	0	4	0	4	9	0	0	0	3	0	3	7	6	1	0	0	0	7	7	40
09:00	0	0	0	1	0	1	2	0	0	0	2	0	2	5	1	1	0	0	0	2	2	11
09:15	0	0	0	2	0	2	5	0	0	0	1	0	1	2	1	0	0	0	0	1	1	12
09:30	0	0	0	2	0	2	5	0	0	0	0	0	0	0	2	1	0	0	0	3	3	14
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	5
H/TOT	0	0	0	5	0	5	12	0	0	0	3	0	3	7	5	2	0	0	0	7	7	42
10:00	0	0	0	1	0	1	2	0	0	0	2	0	2	5	1	0	0	0	0	1	1	9
10:15	0	0	0	1	0	1	2	0	0	0	0	0	0	0	2	1	0	0	0	3	3	7
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	6
10:45	0	0	0	1	0	1	2	0	0	0	2	0	2	5	1	2	1	0	0	4	5	16
H/TOT	0	0	0	3	0	3	7	0	0	0	4	0	4	9	6	3	1	0	0	10	11	38
11:00	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5
11:15	0	0	0	1	0	1	2	0	0	0	3	0	3	7	2	0	0	0	0	2	2	12
11:30	0	0	0	1	0	1	2	1	0	0	1	0	2	3	1	1	1	0	0	3	4	12
11:45	1	0	0	1	0	2	3	0	0	0	1	0	1	2	1	0	1	0	0	2	3	12
H/TOT	1	0	0	4	0	5	10	1	0	0	5	0	6	13	4	1	2	0	0	7	8	41
12:00	0	0	0	1	0	1	2	0	0	0	1	0	1	2	3	0	0	0	0	3	3	10
12:15	0	0	0	1	0	1	2	0	0	0	1	0	1	2	1	1	1	0	0	3	4	13
12:30	0	0	0	1	0	1	2	0	0	0	0	0	0	0	1	0	1	0	0	2	3	8
12:45	0	0	0	0	0	0	0	0	0	0	1	0	1	2	1	0	1	0	0	2	3	9
H/TOT	0	0	0	3	0	3	7	0	0	0	3	0	3	7	6	1	3	0	0	10	12	39

13:00	0	0	0	2	0	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11
13:15	1	0	0	0	0	1	1	0	0	0	1	0	1	2	1	0	0	0	0	1	1	5
13:30	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
13:45	0	0	0	0	0	0	0	0	0	1	0	0	1	2	1	1	0	0	0	2	2	6
H/TOT	1	0	0	3	0	4	8	0	0	1	1	0	2	4	2	1	0	0	0	3	3	25
14:00	0	0	0	1	0	1	2	0	0	0	3	0	3	7	0	1	0	0	0	1	1	15
14:15	0	0	0	2	0	2	5	0	0	0	1	0	1	2	0	1	0	0	0	1	1	12
14:30	0	0	0	1	0	1	2	0	0	0	1	0	1	2	1	1	1	0	0	3	4	13
14:45	0	0	0	1	0	1	2	0	0	0	1	0	1	2	0	1	0	0	0	1	1	7
H/TOT	0	0	0	5	0	5	12	0	0	0	6	0	6	14	1	4	1	0	0	6	7	47
15:00	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	1	0	0	1	2	3	9
15:15	0	0	0	1	0	1	2	0	0	0	0	0	0	0	5	0	2	0	0	7	8	11
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	4
15:45	0	0	0	1	0	1	2	0	0	0	2	0	2	5	1	0	0	0	0	1	1	13
H/TOT	0	0	0	2	0	2	5	0	0	0	3	0	3	7	7	1	2	0	1	11	13	37
16:00	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	0	1	0	0	1	2	10
16:15	0	0	0	2	0	2	5	0	0	0	0	0	0	0	2	0	0	0	0	2	2	12
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	7
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	8
H/TOT	0	0	0	2	0	2	5	0	0	0	1	0	1	2	4	0	2	0	0	6	7	37
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	3	7
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	1	0	0	5	6	11
17:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	3	1	0	0	0	4	4	8
17:45	0	0	0	0	0	0	0	0	0	0	1	0	1	2	2	1	0	1	0	4	5	13
H/TOT	1	0	0	0	0	1	1	0	0	0	1	0	1	2	8	3	3	1	0	15	18	38
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	3
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	3	3	4
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	4	6
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	4	5	6
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	3	0	0	12	14	18
P/TOT	4	0	0	37	0	41	89	1	0	1	34	0	36	81	62	18	17	1	1	99	110	446

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS
TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 08 DATE: 30th April 2024

LOCATION: Unclassified Road Junction South of Lagan Cement Access DAY: Tuesday

	MOVEMENT 1							MOVEMENT 2							MOVEMENT 3						
TIME	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU	CAR	LGV	OGV1	OGV2	BUS	TOT	PCU
07:00	3	0	0	3	0	6	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	2	1	3	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	4	0	0	6	1	11	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:00	1	0	0	3	0	4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:30	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
08:45	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	4	1	0	4	0	9	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	1	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:15	2	1	0	2	0	5	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:30	1	1	0	2	0	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
09:45	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	3	2	1	5	0	11	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:00	1	0	0	1	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:15	2	0	0	1	0	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10:45	1	1	1	1	0	4	6	0	0	0	0	0	0	0	1	0	0	0	0	1	1
H/TOT	4	2	1	3	0	10	14	0	0	0	0	0	0	0	1	0	0	0	0	1	1
11:00	2	0	0	1	0	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:15	0	1	0	1	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11:30	0	0	1	1	0	2	4	0	1	0	0	0	1	1	0	0	0	0	0	0	0
11:45	3	1	0	1	0	5	6	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	5	2	1	4	0	12	18	1	1	0	0	0	2	2	0	0	0	0	0	0	0
12:00	1	0	1	1	0	3	5	0	0	0	0	0	0	0	1	0	0	0	0	1	1
12:15	2	0	1	1	0	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:30	0	1	0	1	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12:45	2	0	0	0	0	2	2	1	0	0	0	0	1	1	0	0	0	0	0	0	0
H/TOT	5	1	2	3	0	11	16	1	0	0	0	0	1	1	1	0	0	0	0	1	1

13:00	3	0	0	2	0	5	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:30	1	0	0	1	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	5	0	0	3	0	8	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:00	1	1	1	1	0	4	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:15	1	0	1	2	0	4	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:30	1	0	0	1	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
14:45	0	0	1	1	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	3	1	3	5	0	12	20	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:00	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0	1	0	0	0	1	1
15:15	1	0	0	1	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:30	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	0	1	1	0	2	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	4	0	2	2	0	8	12	0	0	0	0	0	0	0	0	1	0	0	0	1	1
16:00	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:15	1	0	0	2	1	4	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
16:45	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	6	0	1	2	1	10	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:00	1	0	1	0	0	2	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:15	4	0	0	0	0	4	4	0	0	0	0	0	0	0	1	0	0	0	0	1	1
17:30	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17:45	2	1	1	0	0	4	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	9	1	2	0	0	12	13	0	0	0	0	0	0	0	1	0	0	0	0	1	1
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:30	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	2	0	1	0	0	3	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0
P/TOT	54	10	14	37	2	117	174	2	1	0	0	0	3	3	3	1	0	0	0	4	4

TRAFFINOMICS LIMITED

APRIL 2024 LAGAN QUARRY, BWEENG II TRAFFIC COUNTS

TRA/24/051 MANUAL CLASSIFIED JUNCTION TURNING COUNTS

SITE: 08 DATE: 30th April 2024

LOCATION Unclassified Road Junction South of Lagan Cement Access DAY: Tuesday

	MOVEMENT 4							MOVEMENT 5							MOVEMENT 6							PCU's Through Junction
TIME	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	**CAR**	**LGV**	**OGV1**	**OGV2**	**BUS**	**TOT**	**PCU**	
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	11
07:15	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	3	0	4	8	10
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	8
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	3	4	7
H/TOT	0	0	0	0	0	0	0	1	0	0	0	0	1	1	5	0	0	4	0	9	14	35
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	5	13
08:15	0	1	0	0	0	1	1	0	0	0	0	0	0	0	3	1	0	1	0	5	6	10
08:30	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	0	0	1	1	3
08:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	2	0	0	0	0	2	2	6
H/TOT	0	1	0	0	0	1	1	1	1	0	0	0	2	2	6	1	0	3	0	10	14	31
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	0	4	7	9
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	3	11
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	3	3	10
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	3
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	3	0	10	14	32
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	3	6	9
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	3	3	7
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	3
10:45	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	2	1	2	0	5	8	16
H/TOT	1	0	0	0	0	1	1	0	0	0	0	0	0	0	5	3	1	4	0	13	19	35
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
11:15	1	0	0	0	0	1	1	0	0	0	0	0	0	0	2	0	0	3	0	5	9	13
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	0	5	7	12
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	3	5	12
H/TOT	1	0	0	0	0	1	1	0	0	0	0	0	0	0	5	1	2	5	0	13	21	41
12:00	0	1	0	0	0	1	1	0	0	0	0	0	0	0	2	0	0	1	0	3	4	11
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	4	6	12
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	2	3	6
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	3	5	8
H/TOT	0	1	0	0	0	1	1	0	0	0	0	0	0	0	5	1	3	3	0	12	17	36

13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	3	4
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	3	4	4
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	1	0	5	7	19
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	4	8	14
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	3	10
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	0	4	6	9
14:45	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	1	0	1	0	2	3	8
H/TOT	0	0	0	0	0	0	0	0	1	0	0	0	1	1	1	4	1	6	0	12	20	41
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	4	8
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	2	0	0	7	8	11
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	3
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	3	6	9
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	2	3	1	13	19	32
16:00	0	0	0	0	0	0	0	0	0	1	0	0	1	2	0	0	1	1	0	2	4	8
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	10
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	3
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	2	2	4
H/TOT	0	0	0	0	0	0	0	0	0	1	0	0	1	2	4	0	2	1	0	7	9	25
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	3	6
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	0	4	5	10
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1	0	0	0	4	4	6
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	2	0	5	8	12
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	3	3	2	0	15	19	33
18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	2	2
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	3	3	4
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	4	4	6
18:45	0	0	0	0	0	0	0	0	0	0	1	0	1	2	2	0	2	0	0	4	5	8
H/TOT	0	0	0	0	0	0	0	0	0	0	1	0	1	2	8	1	3	0	0	12	14	19
P/TOT	2	2	0	0	0	4	4	2	2	1	1	0	6	8	60	17	18	35	1	131	187	379

Appendix C – Estimated AADTs

TABLE 6-1: ESTIMATED AADTS AT SITE 1 - (KILPADDER CROSS)

Hour Ending	R619 N	L5360 E	R619 S	L5360 W
08:00	145	6	147	8
09:00	163	14	171	10
10:00	127	11	138	22
11:00	96	9	98	11
12:00	107	8	113	10
13:00	87	12	94	13
14:00	90	6	99	11
15:00	118	10	127	11
16:00	130	10	138	8
17:00	188	17	196	9
18:00	199	13	212	18
19:00	133	13	144	12
Period Total	**1,583**	**129**	**1,677**	**143**
Period Total HGVs	**142**	**8**	**156**	**16**
% HGVs	**8.97%**	**6.20%**	**9.30%**	**11.19%**
Total AADT	**1,912**	**156**	**2,025**	**173**

TABLE 6-2: ESTIMATED AADTS AT SITE 2 – (PENDY' S CROSS)

Hour Ending	L1214 N	L5364	L1214 S	L5360
08:00	42	24	24	6
09:00	44	28	35	15
10:00	60	38	36	12
11:00	36	21	25	8
12:00	30	25	17	6
13:00	53	33	35	11
14:00	46	29	21	6
15:00	52	36	24	12
16:00	44	29	23	10
17:00	47	32	37	22
18:00	71	48	39	16
19:00	38	47	23	22
Period Total	**563**	**390**	**339**	**146**
Period Total HGVs	**39**	**34**	**26**	**15**
% HGVs	**6.93%**	**8.72%**	**7.67%**	**10.27%**
Total AADT	**680**	**471**	**409**	**176**

TABLE 6-3: ESTIMATED AADTS AT SITE 3 - (GLANNOGE CROSS)

Hour Ending	R619 N	L5361	R619 S	Local Access
08:00	149	11	142	0
09:00	169	11	168	2
10:00	113	6	112	5
11:00	102	3	97	2
12:00	105	6	101	2
13:00	91	7	90	0
14:00	78	10	78	0
15:00	110	7	107	2
16:00	132	10	126	2
17:00	177	14	168	3
18:00	190	11	185	2
19:00	129	15	124	4
Period Total	**1,545**	**111**	**1,498**	**24**
Period Total HGVs	**173**	**36**	**145**	**0**
% HGVs	**11.20%**	**32.43%**	**9.68%**	**0.00%**
Total AADT	**1,866**	**134**	**1,809**	**29**

TABLE 6-4: ESTIMATED AADTS AT SITE 4 - (TOBERGAL BRIDGE)

Hour Ending	L1214 S	L5361	L1214 N
08:00	16	9	17
09:00	18	11	21
10:00	22	9	23
11:00	22	6	16
12:00	17	3	14
13:00	25	7	26
14:00	13	1	14
15:00	19	10	21
16:00	23	15	18
17:00	26	8	20
18:00	32	10	28
19:00	14	7	11
Period Total	**247**	**96**	**229**
Period Total HGVs	**59**	**40**	**27**
% HGVs	**24%**	**42%**	**12%**
Total AADT	**298**	**116**	**277**

TABLE 6-5: ESTIMATED AADTS AT SITE 5 - (COOLFADDA JUNCTION)

Hour Ending	L1213	L1214	L2766
08:00	109	32	131
09:00	126	34	150
10:00	70	15	83
11:00	54	18	68
12:00	61	21	78
13:00	61	25	84
14:00	70	17	81
15:00	85	25	100
16:00	101	23	112
17:00	96	27	105
18:00	142	29	167
19:00	109	29	130
Period Total	**1,084**	**295**	**1,289**
Period Total HGVs	**52**	**105**	**141**
% HGVs	**5%**	**36%**	**11%**
Total AADT	**1,309**	**356**	**1,557**

TABLE 6-6: ESTIMATED AADTS AT SITE 6 – (AHADALLANE JUNCTION)

Hour Ending	L2766 E	L2765	L2766 W
08:00	125	14	131
09:00	133	21	150
10:00	78	11	83
11:00	60	18	68
12:00	66	12	78
13:00	65	27	84
14:00	68	21	81
15:00	82	20	100
16:00	104	14	112
17:00	94	17	105
18:00	142	25	167
19:00	116	24	130
Period Total	**1,133**	**224**	**1,289**
Period Total HGVs	**127**	**22**	**141**
% HGVs	**11%**	**10%**	**11%**
Total AADT	**1,368**	**271**	**1,557**

TABLE 6-7: ESTIMATED AADTS AT SITE 7 - (QUARRY ACCESS)

Hour Ending	L1214 S	Quarry Access	L1214 N
08:00	20	17	15
09:00	19	14	19
10:00	21	15	20
11:00	24	11	21
12:00	27	12	17
13:00	25	10	23
14:00	13	11	12
15:00	24	17	19
16:00	22	9	21
17:00	17	13	24
18:00	28	7	31
19:00	15	1	16
Period Total	**255**	**137**	**238**
Period Total HGVs	**107**	**89**	**52**
% HGVs	**42%**	**65%**	**22%**
Total AADT	**308**	**165**	**287**

TABLE 6-8: ESTIMATED AADTS AT SITE 8 - (L5362 JUNCTION)

Hour Ending	L1214 S	L5362	L1214 N
08:00	21	1	20
09:00	22	3	19
10:00	21	0	21
11:00	24	2	24
12:00	26	3	27
13:00	24	3	25
14:00	13	0	13
15:00	25	1	24
16:00	21	1	22
17:00	18	1	17
18:00	27	1	28
19:00	16	1	15
Period Total	**258**	**17**	**255**
Period Total HGVs	**109**	**2**	**107**
% HGVs	**42%**	**12%**	**42%**
Total AADT	**312**	**21**	**308**

Appendix D – Junctions 9 Outputs

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.5.0.6896
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Filename: Site 03 Glannoge Cross.j9
Path: W:\2021\P21-019\2024\Modelling\Site 03 - Glannoge Cross
Report generation date: 29/07/2024 16:02:36

»Opening Year + Adj, 12 hrs
»+5+ Adj , 12 hrs
»+15+ Adj, 12 hrs
»Openign Year + Adj + Dev, 12 hrs
»+5 + Adj+Dev, 12 hrs
»+15+ Adj + Dev , 12 hrs

Summary of junction performance

	12 hrs			
	Queue (Veh)	Delay (s)	RFC	LOS
	Opening Year + Adj			
Stream B-C	0.0	11.11	0.01	B
Stream B-AD	0.0	15.07	0.03	C
Stream A-BCD	0.0	6.77	0.01	A
Stream D-A	0.0	6.73	0.01	A
Stream D-BC	0.0	8.31	0.01	A
Stream C-ABD	0.0	10.20	0.01	B
	+5+ Adj			
Stream B-C	0.0	11.15	0.01	B
Stream B-AD	0.0	15.20	0.04	C
Stream A-BCD	0.0	6.72	0.02	A
Stream D-A	0.0	6.76	0.01	A
Stream D-BC	0.0	8.38	0.01	A
Stream C-ABD	0.0	10.19	0.02	B
	+15+ Adj			
Stream B-C	0.0	11.21	0.02	B
Stream B-AD	0.1	15.37	0.04	C
Stream A-BCD	0.0	6.66	0.02	A
Stream D-A	0.0	6.80	0.01	A
Stream D-BC	0.0	8.46	0.01	A
Stream C-ABD	0.0	10.18	0.02	B
	Openign Year + Adj + Dev			
Stream B-C	0.0	11.79	0.02	B
Stream B-AD	0.1	15.05	0.05	C
Stream A-BCD	0.0	6.76	0.01	A
Stream D-A	0.0	6.74	0.01	A
Stream D-BC	0.0	8.37	0.01	A
Stream C-ABD	0.0	10.17	0.02	B
	+5 + Adj+Dev			
Stream B-C	0.0	11.87	0.02	B
Stream B-AD	0.1	15.31	0.05	C
Stream A-BCD	0.0	6.71	0.02	A
Stream D-A	0.0	6.77	0.01	A
Stream D-BC	0.0	8.44	0.01	A
Stream C-ABD	0.0	10.15	0.02	B
	+15+ Adj + Dev			
Stream B-C	0.0	11.96	0.02	B
Stream B-AD	0.1	15.59	0.06	C
Stream A-BCD	0.0	6.65	0.02	A
Stream D-A	0.0	6.82	0.01	A
Stream D-BC	0.0	8.52	0.01	A
Stream C-ABD	0.0	10.13	0.03	B

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

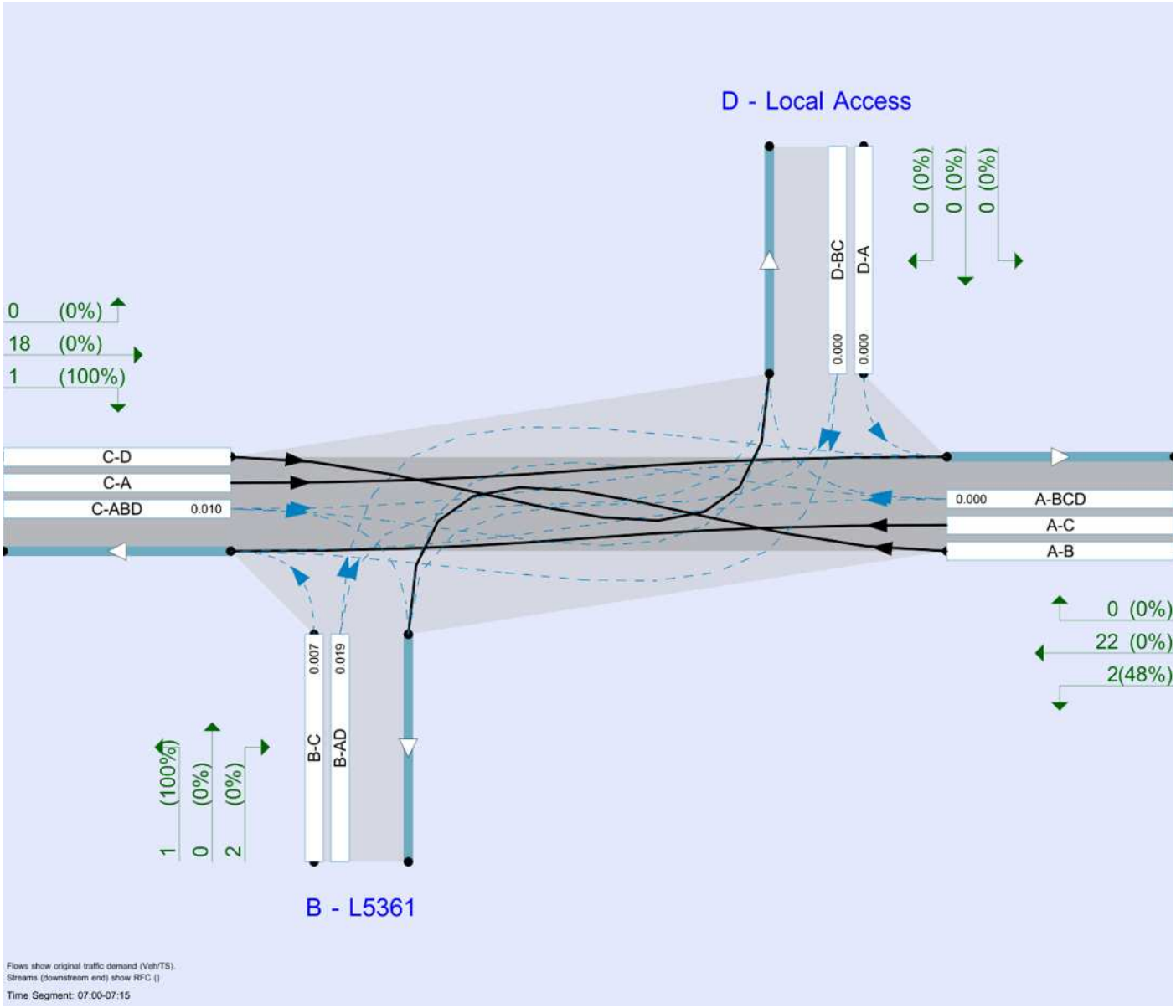
File summary

File Description

Title	Carrigcleena More
Location	Bweeng, Co. Cork
Site number	3
Date	29/07/2024
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	PMCE\papadakisa
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perTimeSegment	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D1	Base Year	12 hrs	DIRECT	07:00	19:00	720	15			
D2	Opening Yaer	12 hrs	DIRECT	07:00	19:00	720	15			
D3	+5	12 hrs	DIRECT	07:00	19:00	720	15			
D4	+15	12 hrs	DIRECT	07:00	19:00	720	15			
D5	Adjacent Dev Traffic	12 hrs	DIRECT	07:00	19:00	720	15			
D6	Development Traffic	12 hrs	DIRECT	07:00	19:00	720	15			
D7	Opening Year + Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D2+D5
D8	+5+ Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D3+D5
D9	+15+ Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D4+D5
D10	Openign Year + Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D2+D5+D6
D11	+5 + Adj+Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D3+D5+D6
D12	+15+ Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D4+D5+D6

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

Opening Year + Adj, 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	A - R619 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - R619 S - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	D - Local Access - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Glannoge Cross	Right-Left Stagger	Two-way		0.73	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	R619 N		Major
B	L5361		Minor
C	R619 S		Major
D	Local Access		Minor

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
A - R619 N	5.60			100.0	✓	0.00
C - R619 S	5.60			200.0	✓	0.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B - L5361	One lane plus flare	10.00	4.40	2.90	2.70	2.20	✓	1.00	40	40
D - Local Access	One lane plus flare	5.00	2.20	2.20	2.20	2.20	✓	1.00	40	40

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (Veh/TS)	Slope for A-B	Slope for A-C	Slope for A-D	Slope for B-A	Slope for B-D	Slope for C-A	Slope for C-B	Slope for C-D	Slope for D-B	Slope for D-C
1	A-D	157.969	-	-	-	0.249	0.249	0.249	-	0.249	-	-
1	B-AD	133.181	0.099	0.250	-	-	-	0.157	0.356	0.157	0.099	0.250
1	B-C	154.156	0.096	0.243	-	-	-	-	-	-	0.096	0.243
1	C-B	172.446	0.272	0.272	-	-	-	-	-	-	0.272	0.272
1	D-A	154.156	-	-	-	0.243	0.096	0.243	-	0.096	-	-
1	D-BC	118.111	0.139	0.139	0.316	0.221	0.088	0.221	-	0.088	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D7	Opening Year + Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D2+D5

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - R619 N		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - R619 S		DIRECT	✓	100.000
D - Local Access		DIRECT	✓	100.000

Origin-Destination Data

07:00 - 07:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	18.40	0.00
	B - L5361	1.04	0.00	0.00	0.00
	C - R619 S	15.28	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:15 - 07:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.02	20.40	0.00
	B - L5361	1.02	0.00	1.02	0.00
	C - R619 S	18.36	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.08	18.43	0.00
	B - L5361	2.04	0.00	0.00	0.00
	C - R619 S	13.25	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	20.43	0.00
	B - L5361	1.02	0.00	1.02	0.00
	C - R619 S	18.42	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:00 - 08:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	19.40	0.00
	B - L5361	0.00	0.00	1.02	0.00
	C - R619 S	24.47	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:15 - 08:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	18.34	0.00
	B - L5361	2.06	0.00	0.00	0.00
	C - R619 S	21.42	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	14.28	0.00
	B - L5361	0.00	0.00	1.04	0.00
	C - R619 S	26.51	1.02	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.06	19.40	0.00
	B - L5361	3.09	0.00	1.02	0.00
	C - R619 S	21.43	0.00	0.00	1.02
	D - Local Access	0.00	0.00	1.02	0.00

09:00 - 09:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	16.32	0.00
	B - L5361	0.00	0.00	1.02	0.00
	C - R619 S	25.47	0.00	0.00	0.00
	D - Local Access	1.02	0.00	1.02	0.00

09:15 - 09:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	11.26	1.02
	B - L5361	1.02	0.00	0.00	1.02
	C - R619 S	11.25	1.02	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	11.23	0.00
	B - L5361	1.02	0.00	0.00	0.00
	C - R619 S	11.25	1.04	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	9.19	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	14.32	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:00 - 10:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	14.32	0.00
	B - L5361	2.06	0.00	0.00	0.00
	C - R619 S	11.21	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	9.21	1.02
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	12.25	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.04	10.21	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	9.19	0.00	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	14.28	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	18.40	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	11.28	0.00
	B - L5361	1.02	0.00	0.00	0.00
	C - R619 S	10.21	0.00	0.00	1.02
	D - Local Access	0.00	0.00	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	7.13	0.00
	B - L5361	1.04	0.00	0.00	0.00
	C - R619 S	14.28	0.00	0.00	0.00
	D - Local Access	0.00	1.02	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.04	18.38	0.00
	B - L5361	1.02	0.00	0.00	0.00
	C - R619 S	16.34	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	15.32	0.00
	B - L5361	1.04	0.00	0.00	0.00
	C - R619 S	9.19	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.02	11.21	0.00
	B - L5361	1.02	0.00	2.04	0.00
	C - R619 S	13.25	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:15 - 12:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.04	14.32	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	9.21	1.02	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	10.21	0.00
	B - L5361	1.04	0.00	0.00	0.00
	C - R619 S	11.25	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:45 - 13:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	9.21	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	10.25	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.02	7.13	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	7.15	2.04	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.02	14.30	0.00
	B - L5361	1.02	0.00	1.02	0.00
	C - R619 S	11.25	1.02	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	5.09	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	5.11	1.02	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:45 - 14:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.02	14.30	0.00
	B - L5361	1.02	0.00	0.00	0.00
	C - R619 S	10.23	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.02	17.42	0.00
	B - L5361	1.02	0.00	1.02	0.00
	C - R619 S	16.36	0.00	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

14:15 - 14:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.04	6.13	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	11.21	1.02	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	4.08	0.00
	B - L5361	1.04	0.00	0.00	0.00
	C - R619 S	19.38	0.00	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

14:45 - 15:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	12.26	0.00
	B - L5361	0.00	0.00	1.04	0.00
	C - R619 S	19.42	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:00 - 15:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.08	13.25	1.02
	B - L5361	1.04	0.00	0.00	0.00
	C - R619 S	15.32	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:15 - 15:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.04	18.42	0.00
	B - L5361	1.04	0.00	1.02	0.00
	C - R619 S	16.30	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.02	10.19	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	20.38	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.04	18.36	0.00
	B - L5361	0.00	0.00	1.02	0.00
	C - R619 S	13.26	1.02	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

16:00 - 16:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.04	22.42	1.02
	B - L5361	2.06	0.00	1.04	0.00
	C - R619 S	19.38	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.04	16.40	1.02
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	19.42	1.02	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.06	18.38	0.00
	B - L5361	0.00	0.00	1.02	0.00
	C - R619 S	22.47	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.04	22.45	0.00
	B - L5361	2.06	0.00	0.00	0.00
	C - R619 S	26.53	1.02	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

17:00 - 17:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.06	25.53	1.02
	B - L5361	1.02	0.00	1.02	0.00
	C - R619 S	22.43	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:15 - 17:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	32.66	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	34.66	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.04	21.40	0.00
	B - L5361	1.04	0.00	0.00	0.00
	C - R619 S	11.23	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.04	21.40	0.00
	B - L5361	0.00	0.00	2.04	0.00
	C - R619 S	15.28	1.02	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.02	16.30	0.00
	B - L5361	1.04	0.00	1.02	0.00
	C - R619 S	24.49	1.02	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.04	13.25	2.04
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	20.38	1.02	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.04	9.17	0.00
	B - L5361	1.02	0.00	1.02	0.00
	C - R619 S	12.23	0.00	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

18:45 - 19:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	10.21	1.02
	B - L5361	2.06	0.00	1.02	0.00
	C - R619 S	13.25	2.04	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	96	0
	B - L5361	0	0	0	0
	C - R619 S	5	0	0	0
	D - Local Access	0	0	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	19	0
	B - L5361	100	0	100	0
	C - R619 S	33	0	0	0
	D - Local Access	0	0	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	100	0
	C - R619 S	9	0	0	0
	D - Local Access	0	0	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	38	0
	B - L5361	26	0	0	0
	C - R619 S	69	0	0	0
	D - Local Access	0	0	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	88	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	13	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

09:00 - 09:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	3	0
	B - L5361	0	0	0	0
	C - R619 S	16	0	0	0
	D - Local Access	0	0	0	0

09:15 - 09:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	95	0
	B - L5361	27	0	0	0
	C - R619 S	15	0	0	0
	D - Local Access	0	0	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	27	0	0	0
	C - R619 S	47	100	0	0
	D - Local Access	0	0	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	10	0
	B - L5361	0	0	0	0
	C - R619 S	33	0	0	0
	D - Local Access	0	0	0	0

10:00 - 10:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	13	0	0	0
	C - R619 S	20	0	0	0
	D - Local Access	0	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	1	0	0	0
	D - Local Access	0	0	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	27	0
	B - L5361	0	0	0	0
	C - R619 S	100	0	0	0
	D - Local Access	0	0	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	93	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	27	0	0	0
	C - R619 S	39	0	0	0
	D - Local Access	0	0	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	100	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	11	0
	B - L5361	0	0	0	0
	C - R619 S	25	0	0	0
	D - Local Access	0	0	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	23	0
	B - L5361	0	0	0	0
	C - R619 S	80	0	0	0
	D - Local Access	0	0	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	0	0
	C - R619 S	72	0	0	0
	D - Local Access	0	0	0	0

12:15 - 12:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	61	0
	B - L5361	0	0	0	0
	C - R619 S	21	0	0	0
	D - Local Access	0	0	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	25	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

12:45 - 13:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	24	0	0	0
	D - Local Access	0	0	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	0	0
	C - R619 S	8	0	0	0
	D - Local Access	0	0	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	100	0	0	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	67	100	0	0
	D - Local Access	0	0	0	0

13:45 - 14:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	0	0
	C - R619 S	1	0	0	0
	D - Local Access	0	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

14:15 - 14:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	48	100	0	0
	D - Local Access	0	0	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	8	0	0	0
	D - Local Access	27	0	0	0

14:45 - 15:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	37	0	0	0
	D - Local Access	0	0	0	0

15:00 - 15:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	5	0
	B - L5361	100	0	0	0
	C - R619 S	23	0	0	0
	D - Local Access	0	0	0	0

15:15 - 15:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	0	0
	C - R619 S	38	0	0	0
	D - Local Access	0	0	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	0	0	0	0
	C - R619 S	20	0	0	0
	D - Local Access	0	0	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	25	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	27	0	0
	D - Local Access	0	0	0	0

16:00 - 16:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	14	0	27
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	25	47	27
	B - L5361	0	0	0	0
	C - R619 S	26	27	0	0
	D - Local Access	0	0	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	13	81	0
	B - L5361	0	0	0	0
	C - R619 S	34	0	0	0
	D - Local Access	0	0	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	0	0
	C - R619 S	20	27	0	0
	D - Local Access	0	0	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	15	0
	B - L5361	0	0	0	0
	C - R619 S	9	0	0	0
	D - Local Access	0	0	0	0

17:15 - 17:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	36	0
	B - L5361	25	0	0	0
	C - R619 S	100	0	0	0
	D - Local Access	0	0	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	0	0	0	0
	C - R619 S	27	27	0	0
	D - Local Access	0	0	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	38	0
	B - L5361	0	0	27	0
	C - R619 S	0	27	0	0
	D - Local Access	0	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	35	0
	B - L5361	0	0	0	0
	C - R619 S	7	0	0	0
	D - Local Access	0	0	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	0	0	27	0
	C - R619 S	86	0	0	0
	D - Local Access	0	0	0	0

18:45 - 19:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	11	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.01	11.11	0.0	B	0.45	21.46
B-AD	0.03	15.07	0.0	C	0.79	38.00
A-BCD	0.01	6.77	0.0	A	0.21	10.28
A-B					0.75	35.88
A-C					14.83	711.62
D-A	0.01	6.73	0.0	A	0.19	9.17
D-BC	0.01	8.31	0.0	A	0.06	3.06
C-ABD	0.01	10.20	0.0	B	0.40	19.33
C-D					0.04	2.04
C-A					16.07	771.54

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.38	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.04	1.04	126.19	0.008	1.03	0.0	0.0	7.190	A
A-BCD	0.00	0.00	153.90	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	18.40	18.40			18.40				
D-A	0.00	0.00	150.19	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.94	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	167.44	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	15.28	15.28			15.28				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	165.98	0.006	1.01	0.0	0.0	5.455	A
B-AD	1.02	1.02	127.08	0.008	1.02	0.0	0.0	7.141	A
A-BCD	0.00	0.00	153.14	0.000	0.00	0.0	0.0	0.000	A
A-B	1.02	1.02			1.02				
A-C	20.40	20.40			20.40				
D-A	0.00	0.00	149.44	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.84	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	166.62	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	18.36	18.36			18.36				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	144.56	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.04	2.04	121.64	0.017	2.03	0.0	0.0	7.524	A
A-BCD	0.00	0.00	137.47	0.000	0.00	0.0	0.0	0.000	A
A-B	3.08	3.08			3.08				
A-C	18.43	18.43			18.43				
D-A	0.00	0.00	150.27	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.11	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	160.71	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	13.25	13.25			13.25				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	82.34	0.012	1.01	0.0	0.0	8.273	A
B-AD	1.02	1.02	63.13	0.016	1.02	0.0	0.0	9.689	A
A-BCD	0.00	0.00	139.67	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	20.43	20.43			20.43				
D-A	0.00	0.00	147.70	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.85	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	158.74	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	18.42	18.42			18.42				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	82.05	0.012	1.02	0.0	0.0	11.106	B
B-AD	0.00	0.00	56.62	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	145.26	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	19.40	19.40			19.40				
D-A	0.00	0.00	147.68	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.52	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	161.79	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	24.47	24.47			24.47				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	73.76	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.06	2.06	96.35	0.021	2.03	0.0	0.0	11.456	B
A-BCD	0.00	0.00	138.81	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	18.34	18.34			18.34				
D-A	0.00	0.00	144.73	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.01	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	150.13	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	21.42	21.42			21.42				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.04	1.04	161.82	0.006	1.03	0.0	0.0	8.397	A
B-AD	0.00	0.00	88.92	0.000	0.03	0.0	0.0	0.000	A
A-BCD	0.00	0.00	132.26	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	14.28	14.28			14.28				
D-A	0.00	0.00	147.70	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.50	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.19	1.19	181.92	0.007	1.19	0.0	0.0	4.979	A
C-D	0.00	0.00			0.00				
C-A	26.34	26.34			26.34				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	81.25	0.013	1.02	0.0	0.0	8.400	A
B-AD	3.09	3.09	128.91	0.024	3.07	0.0	0.0	7.903	A
A-BCD	0.00	0.00	139.32	0.000	0.00	0.0	0.0	0.000	A
A-B	2.06	2.06			2.06				
A-C	19.40	19.40			19.40				
D-A	0.00	0.00	108.83	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.02	1.02	115.49	0.009	1.01	0.0	0.0	7.861	A
C-ABD	0.00	0.00	166.26	0.000	0.01	0.0	0.0	0.000	A
C-D	1.02	1.02			1.02				
C-A	21.43	21.43			21.43				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	162.79	0.006	1.02	0.0	0.0	8.294	A
B-AD	0.00	0.00	113.58	0.000	0.03	0.0	0.0	0.000	A
A-BCD	0.00	0.00	143.76	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	16.32	16.32			16.32				
D-A	1.02	1.02	146.48	0.007	1.01	0.0	0.0	6.186	A
D-BC	1.02	1.02	109.27	0.009	1.02	0.0	0.0	8.313	A
C-ABD	0.00	0.00	164.39	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	25.47	25.47			25.47				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	148.26	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.04	2.04	110.45	0.018	2.02	0.0	0.0	7.697	A
A-BCD	1.10	1.10	157.91	0.007	1.09	0.0	0.0	5.738	A
A-B	0.00	0.00			0.00				
A-C	11.19	11.19			11.19				
D-A	1.02	1.02	154.58	0.007	1.02	0.0	0.0	5.862	A
D-BC	0.00	0.00	84.79	0.000	0.01	0.0	0.0	0.000	A
C-ABD	1.09	1.09	172.93	0.006	1.08	0.0	0.0	5.210	A
C-D	0.00	0.00			0.00				
C-A	11.17	11.17			11.17				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	151.04	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.02	1.02	100.35	0.010	1.03	0.0	0.0	8.431	A
A-BCD	0.00	0.00	143.70	0.000	0.01	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	11.23	11.23			11.23				
D-A	0.00	0.00	153.92	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	85.08	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.18	1.18	93.09	0.013	1.18	0.0	0.0	7.541	A
C-D	0.00	0.00			0.00				
C-A	11.10	11.10			11.10				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	151.70	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	100.66	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	142.86	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	9.19	9.19			9.19				
D-A	0.00	0.00	149.51	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.48	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	97.86	0.000	0.01	0.0	0.0	9.589	A
C-D	0.00	0.00			0.00				
C-A	14.32	14.32			14.32				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.99	0.000	0.00	0.0	0.0	0.000	A
B-AD	2.06	2.06	113.07	0.018	2.04	0.0	0.0	8.446	A
A-BCD	0.00	0.00	148.67	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	14.32	14.32			14.32				
D-A	0.00	0.00	150.33	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.64	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	126.26	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	11.21	11.21			11.21				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.67	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	112.31	0.000	0.02	0.0	0.0	0.000	A
A-BCD	1.08	1.08	157.75	0.007	1.07	0.0	0.0	5.770	A
A-B	0.00	0.00			0.00				
A-C	9.14	9.14			9.14				
D-A	0.00	0.00	151.14	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.48	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	152.60	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	12.25	12.25			12.25				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	168.41	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	126.89	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	144.87	0.000	0.01	0.0	0.0	0.000	A
A-B	1.04	1.04			1.04				
A-C	10.21	10.21			10.21				
D-A	1.02	1.02	153.79	0.007	1.01	0.0	0.0	5.890	A
D-BC	0.00	0.00	84.71	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	143.70	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	9.19	9.19			9.19				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	164.53	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	124.30	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	128.25	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	14.28	14.28			14.28				
D-A	0.00	0.00	153.79	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	83.27	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	151.76	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	18.40	18.40			18.40				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	148.29	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.02	1.02	98.68	0.010	1.01	0.0	0.0	8.524	A
A-BCD	0.00	0.00	125.80	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	11.28	11.28			11.28				
D-A	0.00	0.00	150.29	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.45	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	152.23	0.000	0.00	0.0	0.0	0.000	A
C-D	1.02	1.02			1.02				
C-A	10.21	10.21			10.21				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.97	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.04	1.04	63.85	0.016	1.03	0.0	0.0	11.734	B
A-BCD	0.00	0.00	124.46	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	7.13	7.13			7.13				
D-A	0.00	0.00	110.37	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.02	1.02	118.59	0.009	1.01	0.0	0.0	7.654	A
C-ABD	0.00	0.00	160.85	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	14.28	14.28			14.28				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	148.68	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.02	1.02	123.07	0.008	1.02	0.0	0.0	10.995	B
A-BCD	0.00	0.00	121.41	0.000	0.00	0.0	0.0	0.000	A
A-B	1.04	1.04			1.04				
A-C	18.38	18.38			18.38				
D-A	0.00	0.00	109.70	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	116.19	0.000	0.01	0.0	0.0	0.000	A
C-ABD	0.00	0.00	157.77	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	16.34	16.34			16.34				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.26	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.04	1.04	125.88	0.008	1.04	0.0	0.0	7.211	A
A-BCD	0.00	0.00	132.71	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	15.32	15.32			15.32				
D-A	0.00	0.00	149.88	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.60	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	148.46	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	9.19	9.19			9.19				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.04	2.04	161.26	0.013	2.03	0.0	0.0	5.651	A
B-AD	1.02	1.02	124.23	0.008	1.02	0.0	0.0	7.306	A
A-BCD	0.00	0.00	136.71	0.000	0.00	0.0	0.0	0.000	A
A-B	1.02	1.02			1.02				
A-C	11.21	11.21			11.21				
D-A	0.00	0.00	148.38	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.11	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	146.61	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	13.25	13.25			13.25				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	169.28	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	124.39	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	137.13	0.000	0.00	0.0	0.0	0.000	A
A-B	1.04	1.04			1.04				
A-C	14.32	14.32			14.32				
D-A	0.00	0.00	151.46	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.31	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.08	1.08	171.03	0.006	1.07	0.0	0.0	5.297	A
C-D	0.00	0.00			0.00				
C-A	9.15	9.15			9.15				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	151.29	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.04	1.04	103.48	0.010	1.03	0.0	0.0	7.919	A
A-BCD	0.00	0.00	145.27	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	10.21	10.21			10.21				
D-A	0.00	0.00	151.11	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.92	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	167.80	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	11.25	11.25			11.25				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	151.91	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	103.51	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	149.87	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	9.21	9.21			9.21				
D-A	0.00	0.00	151.08	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	114.03	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	163.05	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	10.25	10.25			10.25				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	169.95	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	127.41	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	148.61	0.000	0.00	0.0	0.0	0.000	A
A-B	1.02	1.02			1.02				
A-C	7.13	7.13			7.13				
D-A	0.00	0.00	152.27	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	115.22	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.12	2.12	174.38	0.012	2.11	0.0	0.0	5.237	A
C-D	0.00	0.00			0.00				
C-A	7.06	7.06			7.06				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	161.52	0.006	1.01	0.0	0.0	5.606	A
B-AD	1.02	1.02	61.71	0.017	1.01	0.0	0.0	11.964	B
A-BCD	0.00	0.00	146.11	0.000	0.00	0.0	0.0	0.000	A
A-B	1.02	1.02			1.02				
A-C	14.30	14.30			14.30				
D-A	0.00	0.00	150.93	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.00	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.16	1.16	93.79	0.012	1.16	0.0	0.0	6.801	A
C-D	0.00	0.00			0.00				
C-A	11.10	11.10			11.10				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	158.40	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	63.25	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	135.01	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	5.09	5.09			5.09				
D-A	0.00	0.00	152.08	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	114.80	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.08	1.08	88.39	0.012	1.08	0.0	0.0	10.034	B
C-D	0.00	0.00			0.00				
C-A	5.05	5.05			5.05				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	150.26	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.02	1.02	127.85	0.008	1.01	0.0	0.0	10.684	B
A-BCD	0.00	0.00	139.68	0.000	0.00	0.0	0.0	0.000	A
A-B	1.02	1.02			1.02				
A-C	14.30	14.30			14.30				
D-A	0.00	0.00	151.40	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.43	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	92.93	0.000	0.01	0.0	0.0	10.201	B
C-D	0.00	0.00			0.00				
C-A	10.23	10.23			10.23				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	79.82	0.013	1.01	0.0	0.0	8.538	A
B-AD	1.02	1.02	123.71	0.008	1.02	0.0	0.0	7.335	A
A-BCD	0.00	0.00	141.10	0.000	0.00	0.0	0.0	0.000	A
A-B	1.02	1.02			1.02				
A-C	17.42	17.42			17.42				
D-A	1.02	1.02	154.04	0.007	1.01	0.0	0.0	5.880	A
D-BC	0.00	0.00	84.37	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	165.56	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	16.36	16.36			16.36				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	80.88	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	123.43	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	131.56	0.000	0.00	0.0	0.0	0.000	A
A-B	1.04	1.04			1.04				
A-C	6.13	6.13			6.13				
D-A	0.00	0.00	154.25	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	85.08	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.16	1.16	92.52	0.013	1.15	0.0	0.0	9.842	A
C-D	0.00	0.00			0.00				
C-A	11.07	11.07			11.07				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	121.49	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.04	1.04	127.86	0.008	1.03	0.0	0.0	7.095	A
A-BCD	0.00	0.00	126.06	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	4.08	4.08			4.08				
D-A	1.02	1.02	120.56	0.008	1.01	0.0	0.0	6.725	A
D-BC	0.00	0.00	84.72	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	102.42	0.000	0.02	0.0	0.0	9.503	A
C-D	0.00	0.00			0.00				
C-A	19.38	19.38			19.38				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.04	1.04	166.04	0.006	1.03	0.0	0.0	8.181	A
B-AD	0.00	0.00	114.80	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	136.98	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	12.26	12.26			12.26				
D-A	0.00	0.00	119.64	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	83.51	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	156.75	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	19.42	19.42			19.42				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	150.10	0.000	0.01	0.0	0.0	0.000	A
B-AD	1.04	1.04	63.24	0.016	1.03	0.0	0.0	10.803	B
A-BCD	1.12	1.12	162.64	0.007	1.12	0.0	0.0	5.719	A
A-B	2.06	2.06			2.06				
A-C	13.15	13.15			13.15				
D-A	0.00	0.00	139.70	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.93	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	150.16	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	15.32	15.32			15.32				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	160.21	0.006	1.01	0.0	0.0	5.652	A
B-AD	1.04	1.04	60.76	0.017	1.03	0.0	0.0	15.069	C
A-BCD	0.00	0.00	151.20	0.000	0.01	0.0	0.0	0.000	A
A-B	1.04	1.04			1.04				
A-C	18.42	18.42			18.42				
D-A	0.00	0.00	143.38	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.97	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	151.01	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	16.30	16.30			16.30				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	154.42	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	61.20	0.000	0.02	0.0	0.0	0.000	A
A-BCD	0.00	0.00	121.15	0.000	0.00	0.0	0.0	0.000	A
A-B	1.02	1.02			1.02				
A-C	10.19	10.19			10.19				
D-A	0.00	0.00	145.74	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.55	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	154.16	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	20.38	20.38			20.38				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	164.39	0.006	1.01	0.0	0.0	5.508	A
B-AD	0.00	0.00	101.85	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	133.64	0.000	0.00	0.0	0.0	0.000	A
A-B	1.04	1.04			1.04				
A-C	18.36	18.36			18.36				
D-A	1.02	1.02	155.07	0.007	1.01	0.0	0.0	6.631	A
D-BC	0.00	0.00	84.96	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.12	1.12	141.14	0.008	1.12	0.0	0.0	6.425	A
C-D	0.00	0.00			0.00				
C-A	13.16	13.16			13.16				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.04	1.04	82.81	0.013	1.03	0.0	0.0	8.278	A
B-AD	2.06	2.06	126.14	0.016	2.03	0.0	0.0	9.735	A
A-BCD	1.24	1.24	138.18	0.009	1.23	0.0	0.0	6.007	A
A-B	2.02	2.02			2.02				
A-C	22.21	22.21			22.21				
D-A	0.00	0.00	153.03	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.75	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	133.33	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	19.38	19.38			19.38				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	82.03	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	125.61	0.000	0.02	0.0	0.0	0.000	A
A-BCD	1.18	1.18	130.46	0.009	1.18	0.0	0.0	6.767	A
A-B	1.03	1.03			1.03				
A-C	16.25	16.25			16.25				
D-A	0.00	0.00	148.18	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.74	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.18	1.18	142.83	0.008	1.17	0.0	0.0	6.291	A
C-D	0.00	0.00			0.00				
C-A	19.26	19.26			19.26				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	160.28	0.006	1.01	0.0	0.0	8.529	A
B-AD	0.00	0.00	109.08	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	116.35	0.000	0.01	0.0	0.0	0.000	A
A-B	2.06	2.06			2.06				
A-C	18.38	18.38			18.38				
D-A	0.00	0.00	146.81	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.46	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	128.37	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	22.47	22.47			22.47				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	147.42	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.06	2.06	61.00	0.034	2.03	0.0	0.0	11.344	B
A-BCD	0.00	0.00	131.10	0.000	0.00	0.0	0.0	0.000	A
A-B	1.04	1.04			1.04				
A-C	22.45	22.45			22.45				
D-A	1.02	1.02	149.42	0.007	1.01	0.0	0.0	6.064	A
D-BC	0.00	0.00	80.78	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.24	1.24	148.22	0.008	1.23	0.0	0.0	6.151	A
C-D	0.00	0.00			0.00				
C-A	26.31	26.31			26.31				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	163.05	0.006	1.01	0.0	0.0	5.553	A
B-AD	1.02	1.02	120.95	0.008	1.03	0.0	0.0	12.290	B
A-BCD	1.22	1.22	168.56	0.007	1.21	0.0	0.0	6.079	A
A-B	2.04	2.04			2.04				
A-C	25.34	25.34			25.34				
D-A	0.00	0.00	151.98	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	81.41	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	130.51	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	22.43	22.43			22.43				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	156.65	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	116.48	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	145.93	0.000	0.01	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	32.66	32.66			32.66				
D-A	0.00	0.00	145.73	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	105.89	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	155.51	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	34.66	34.66			34.66				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	146.48	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.04	1.04	98.11	0.011	1.03	0.0	0.0	8.357	A
A-BCD	0.00	0.00	144.11	0.000	0.00	0.0	0.0	0.000	A
A-B	2.04	2.04			2.04				
A-C	21.40	21.40			21.40				
D-A	0.00	0.00	148.38	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.51	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	142.46	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	11.23	11.23			11.23				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.04	2.04	163.41	0.012	2.03	0.0	0.0	5.576	A
B-AD	0.00	0.00	90.82	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	132.87	0.000	0.00	0.0	0.0	0.000	A
A-B	1.04	1.04			1.04				
A-C	21.40	21.40			21.40				
D-A	1.02	1.02	153.54	0.007	1.01	0.0	0.0	5.900	A
D-BC	0.00	0.00	83.54	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.14	1.14	140.58	0.008	1.13	0.0	0.0	6.420	A
C-D	0.00	0.00			0.00				
C-A	15.16	15.16			15.16				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	132.36	0.008	1.02	0.0	0.0	5.894	A
B-AD	1.04	1.04	123.57	0.008	1.03	0.0	0.0	8.253	A
A-BCD	0.00	0.00	134.94	0.000	0.00	0.0	0.0	0.000	A
A-B	1.02	1.02			1.02				
A-C	16.30	16.30			16.30				
D-A	0.00	0.00	152.00	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.51	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.22	1.22	148.29	0.008	1.22	0.0	0.0	6.225	A
C-D	0.00	0.00			0.00				
C-A	24.29	24.29			24.29				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	130.96	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	127.33	0.000	0.01	0.0	0.0	0.000	A
A-BCD	2.25	2.25	161.11	0.014	2.24	0.0	0.0	5.654	A
A-B	2.01	2.01			2.01				
A-C	13.06	13.06			13.06				
D-A	0.00	0.00	148.88	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.90	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.15	1.15	179.06	0.006	1.15	0.0	0.0	5.612	A
C-D	0.00	0.00			0.00				
C-A	20.25	20.25			20.25				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	134.87	0.008	1.01	0.0	0.0	6.723	A
B-AD	1.02	1.02	127.48	0.008	1.01	0.0	0.0	7.115	A
A-BCD	0.00	0.00	147.85	0.000	0.02	0.0	0.0	0.000	A
A-B	1.04	1.04			1.04				
A-C	9.17	9.17			9.17				
D-A	1.02	1.02	152.45	0.007	1.01	0.0	0.0	5.942	A
D-BC	0.00	0.00	84.09	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	168.13	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	12.23	12.23			12.23				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	84.32	0.012	1.02	0.0	0.0	8.831	A
B-AD	2.06	2.06	129.55	0.016	2.05	0.0	0.0	7.058	A
A-BCD	1.09	1.09	160.47	0.007	1.08	0.0	0.0	5.726	A
A-B	0.00	0.00			0.00				
A-C	10.14	10.14			10.14				
D-A	0.00	0.00	154.56	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	85.25	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.20	2.20	177.62	0.012	2.19	0.0	0.0	5.143	A
C-D	0.00	0.00			0.00				
C-A	13.08	13.08			13.08				

+5+ Adj , 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	A - R619 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - R619 S - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	D - Local Access - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Glannoge Cross	Right-Left Stagger	Two-way		0.74	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D8	+5+ Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D3+D5

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - R619 N		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - R619 S		DIRECT	✓	100.000
D - Local Access		DIRECT	✓	100.000

Origin-Destination Data

Demand (Veh/TS)

07:00 - 07:15

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	20.28	0.00
	B - L5361	1.22	0.00	0.00	0.00
	C - R619 S	16.62	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

Demand (Veh/TS)

07:15 - 07:30

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.11	22.27	0.00
	B - L5361	1.11	0.00	1.11	0.00
	C - R619 S	20.05	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.44	20.51	0.00
	B - L5361	2.22	0.00	0.00	0.00
	C - R619 S	14.40	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	22.50	0.00
	B - L5361	1.11	0.00	1.11	0.00
	C - R619 S	20.40	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:00 - 08:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	21.28	0.00
	B - L5361	0.00	0.00	1.11	0.00
	C - R619 S	26.70	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:15 - 08:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	19.94	0.00
	B - L5361	2.33	0.00	0.00	0.00
	C - R619 S	23.38	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	15.62	0.00
	B - L5361	0.00	0.00	1.22	0.00
	C - R619 S	28.91	1.11	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.33	21.28	0.00
	B - L5361	3.55	0.00	1.11	0.00
	C - R619 S	23.49	0.00	0.00	1.11
	D - Local Access	0.00	0.00	1.11	0.00

09:00 - 09:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	17.84	0.00
	B - L5361	0.00	0.00	1.11	0.00
	C - R619 S	27.69	0.00	0.00	0.00
	D - Local Access	1.11	0.00	1.11	0.00

09:15 - 09:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	12.53	1.11
	B - L5361	1.11	0.00	0.00	1.11
	C - R619 S	12.41	1.11	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	12.30	0.00
	B - L5361	1.11	0.00	0.00	0.00
	C - R619 S	12.41	1.22	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	10.08	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	15.85	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:00 - 10:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	15.85	0.00
	B - L5361	2.33	0.00	0.00	0.00
	C - R619 S	12.18	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	10.20	1.11
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	13.41	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.22	11.19	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	10.08	0.00	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	15.62	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	20.28	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	12.64	0.00
	B - L5361	1.11	0.00	0.00	0.00
	C - R619 S	11.19	0.00	0.00	1.11
	D - Local Access	0.00	0.00	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	7.75	0.00
	B - L5361	1.22	0.00	0.00	0.00
	C - R619 S	15.62	0.00	0.00	0.00
	D - Local Access	0.00	1.11	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.22	20.17	0.00
	B - L5361	1.11	0.00	0.00	0.00
	C - R619 S	17.95	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	16.85	0.00
	B - L5361	1.22	0.00	0.00	0.00
	C - R619 S	10.08	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.11	12.18	0.00
	B - L5361	1.11	0.00	2.22	0.00
	C - R619 S	14.40	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:15 - 12:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.22	15.85	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	10.20	1.11	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	11.19	0.00
	B - L5361	1.22	0.00	0.00	0.00
	C - R619 S	12.41	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:45 - 13:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	10.20	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	11.42	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.11	7.75	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	7.87	2.22	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.11	15.74	0.00
	B - L5361	1.11	0.00	1.11	0.00
	C - R619 S	12.41	1.11	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	5.54	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	5.65	1.11	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:45 - 14:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.11	15.74	0.00
	B - L5361	1.11	0.00	0.00	0.00
	C - R619 S	11.31	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.11	19.40	0.00
	B - L5361	1.11	0.00	1.11	0.00
	C - R619 S	18.07	0.00	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

14:15 - 14:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.22	6.76	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	12.18	1.11	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	4.43	0.00
	B - L5361	1.22	0.00	0.00	0.00
	C - R619 S	21.16	0.00	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

14:45 - 15:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	13.52	0.00
	B - L5361	0.00	0.00	1.22	0.00
	C - R619 S	21.39	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:00 - 15:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.45	14.40	1.11
	B - L5361	1.22	0.00	0.00	0.00
	C - R619 S	16.85	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:15 - 15:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.22	20.40	0.00
	B - L5361	1.22	0.00	1.11	0.00
	C - R619 S	17.72	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.11	11.08	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	22.15	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.22	20.05	0.00
	B - L5361	0.00	0.00	1.11	0.00
	C - R619 S	14.51	1.11	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

16:00 - 16:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.22	24.37	1.11
	B - L5361	2.33	0.00	1.22	0.00
	C - R619 S	21.16	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.22	18.30	1.11
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	21.39	1.11	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.33	20.17	0.00
	B - L5361	0.00	0.00	1.11	0.00
	C - R619 S	24.71	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.22	24.60	0.00
	B - L5361	2.33	0.00	0.00	0.00
	C - R619 S	29.03	1.11	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

17:00 - 17:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.33	28.04	1.11
	B - L5361	1.11	0.00	1.11	0.00
	C - R619 S	24.48	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:15 - 17:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	35.79	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	37.78	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.22	23.26	0.00
	B - L5361	1.22	0.00	0.00	0.00
	C - R619 S	12.30	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.22	23.26	0.00
	B - L5361	0.00	0.00	2.22	0.00
	C - R619 S	16.62	1.11	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.11	17.72	0.00
	B - L5361	1.22	0.00	1.11	0.00
	C - R619 S	26.81	1.11	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.22	14.40	2.22
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	22.15	1.11	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.22	9.97	0.00
	B - L5361	1.11	0.00	1.11	0.00
	C - R619 S	13.29	0.00	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

18:45 - 19:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	11.19	1.11
	B - L5361	2.33	0.00	1.11	0.00
	C - R619 S	14.40	2.22	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	97	0
	B - L5361	0	0	0	0
	C - R619 S	7	0	0	0
	D - Local Access	0	0	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	18	0
	B - L5361	100	0	100	0
	C - R619 S	36	0	0	0
	D - Local Access	0	0	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	100	0
	C - R619 S	10	0	0	0
	D - Local Access	0	0	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	40	0
	B - L5361	21	0	0	0
	C - R619 S	68	0	0	0
	D - Local Access	0	0	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	88	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	17	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

09:00 - 09:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	2	0
	B - L5361	0	0	0	0
	C - R619 S	16	0	0	0
	D - Local Access	0	0	0	0

09:15 - 09:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	91	0
	B - L5361	27	0	0	0
	C - R619 S	13	0	0	0
	D - Local Access	0	0	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	27	0	0	0
	C - R619 S	46	100	0	0
	D - Local Access	0	0	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	11	0
	B - L5361	0	0	0	0
	C - R619 S	32	0	0	0
	D - Local Access	0	0	0	0

10:00 - 10:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	17	0	0	0
	C - R619 S	25	0	0	0
	D - Local Access	0	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	4	0	0	0
	D - Local Access	0	0	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	26	0
	B - L5361	0	0	0	0
	C - R619 S	100	0	0	0
	D - Local Access	0	0	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	96	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	27	0	0	0
	C - R619 S	38	0	0	0
	D - Local Access	0	0	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	100	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	11	0
	B - L5361	0	0	0	0
	C - R619 S	25	0	0	0
	D - Local Access	0	0	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	24	0
	B - L5361	0	0	0	0
	C - R619 S	80	0	0	0
	D - Local Access	0	0	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	0	0
	C - R619 S	75	0	0	0
	D - Local Access	0	0	0	0

12:15 - 12:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	59	0
	B - L5361	0	0	0	0
	C - R619 S	22	0	0	0
	D - Local Access	0	0	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	15	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

12:45 - 13:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	22	0	0	0
	D - Local Access	0	0	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	0	0
	C - R619 S	7	0	0	0
	D - Local Access	0	0	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	100	0	0	0
	C - R619 S	1	100	0	0
	D - Local Access	0	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	71	100	0	0
	D - Local Access	0	0	0	0

13:45 - 14:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

14:15 - 14:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	49	100	0	0
	D - Local Access	0	0	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	11	0	0	0
	D - Local Access	27	0	0	0

14:45 - 15:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	37	0	0	0
	D - Local Access	0	0	0	0

15:00 - 15:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	7	0
	B - L5361	100	0	0	0
	C - R619 S	24	0	0	0
	D - Local Access	0	0	0	0

15:15 - 15:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	0	0
	C - R619 S	41	0	0	0
	D - Local Access	0	0	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	0	0	0	0
	C - R619 S	20	0	0	0
	D - Local Access	0	0	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	15	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	27	0	0
	D - Local Access	0	0	0	0

16:00 - 16:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	23	0	27
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	15	45	27
	B - L5361	0	0	0	0
	C - R619 S	25	27	0	0
	D - Local Access	0	0	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	17	81	0
	B - L5361	0	0	0	0
	C - R619 S	35	0	0	0
	D - Local Access	0	0	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	0	0
	C - R619 S	20	27	0	0
	D - Local Access	0	0	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	15	0
	B - L5361	0	0	0	0
	C - R619 S	9	0	0	0
	D - Local Access	0	0	0	0

17:15 - 17:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	38	0
	B - L5361	15	0	0	0
	C - R619 S	100	0	0	0
	D - Local Access	0	0	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	0	0	0	0
	C - R619 S	27	27	0	0
	D - Local Access	0	0	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	41	0
	B - L5361	0	0	27	0
	C - R619 S	0	27	0	0
	D - Local Access	0	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	36	0
	B - L5361	0	0	0	0
	C - R619 S	7	0	0	0
	D - Local Access	0	0	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	0	0	27	0
	C - R619 S	89	0	0	0
	D - Local Access	0	0	0	0

18:45 - 19:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	12	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.01	11.15	0.0	B	0.49	23.61
B-AD	0.04	15.20	0.0	C	0.89	42.82
A-BCD	0.02	6.72	0.0	A	0.24	11.30
A-B					0.84	40.50
A-C					16.27	780.78
D-A	0.01	6.76	0.0	A	0.21	9.97
D-BC	0.01	8.38	0.0	A	0.07	3.32
C-ABD	0.02	10.19	0.0	B	0.44	21.35
C-D					0.05	2.22
C-A					17.60	844.57

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	148.86	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.22	1.22	125.51	0.010	1.21	0.0	0.0	7.240	A
A-BCD	0.00	0.00	153.53	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	20.28	20.28			20.28				
D-A	0.00	0.00	149.82	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.34	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	166.93	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	16.62	16.62			16.62				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	165.43	0.007	1.10	0.0	0.0	5.476	A
B-AD	1.11	1.11	126.33	0.009	1.11	0.0	0.0	7.189	A
A-BCD	0.00	0.00	152.70	0.000	0.00	0.0	0.0	0.000	A
A-B	1.11	1.11			1.11				
A-C	22.27	22.27			22.27				
D-A	0.00	0.00	149.01	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.17	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	166.09	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	20.05	20.05			20.05				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	143.45	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.22	2.22	120.33	0.018	2.21	0.0	0.0	7.618	A
A-BCD	0.00	0.00	137.02	0.000	0.00	0.0	0.0	0.000	A
A-B	3.44	3.44			3.44				
A-C	20.51	20.51			20.51				
D-A	0.00	0.00	149.88	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.12	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	159.19	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	14.40	14.40			14.40				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	82.00	0.014	1.10	0.0	0.0	8.316	A
B-AD	1.11	1.11	62.58	0.018	1.11	0.0	0.0	9.785	A
A-BCD	0.00	0.00	138.93	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	22.50	22.50			22.50				
D-A	0.00	0.00	146.88	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.78	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	157.49	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	20.40	20.40			20.40				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	81.79	0.014	1.10	0.0	0.0	11.153	B
B-AD	0.00	0.00	56.22	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	144.63	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	21.28	21.28			21.28				
D-A	0.00	0.00	147.02	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.65	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	160.73	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	26.70	26.70			26.70				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	73.41	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.33	2.33	99.47	0.023	2.30	0.0	0.0	11.281	B
A-BCD	0.00	0.00	137.69	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	19.94	19.94			19.94				
D-A	0.00	0.00	143.91	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	104.90	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	149.35	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	23.38	23.38			23.38				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	161.18	0.008	1.21	0.0	0.0	8.329	A
B-AD	0.00	0.00	91.82	0.000	0.03	0.0	0.0	0.000	A
A-BCD	0.00	0.00	131.56	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	15.62	15.62			15.62				
D-A	0.00	0.00	147.12	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.61	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.32	1.32	182.79	0.007	1.31	0.0	0.0	4.958	A
C-D	0.00	0.00			0.00				
C-A	28.71	28.71			28.71				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	80.70	0.014	1.11	0.0	0.0	8.353	A
B-AD	3.55	3.55	128.34	0.028	3.52	0.0	0.0	7.814	A
A-BCD	0.00	0.00	137.92	0.000	0.00	0.0	0.0	0.000	A
A-B	2.33	2.33			2.33				
A-C	21.28	21.28			21.28				
D-A	0.00	0.00	108.36	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.11	1.11	114.56	0.010	1.10	0.0	0.0	7.932	A
C-ABD	0.00	0.00	165.62	0.000	0.01	0.0	0.0	0.000	A
C-D	1.11	1.11			1.11				
C-A	23.49	23.49			23.49				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	162.36	0.007	1.11	0.0	0.0	8.322	A
B-AD	0.00	0.00	112.86	0.000	0.03	0.0	0.0	0.000	A
A-BCD	0.00	0.00	142.76	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	17.84	17.84			17.84				
D-A	1.11	1.11	145.77	0.008	1.10	0.0	0.0	6.220	A
D-BC	1.11	1.11	108.45	0.010	1.11	0.0	0.0	8.383	A
C-ABD	0.00	0.00	163.82	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	27.69	27.69			27.69				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	147.74	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.22	2.22	109.84	0.020	2.20	0.0	0.0	7.739	A
A-BCD	1.20	1.20	158.21	0.008	1.19	0.0	0.0	5.731	A
A-B	0.00	0.00			0.00				
A-C	12.43	12.43			12.43				
D-A	1.11	1.11	154.26	0.007	1.11	0.0	0.0	5.878	A
D-BC	0.00	0.00	84.36	0.000	0.01	0.0	0.0	0.000	A
C-ABD	1.19	1.19	173.18	0.007	1.19	0.0	0.0	5.206	A
C-D	0.00	0.00			0.00				
C-A	12.33	12.33			12.33				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	150.74	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.11	1.11	99.83	0.011	1.12	0.0	0.0	8.483	A
A-BCD	0.00	0.00	142.77	0.000	0.01	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	12.30	12.30			12.30				
D-A	0.00	0.00	153.48	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.67	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.41	1.41	93.79	0.015	1.40	0.0	0.0	7.606	A
C-D	0.00	0.00			0.00				
C-A	12.23	12.23			12.23				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	151.44	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	100.21	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	142.56	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	10.08	10.08			10.08				
D-A	0.00	0.00	149.05	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.91	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	99.09	0.000	0.02	0.0	0.0	9.511	A
C-D	0.00	0.00			0.00				
C-A	15.85	15.85			15.85				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.49	0.000	0.00	0.0	0.0	0.000	A
B-AD	2.33	2.33	108.18	0.022	2.31	0.0	0.0	8.727	A
A-BCD	0.00	0.00	148.21	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	15.85	15.85			15.85				
D-A	0.00	0.00	149.79	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.93	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	126.95	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	12.18	12.18			12.18				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.19	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	107.39	0.000	0.02	0.0	0.0	0.000	A
A-BCD	1.18	1.18	157.70	0.008	1.18	0.0	0.0	5.769	A
A-B	0.00	0.00			0.00				
A-C	10.12	10.12			10.12				
D-A	0.00	0.00	150.77	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.84	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	151.33	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	13.41	13.41			13.41				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	168.09	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	125.62	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	143.58	0.000	0.01	0.0	0.0	0.000	A
A-B	1.22	1.22			1.22				
A-C	11.19	11.19			11.19				
D-A	1.11	1.11	153.34	0.007	1.10	0.0	0.0	5.911	A
D-BC	0.00	0.00	84.27	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	143.05	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	10.08	10.08			10.08				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	163.71	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	122.90	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	127.54	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	15.62	15.62			15.62				
D-A	0.00	0.00	153.31	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.63	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	150.80	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	20.28	20.28			20.28				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	147.59	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.11	1.11	97.98	0.011	1.10	0.0	0.0	8.807	A
A-BCD	0.00	0.00	125.35	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	12.64	12.64			12.64				
D-A	0.00	0.00	149.95	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.76	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	151.66	0.000	0.00	0.0	0.0	0.000	A
C-D	1.11	1.11			1.11				
C-A	11.19	11.19			11.19				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.55	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.22	1.22	63.58	0.019	1.22	0.0	0.0	11.920	B
A-BCD	0.00	0.00	124.04	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	7.75	7.75			7.75				
D-A	0.00	0.00	110.04	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.11	1.11	118.00	0.009	1.10	0.0	0.0	7.698	A
C-ABD	0.00	0.00	160.56	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	15.62	15.62			15.62				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	148.13	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.11	1.11	122.08	0.009	1.11	0.0	0.0	11.236	B
A-BCD	0.00	0.00	120.96	0.000	0.00	0.0	0.0	0.000	A
A-B	1.22	1.22			1.22				
A-C	20.17	20.17			20.17				
D-A	0.00	0.00	109.32	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	115.36	0.000	0.01	0.0	0.0	0.000	A
C-ABD	0.00	0.00	157.21	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	17.95	17.95			17.95				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	148.70	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.22	1.22	125.11	0.010	1.23	0.0	0.0	7.264	A
A-BCD	0.00	0.00	132.13	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	16.85	16.85			16.85				
D-A	0.00	0.00	149.44	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.90	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	147.92	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	10.08	10.08			10.08				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.22	2.22	160.96	0.014	2.20	0.0	0.0	5.668	A
B-AD	1.11	1.11	123.61	0.009	1.11	0.0	0.0	7.348	A
A-BCD	0.00	0.00	136.05	0.000	0.00	0.0	0.0	0.000	A
A-B	1.11	1.11			1.11				
A-C	12.18	12.18			12.18				
D-A	0.00	0.00	147.78	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.41	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	145.87	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	14.40	14.40			14.40				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	168.60	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	123.61	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	137.00	0.000	0.00	0.0	0.0	0.000	A
A-B	1.22	1.22			1.22				
A-C	15.85	15.85			15.85				
D-A	0.00	0.00	151.12	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.67	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.18	1.18	170.87	0.007	1.17	0.0	0.0	5.306	A
C-D	0.00	0.00			0.00				
C-A	10.13	10.13			10.13				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	151.02	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.22	1.22	111.77	0.011	1.21	0.0	0.0	7.633	A
A-BCD	0.00	0.00	145.07	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	11.19	11.19			11.19				
D-A	0.00	0.00	150.80	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.50	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	167.15	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	12.41	12.41			12.41				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	151.67	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	111.77	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	149.61	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	10.20	10.20			10.20				
D-A	0.00	0.00	150.76	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.60	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	162.84	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	11.42	11.42			11.42				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	169.77	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	128.58	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	148.47	0.000	0.00	0.0	0.0	0.000	A
A-B	1.11	1.11			1.11				
A-C	7.75	7.75			7.75				
D-A	0.00	0.00	152.11	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	114.97	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.32	2.32	174.64	0.013	2.30	0.0	0.0	5.240	A
C-D	0.00	0.00			0.00				
C-A	7.76	7.76			7.76				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	161.07	0.007	1.10	0.0	0.0	5.625	A
B-AD	1.11	1.11	61.40	0.018	1.09	0.0	0.0	11.544	B
A-BCD	0.00	0.00	145.78	0.000	0.00	0.0	0.0	0.000	A
A-B	1.11	1.11			1.11				
A-C	15.74	15.74			15.74				
D-A	0.00	0.00	150.58	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.47	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.28	1.28	94.53	0.014	1.28	0.0	0.0	6.779	A
C-D	0.00	0.00			0.00				
C-A	12.24	12.24			12.24				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	158.38	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	62.98	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	134.77	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	5.54	5.54			5.54				
D-A	0.00	0.00	151.80	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	114.42	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.18	1.18	88.60	0.013	1.18	0.0	0.0	9.990	A
C-D	0.00	0.00			0.00				
C-A	5.58	5.58			5.58				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.87	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.11	1.11	127.33	0.009	1.09	0.0	0.0	10.739	B
A-BCD	0.00	0.00	139.45	0.000	0.00	0.0	0.0	0.000	A
A-B	1.11	1.11			1.11				
A-C	15.74	15.74			15.74				
D-A	0.00	0.00	151.14	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.98	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	93.51	0.000	0.02	0.0	0.0	10.194	B
C-D	0.00	0.00			0.00				
C-A	11.30	11.30			11.30				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	79.54	0.014	1.10	0.0	0.0	8.573	A
B-AD	1.11	1.11	122.95	0.009	1.11	0.0	0.0	7.389	A
A-BCD	0.00	0.00	140.69	0.000	0.00	0.0	0.0	0.000	A
A-B	1.11	1.11			1.11				
A-C	19.40	19.40			19.40				
D-A	1.11	1.11	153.59	0.007	1.10	0.0	0.0	5.901	A
D-BC	0.00	0.00	83.85	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	166.79	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	18.07	18.07			18.07				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	80.71	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	122.80	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	131.21	0.000	0.00	0.0	0.0	0.000	A
A-B	1.22	1.22			1.22				
A-C	6.76	6.76			6.76				
D-A	0.00	0.00	153.84	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.66	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.27	1.27	93.00	0.014	1.26	0.0	0.0	9.802	A
C-D	0.00	0.00			0.00				
C-A	12.02	12.02			12.02				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	121.31	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.22	1.22	127.26	0.010	1.21	0.0	0.0	7.139	A
A-BCD	0.00	0.00	125.48	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	4.43	4.43			4.43				
D-A	1.11	1.11	119.99	0.009	1.10	0.0	0.0	6.762	A
D-BC	0.00	0.00	84.17	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	103.62	0.000	0.02	0.0	0.0	9.413	A
C-D	0.00	0.00			0.00				
C-A	21.16	21.16			21.16				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	165.70	0.007	1.21	0.0	0.0	8.101	A
B-AD	0.00	0.00	114.12	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	136.36	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	13.52	13.52			13.52				
D-A	0.00	0.00	119.10	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.92	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	151.51	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	21.39	21.39			21.39				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.61	0.000	0.01	0.0	0.0	0.000	A
B-AD	1.22	1.22	62.89	0.019	1.21	0.0	0.0	10.889	B
A-BCD	1.24	1.24	162.97	0.008	1.23	0.0	0.0	5.724	A
A-B	2.43	2.43			2.43				
A-C	14.29	14.29			14.29				
D-A	0.00	0.00	139.14	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.11	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	149.23	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	16.85	16.85			16.85				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	158.95	0.007	1.10	0.0	0.0	5.701	A
B-AD	1.22	1.22	60.40	0.020	1.22	0.0	0.0	15.204	C
A-BCD	0.00	0.00	150.21	0.000	0.01	0.0	0.0	0.000	A
A-B	1.22	1.22			1.22				
A-C	20.40	20.40			20.40				
D-A	0.00	0.00	142.68	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.01	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	149.62	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	17.72	17.72			17.72				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	153.60	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	60.86	0.000	0.02	0.0	0.0	0.000	A
A-BCD	0.00	0.00	120.64	0.000	0.00	0.0	0.0	0.000	A
A-B	1.11	1.11			1.11				
A-C	11.08	11.08			11.08				
D-A	0.00	0.00	145.22	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.80	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	153.22	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	22.15	22.15			22.15				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	163.92	0.007	1.10	0.0	0.0	5.527	A
B-AD	0.00	0.00	101.31	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	134.72	0.000	0.00	0.0	0.0	0.000	A
A-B	1.22	1.22			1.22				
A-C	20.05	20.05			20.05				
D-A	1.11	1.11	154.76	0.007	1.10	0.0	0.0	6.648	A
D-BC	0.00	0.00	84.56	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.23	1.23	141.65	0.009	1.22	0.0	0.0	6.407	A
C-D	0.00	0.00			0.00				
C-A	14.39	14.39			14.39				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	82.62	0.015	1.22	0.0	0.0	8.422	A
B-AD	2.33	2.33	125.07	0.019	2.30	0.0	0.0	9.916	A
A-BCD	1.37	1.37	139.30	0.010	1.36	0.0	0.0	5.974	A
A-B	2.19	2.19			2.19				
A-C	24.13	24.13			24.13				
D-A	0.00	0.00	152.51	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.13	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	133.06	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	21.16	21.16			21.16				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	81.85	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	124.33	0.000	0.03	0.0	0.0	0.000	A
A-BCD	1.30	1.30	131.46	0.010	1.30	0.0	0.0	6.717	A
A-B	1.21	1.21			1.21				
A-C	18.11	18.11			18.11				
D-A	0.00	0.00	147.66	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.86	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.30	1.30	143.66	0.009	1.29	0.0	0.0	6.261	A
C-D	0.00	0.00			0.00				
C-A	21.20	21.20			21.20				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	159.40	0.007	1.10	0.0	0.0	8.698	A
B-AD	0.00	0.00	107.87	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	115.75	0.000	0.01	0.0	0.0	0.000	A
A-B	2.33	2.33			2.33				
A-C	20.17	20.17			20.17				
D-A	0.00	0.00	146.02	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	105.24	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	127.87	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	24.71	24.71			24.71				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	146.70	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.33	2.33	60.46	0.039	2.30	0.0	0.0	11.490	B
A-BCD	0.00	0.00	130.80	0.000	0.00	0.0	0.0	0.000	A
A-B	1.22	1.22			1.22				
A-C	24.60	24.60			24.60				
D-A	1.11	1.11	148.48	0.007	1.10	0.0	0.0	6.106	A
D-BC	0.00	0.00	79.91	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.38	1.38	149.33	0.009	1.36	0.0	0.0	6.104	A
C-D	0.00	0.00			0.00				
C-A	28.76	28.76			28.76				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	162.21	0.007	1.10	0.0	0.0	5.585	A
B-AD	1.11	1.11	119.76	0.009	1.12	0.0	0.0	12.482	B
A-BCD	1.35	1.35	169.80	0.008	1.34	0.0	0.0	6.034	A
A-B	2.31	2.31			2.31				
A-C	27.81	27.81			27.81				
D-A	0.00	0.00	151.42	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	80.69	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	129.83	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	24.48	24.48			24.48				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	155.77	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	115.27	0.000	0.02	0.0	0.0	0.000	A
A-BCD	0.00	0.00	144.97	0.000	0.01	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	35.79	35.79			35.79				
D-A	0.00	0.00	144.97	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	104.76	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	154.68	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	37.78	37.78			37.78				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	145.70	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.22	1.22	105.36	0.012	1.21	0.0	0.0	8.102	A
A-BCD	0.00	0.00	143.30	0.000	0.00	0.0	0.0	0.000	A
A-B	2.22	2.22			2.22				
A-C	23.26	23.26			23.26				
D-A	0.00	0.00	147.84	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.57	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	141.71	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	12.30	12.30			12.30				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.22	2.22	162.87	0.014	2.20	0.0	0.0	5.601	A
B-AD	0.00	0.00	97.77	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	132.38	0.000	0.00	0.0	0.0	0.000	A
A-B	1.22	1.22			1.22				
A-C	23.26	23.26			23.26				
D-A	1.11	1.11	153.11	0.007	1.10	0.0	0.0	5.920	A
D-BC	0.00	0.00	83.02	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.26	1.26	140.96	0.009	1.25	0.0	0.0	6.408	A
C-D	0.00	0.00			0.00				
C-A	16.47	16.47			16.47				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	131.20	0.008	1.11	0.0	0.0	5.952	A
B-AD	1.22	1.22	123.02	0.010	1.21	0.0	0.0	7.945	A
A-BCD	0.00	0.00	133.79	0.000	0.00	0.0	0.0	0.000	A
A-B	1.11	1.11			1.11				
A-C	17.72	17.72			17.72				
D-A	0.00	0.00	151.38	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	81.81	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.35	1.35	149.40	0.009	1.35	0.0	0.0	6.196	A
C-D	0.00	0.00			0.00				
C-A	26.57	26.57			26.57				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	130.34	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	126.72	0.000	0.01	0.0	0.0	0.000	A
A-BCD	2.47	2.47	161.28	0.015	2.45	0.0	0.0	5.651	A
A-B	2.18	2.18			2.18				
A-C	14.18	14.18			14.18				
D-A	0.00	0.00	148.37	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.10	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.26	1.26	179.56	0.007	1.27	0.0	0.0	5.588	A
C-D	0.00	0.00			0.00				
C-A	22.00	22.00			22.00				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	134.64	0.008	1.10	0.0	0.0	6.739	A
B-AD	1.11	1.11	126.87	0.009	1.10	0.0	0.0	7.155	A
A-BCD	0.00	0.00	153.96	0.000	0.02	0.0	0.0	5.821	A
A-B	1.22	1.22			1.22				
A-C	9.97	9.97			9.97				
D-A	1.11	1.11	151.83	0.007	1.10	0.0	0.0	5.970	A
D-BC	0.00	0.00	83.55	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	167.52	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	13.29	13.29			13.29				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	83.94	0.013	1.11	0.0	0.0	8.880	A
B-AD	2.33	2.33	129.27	0.018	2.32	0.0	0.0	7.088	A
A-BCD	1.19	1.19	160.70	0.007	1.18	0.0	0.0	5.642	A
A-B	0.00	0.00			0.00				
A-C	11.11	11.11			11.11				
D-A	0.00	0.00	154.20	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.86	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.41	2.41	178.02	0.014	2.40	0.0	0.0	5.141	A
C-D	0.00	0.00			0.00				
C-A	14.21	14.21			14.21				

+15+ Adj, 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	A - R619 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - R619 S - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	D - Local Access - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Glannoge Cross	Right-Left Stagger	Two-way		0.75	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D9	+15+ Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D4+D5

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - R619 N		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - R619 S		DIRECT	✓	100.000
D - Local Access		DIRECT	✓	100.000

Origin-Destination Data

Demand (Veh/TS)

07:00 - 07:15

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	22.42	0.00
	B - L5361	1.44	0.00	0.00	0.00
	C - R619 S	18.10	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

Demand (Veh/TS)

07:15 - 07:30

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.21	24.37	0.00
	B - L5361	1.21	0.00	1.21	0.00
	C - R619 S	21.95	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.85	22.88	0.00
	B - L5361	2.41	0.00	0.00	0.00
	C - R619 S	15.69	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	24.83	0.00
	B - L5361	1.21	0.00	1.21	0.00
	C - R619 S	22.65	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:00 - 08:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	23.39	0.00
	B - L5361	0.00	0.00	1.21	0.00
	C - R619 S	29.20	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:15 - 08:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	21.72	0.00
	B - L5361	2.65	0.00	0.00	0.00
	C - R619 S	25.58	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	17.13	0.00
	B - L5361	0.00	0.00	1.44	0.00
	C - R619 S	31.61	1.21	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.65	23.39	0.00
	B - L5361	4.08	0.00	1.21	0.00
	C - R619 S	25.81	0.00	0.00	1.21
	D - Local Access	0.00	0.00	1.21	0.00

09:00 - 09:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	19.54	0.00
	B - L5361	0.00	0.00	1.21	0.00
	C - R619 S	30.17	0.00	0.00	0.00
	D - Local Access	1.21	0.00	1.21	0.00

09:15 - 09:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	13.97	1.21
	B - L5361	1.21	0.00	0.00	1.21
	C - R619 S	13.74	1.21	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	13.51	0.00
	B - L5361	1.21	0.00	0.00	0.00
	C - R619 S	13.74	1.44	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	11.09	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	17.59	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:00 - 10:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	17.59	0.00
	B - L5361	2.65	0.00	0.00	0.00
	C - R619 S	13.28	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	11.32	1.21
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	14.71	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.44	12.30	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	11.09	0.00	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	17.13	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	22.42	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	14.20	0.00
	B - L5361	1.21	0.00	0.00	0.00
	C - R619 S	12.30	0.00	0.00	1.21
	D - Local Access	0.00	0.00	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	8.45	0.00
	B - L5361	1.44	0.00	0.00	0.00
	C - R619 S	17.13	0.00	0.00	0.00
	D - Local Access	0.00	1.21	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.44	22.19	0.00
	B - L5361	1.21	0.00	0.00	0.00
	C - R619 S	19.77	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	18.57	0.00
	B - L5361	1.44	0.00	0.00	0.00
	C - R619 S	11.09	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.21	13.28	0.00
	B - L5361	1.21	0.00	2.41	0.00
	C - R619 S	15.69	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:15 - 12:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.44	17.59	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	11.32	1.21	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	12.30	0.00
	B - L5361	1.44	0.00	0.00	0.00
	C - R619 S	13.74	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:45 - 13:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	11.32	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	12.76	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.21	8.45	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	8.68	2.41	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.21	17.36	0.00
	B - L5361	1.21	0.00	1.21	0.00
	C - R619 S	13.74	1.21	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	6.03	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	6.27	1.21	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:45 - 14:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.21	17.36	0.00
	B - L5361	1.21	0.00	0.00	0.00
	C - R619 S	12.53	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.21	21.67	0.00
	B - L5361	1.21	0.00	1.21	0.00
	C - R619 S	20.00	0.00	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

14:15 - 14:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.44	7.47	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	13.28	1.21	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	4.83	0.00
	B - L5361	1.44	0.00	0.00	0.00
	C - R619 S	23.16	0.00	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

14:45 - 15:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	14.95	0.00
	B - L5361	0.00	0.00	1.44	0.00
	C - R619 S	23.62	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:00 - 15:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.88	15.69	1.21
	B - L5361	1.44	0.00	0.00	0.00
	C - R619 S	18.57	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:15 - 15:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.44	22.65	0.00
	B - L5361	1.44	0.00	1.21	0.00
	C - R619 S	19.31	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.21	12.07	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	24.14	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.44	21.95	0.00
	B - L5361	0.00	0.00	1.21	0.00
	C - R619 S	15.92	1.21	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

16:00 - 16:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.41	26.55	1.21
	B - L5361	2.65	0.00	1.44	0.00
	C - R619 S	23.16	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.44	20.47	1.21
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	23.62	1.21	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.65	22.19	0.00
	B - L5361	0.00	0.00	1.21	0.00
	C - R619 S	27.25	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.44	27.01	0.00
	B - L5361	2.65	0.00	0.00	0.00
	C - R619 S	31.84	1.21	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

17:00 - 17:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.65	30.87	1.21
	B - L5361	1.21	0.00	1.21	0.00
	C - R619 S	26.78	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:15 - 17:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	39.31	0.00
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	41.26	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.41	25.34	0.00
	B - L5361	1.44	0.00	0.00	0.00
	C - R619 S	13.51	0.00	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.44	25.34	0.00
	B - L5361	0.00	0.00	2.41	0.00
	C - R619 S	18.10	1.21	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.21	19.31	0.00
	B - L5361	1.44	0.00	1.21	0.00
	C - R619 S	29.43	1.21	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.41	15.69	2.41
	B - L5361	0.00	0.00	0.00	0.00
	C - R619 S	24.14	1.21	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.44	10.86	0.00
	B - L5361	1.21	0.00	1.21	0.00
	C - R619 S	14.48	0.00	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

18:45 - 19:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.00	12.30	1.21
	B - L5361	2.65	0.00	1.21	0.00
	C - R619 S	15.69	2.41	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	97	0
	B - L5361	0	0	0	0
	C - R619 S	8	0	0	0
	D - Local Access	0	0	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	18	0
	B - L5361	100	0	100	0
	C - R619 S	39	0	0	0
	D - Local Access	0	0	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	100	0
	C - R619 S	11	0	0	0
	D - Local Access	0	0	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	42	0
	B - L5361	16	0	0	0
	C - R619 S	68	0	0	0
	D - Local Access	0	0	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	89	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	22	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

09:00 - 09:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	2	0
	B - L5361	0	0	0	0
	C - R619 S	17	0	0	0
	D - Local Access	0	0	0	0

09:15 - 09:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	86	0
	B - L5361	27	0	0	0
	C - R619 S	11	0	0	0
	D - Local Access	0	0	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	27	0	0	0
	C - R619 S	46	100	0	0
	D - Local Access	0	0	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	12	0
	B - L5361	0	0	0	0
	C - R619 S	31	0	0	0
	D - Local Access	0	0	0	0

10:00 - 10:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	22	0	0	0
	C - R619 S	30	0	0	0
	D - Local Access	0	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	6	0	0	0
	D - Local Access	0	0	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	24	0
	B - L5361	0	0	0	0
	C - R619 S	100	0	0	0
	D - Local Access	0	0	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	99	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	27	0	0	0
	C - R619 S	37	0	0	0
	D - Local Access	0	0	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	100	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	11	0
	B - L5361	0	0	0	0
	C - R619 S	25	0	0	0
	D - Local Access	0	0	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	25	0
	B - L5361	0	0	0	0
	C - R619 S	81	0	0	0
	D - Local Access	0	0	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	0	0
	C - R619 S	78	0	0	0
	D - Local Access	0	0	0	0

12:15 - 12:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	57	0
	B - L5361	0	0	0	0
	C - R619 S	24	0	0	0
	D - Local Access	0	0	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	6	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

12:45 - 13:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	21	0	0	0
	D - Local Access	0	0	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	0	0
	C - R619 S	6	0	0	0
	D - Local Access	0	0	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	100	0	0	0
	C - R619 S	3	100	0	0
	D - Local Access	0	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	76	100	0	0
	D - Local Access	0	0	0	0

13:45 - 14:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

14:15 - 14:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	51	100	0	0
	D - Local Access	0	0	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	0	0	0	0
	C - R619 S	15	0	0	0
	D - Local Access	27	0	0	0

14:45 - 15:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	37	0	0	0
	D - Local Access	0	0	0	0

15:00 - 15:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	8	0
	B - L5361	100	0	0	0
	C - R619 S	25	0	0	0
	D - Local Access	0	0	0	0

15:15 - 15:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	0	0
	C - R619 S	45	0	0	0
	D - Local Access	0	0	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	0	0	0	0
	C - R619 S	20	0	0	0
	D - Local Access	0	0	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	6	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	27	0	0
	D - Local Access	0	0	0	0

16:00 - 16:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	33	0	27
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	6	44	27
	B - L5361	0	0	0	0
	C - R619 S	23	27	0	0
	D - Local Access	0	0	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	22	80	0
	B - L5361	0	0	0	0
	C - R619 S	37	0	0	0
	D - Local Access	0	0	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	0	0
	C - R619 S	21	27	0	0
	D - Local Access	0	0	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	15	0
	B - L5361	0	0	0	0
	C - R619 S	9	0	0	0
	D - Local Access	0	0	0	0

17:15 - 17:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	40	0
	B - L5361	6	0	0	0
	C - R619 S	100	0	0	0
	D - Local Access	0	0	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	0	0	0	0
	C - R619 S	27	27	0	0
	D - Local Access	0	0	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	45	0
	B - L5361	0	0	27	0
	C - R619 S	0	27	0	0
	D - Local Access	0	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	38	0
	B - L5361	0	0	0	0
	C - R619 S	8	0	0	0
	D - Local Access	0	0	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	0	0	27	0
	C - R619 S	92	0	0	0
	D - Local Access	0	0	0	0

18:45 - 19:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	13	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.02	11.21	0.0	B	0.54	26.04
B-AD	0.04	15.37	0.1	C	1.01	48.36
A-BCD	0.02	6.66	0.0	A	0.26	12.48
A-B					0.95	45.82
A-C					17.89	858.73
D-A	0.01	6.80	0.0	A	0.23	10.86
D-BC	0.01	8.46	0.0	A	0.08	3.62
C-ABD	0.02	10.18	0.0	B	0.49	23.67
C-D					0.05	2.41
C-A					19.31	926.69

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	148.28	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.44	1.44	124.75	0.012	1.43	0.0	0.0	7.297	A
A-BCD	0.00	0.00	153.10	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	22.42	22.42			22.42				
D-A	0.00	0.00	149.41	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.67	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	166.35	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	18.10	18.10			18.10				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	164.81	0.007	1.20	0.0	0.0	5.500	A
B-AD	1.21	1.21	125.49	0.010	1.21	0.0	0.0	7.240	A
A-BCD	0.00	0.00	152.20	0.000	0.00	0.0	0.0	0.000	A
A-B	1.21	1.21			1.21				
A-C	24.37	24.37			24.37				
D-A	0.00	0.00	148.52	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.42	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	165.49	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	21.95	21.95			21.95				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	142.18	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.41	2.41	118.84	0.020	2.40	0.0	0.0	7.730	A
A-BCD	0.00	0.00	136.52	0.000	0.00	0.0	0.0	0.000	A
A-B	3.85	3.85			3.85				
A-C	22.88	22.88			22.88				
D-A	0.00	0.00	149.44	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.99	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	157.49	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	15.69	15.69			15.69				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	81.60	0.015	1.20	0.0	0.0	8.362	A
B-AD	1.21	1.21	61.96	0.020	1.21	0.0	0.0	9.899	A
A-BCD	0.00	0.00	138.08	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	24.83	24.83			24.83				
D-A	0.00	0.00	145.94	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.56	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	156.16	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	22.65	22.65			22.65				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	81.51	0.015	1.20	0.0	0.0	11.206	B
B-AD	0.00	0.00	55.75	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	143.91	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	23.39	23.39			23.39				
D-A	0.00	0.00	146.26	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.67	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	159.60	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	29.20	29.20			29.20				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	73.00	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.65	2.65	102.52	0.026	2.61	0.0	0.0	11.121	B
A-BCD	0.00	0.00	136.48	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	21.72	21.72			21.72				
D-A	0.00	0.00	142.99	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	103.65	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	148.48	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	25.58	25.58			25.58				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.44	1.44	160.44	0.009	1.43	0.0	0.0	8.274	A
B-AD	0.00	0.00	94.69	0.000	0.03	0.0	0.0	0.000	A
A-BCD	0.00	0.00	130.79	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	17.13	17.13			17.13				
D-A	0.00	0.00	146.46	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.61	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.46	1.46	183.78	0.008	1.45	0.0	0.0	4.935	A
C-D	0.00	0.00			0.00				
C-A	31.36	31.36			31.36				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	80.10	0.015	1.21	0.0	0.0	8.316	A
B-AD	4.08	4.08	127.65	0.032	4.05	0.0	0.0	7.745	A
A-BCD	0.00	0.00	136.48	0.000	0.00	0.0	0.0	0.000	A
A-B	2.65	2.65			2.65				
A-C	23.39	23.39			23.39				
D-A	0.00	0.00	107.81	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.21	1.21	113.51	0.011	1.20	0.0	0.0	8.013	A
C-ABD	0.00	0.00	164.88	0.000	0.01	0.0	0.0	0.000	A
C-D	1.21	1.21			1.21				
C-A	25.81	25.81			25.81				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	161.89	0.007	1.21	0.0	0.0	8.354	A
B-AD	0.00	0.00	112.04	0.000	0.03	0.0	0.0	0.000	A
A-BCD	0.00	0.00	141.70	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	19.54	19.54			19.54				
D-A	1.21	1.21	144.97	0.008	1.20	0.0	0.0	6.259	A
D-BC	1.21	1.21	107.53	0.011	1.21	0.0	0.0	8.464	A
C-ABD	0.00	0.00	163.20	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	30.17	30.17			30.17				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	147.15	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.41	2.41	109.17	0.022	2.39	0.0	0.0	7.789	A
A-BCD	1.32	1.32	158.57	0.008	1.31	0.0	0.0	5.722	A
A-B	0.00	0.00			0.00				
A-C	13.85	13.85			13.85				
D-A	1.21	1.21	153.91	0.008	1.21	0.0	0.0	5.893	A
D-BC	0.00	0.00	83.88	0.000	0.01	0.0	0.0	0.000	A
C-ABD	1.31	1.31	173.48	0.008	1.30	0.0	0.0	5.202	A
C-D	0.00	0.00			0.00				
C-A	13.63	13.63			13.63				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	150.41	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.21	1.21	99.24	0.012	1.22	0.0	0.0	8.544	A
A-BCD	0.00	0.00	141.74	0.000	0.01	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	13.51	13.51			13.51				
D-A	0.00	0.00	152.99	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.21	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.68	1.68	94.59	0.018	1.68	0.0	0.0	7.662	A
C-D	0.00	0.00			0.00				
C-A	13.49	13.49			13.49				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	151.14	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	99.70	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	142.21	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	11.09	11.09			11.09				
D-A	0.00	0.00	148.53	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.27	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	100.49	0.000	0.02	0.0	0.0	9.421	A
C-D	0.00	0.00			0.00				
C-A	17.59	17.59			17.59				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	148.92	0.000	0.00	0.0	0.0	0.000	A
B-AD	2.65	2.65	103.75	0.026	2.62	0.0	0.0	9.023	A
A-BCD	0.00	0.00	147.67	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	17.59	17.59			17.59				
D-A	0.00	0.00	149.17	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.12	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	127.60	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	13.28	13.28			13.28				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	148.64	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	102.92	0.000	0.03	0.0	0.0	0.000	A
A-BCD	1.30	1.30	157.64	0.008	1.29	0.0	0.0	5.767	A
A-B	0.00	0.00			0.00				
A-C	11.23	11.23			11.23				
D-A	0.00	0.00	150.35	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.11	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	149.98	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	14.71	14.71			14.71				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	167.72	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	124.32	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	142.16	0.000	0.01	0.0	0.0	0.000	A
A-B	1.44	1.44			1.44				
A-C	12.30	12.30			12.30				
D-A	1.21	1.21	152.84	0.008	1.20	0.0	0.0	5.934	A
D-BC	0.00	0.00	83.78	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	142.36	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	11.09	11.09			11.09				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	162.77	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	121.37	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	126.78	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	17.13	17.13			17.13				
D-A	0.00	0.00	152.78	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	81.91	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	149.74	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	22.42	22.42			22.42				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	146.79	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.21	1.21	97.19	0.012	1.19	0.0	0.0	9.102	A
A-BCD	0.00	0.00	124.87	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	14.20	14.20			14.20				
D-A	0.00	0.00	149.58	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.99	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	150.99	0.000	0.00	0.0	0.0	0.000	A
C-D	1.21	1.21			1.21				
C-A	12.30	12.30			12.30				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.07	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.44	1.44	63.27	0.023	1.43	0.0	0.0	12.115	B
A-BCD	0.00	0.00	123.57	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	8.45	8.45			8.45				
D-A	0.00	0.00	109.67	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.21	1.21	117.35	0.010	1.20	0.0	0.0	7.748	A
C-ABD	0.00	0.00	160.24	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	17.13	17.13			17.13				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	147.51	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.21	1.21	120.97	0.010	1.21	0.0	0.0	11.483	B
A-BCD	0.00	0.00	120.46	0.000	0.00	0.0	0.0	0.000	A
A-B	1.44	1.44			1.44				
A-C	22.19	22.19			22.19				
D-A	0.00	0.00	108.90	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	114.42	0.000	0.01	0.0	0.0	0.000	A
C-ABD	0.00	0.00	156.58	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	19.77	19.77			19.77				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	148.07	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.44	1.44	124.23	0.012	1.44	0.0	0.0	7.329	A
A-BCD	0.00	0.00	131.50	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	18.57	18.57			18.57				
D-A	0.00	0.00	148.93	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.11	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	147.31	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	11.09	11.09			11.09				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.41	2.41	160.63	0.015	2.40	0.0	0.0	5.687	A
B-AD	1.21	1.21	122.92	0.010	1.21	0.0	0.0	7.393	A
A-BCD	0.00	0.00	135.32	0.000	0.00	0.0	0.0	0.000	A
A-B	1.21	1.21			1.21				
A-C	13.28	13.28			13.28				
D-A	0.00	0.00	147.09	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.62	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	145.09	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	15.69	15.69			15.69				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	167.86	0.000	0.02	0.0	0.0	0.000	A
B-AD	0.00	0.00	122.71	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	136.84	0.000	0.00	0.0	0.0	0.000	A
A-B	1.44	1.44			1.44				
A-C	17.59	17.59			17.59				
D-A	0.00	0.00	150.73	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.94	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.29	1.29	170.70	0.008	1.28	0.0	0.0	5.315	A
C-D	0.00	0.00			0.00				
C-A	11.24	11.24			11.24				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	150.71	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.44	1.44	120.25	0.012	1.43	0.0	0.0	7.363	A
A-BCD	0.00	0.00	144.84	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	12.30	12.30			12.30				
D-A	0.00	0.00	150.44	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.02	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	166.39	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	13.74	13.74			13.74				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	151.40	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	120.22	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	149.31	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	11.32	11.32			11.32				
D-A	0.00	0.00	150.40	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.11	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	162.60	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	12.76	12.76			12.76				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	169.57	0.000	0.00	0.0	0.0	0.000	A
B-AD	0.00	0.00	129.56	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	148.32	0.000	0.00	0.0	0.0	0.000	A
A-B	1.21	1.21			1.21				
A-C	8.45	8.45			8.45				
D-A	0.00	0.00	151.92	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	114.69	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.54	2.54	174.95	0.015	2.52	0.0	0.0	5.243	A
C-D	0.00	0.00			0.00				
C-A	8.55	8.55			8.55				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	160.57	0.008	1.20	0.0	0.0	5.646	A
B-AD	1.21	1.21	61.04	0.020	1.19	0.0	0.0	11.153	B
A-BCD	0.00	0.00	145.38	0.000	0.00	0.0	0.0	0.000	A
A-B	1.21	1.21			1.21				
A-C	17.36	17.36			17.36				
D-A	0.00	0.00	150.15	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.83	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.41	1.41	95.33	0.015	1.42	0.0	0.0	6.755	A
C-D	0.00	0.00			0.00				
C-A	13.53	13.53			13.53				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	158.34	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	62.69	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	134.48	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	6.03	6.03			6.03				
D-A	0.00	0.00	151.47	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.99	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.30	1.30	88.83	0.015	1.29	0.0	0.0	9.944	A
C-D	0.00	0.00			0.00				
C-A	6.17	6.17			6.17				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.43	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.21	1.21	126.72	0.010	1.19	0.0	0.0	10.805	B
A-BCD	0.00	0.00	139.15	0.000	0.00	0.0	0.0	0.000	A
A-B	1.21	1.21			1.21				
A-C	17.36	17.36			17.36				
D-A	0.00	0.00	150.82	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.44	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	94.13	0.000	0.02	0.0	0.0	10.183	B
C-D	0.00	0.00			0.00				
C-A	12.53	12.53			12.53				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	79.22	0.015	1.20	0.0	0.0	8.616	A
B-AD	1.21	1.21	122.08	0.010	1.21	0.0	0.0	7.445	A
A-BCD	0.00	0.00	140.22	0.000	0.00	0.0	0.0	0.000	A
A-B	1.21	1.21			1.21				
A-C	21.67	21.67			21.67				
D-A	1.21	1.21	153.08	0.008	1.20	0.0	0.0	5.925	A
D-BC	0.00	0.00	83.26	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	166.14	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	20.00	20.00			20.00				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	80.51	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	122.10	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	130.81	0.000	0.00	0.0	0.0	0.000	A
A-B	1.44	1.44			1.44				
A-C	7.47	7.47			7.47				
D-A	0.00	0.00	153.37	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.17	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.41	1.41	93.53	0.015	1.39	0.0	0.0	9.759	A
C-D	0.00	0.00			0.00				
C-A	13.08	13.08			13.08				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	121.10	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.44	1.44	126.58	0.011	1.43	0.0	0.0	7.190	A
A-BCD	0.00	0.00	124.80	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	4.83	4.83			4.83				
D-A	1.21	1.21	119.35	0.010	1.20	0.0	0.0	6.804	A
D-BC	0.00	0.00	83.54	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	104.94	0.000	0.02	0.0	0.0	9.312	A
C-D	0.00	0.00			0.00				
C-A	23.16	23.16			23.16				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.44	1.44	165.32	0.009	1.43	0.0	0.0	8.027	A
B-AD	0.00	0.00	113.35	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	135.66	0.000	0.00	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	14.95	14.95			14.95				
D-A	0.00	0.00	118.49	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.25	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	146.43	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	23.63	23.63			23.63				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	149.04	0.000	0.01	0.0	0.0	0.000	A
B-AD	1.44	1.44	62.48	0.023	1.42	0.0	0.0	10.988	B
A-BCD	1.36	1.36	163.34	0.008	1.35	0.0	0.0	5.729	A
A-B	2.85	2.85			2.85				
A-C	15.56	15.56			15.56				
D-A	0.00	0.00	138.51	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.18	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	148.24	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	18.57	18.57			18.57				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	157.64	0.008	1.20	0.0	0.0	5.752	A
B-AD	1.44	1.44	59.97	0.024	1.43	0.0	0.0	15.371	C
A-BCD	0.00	0.00	149.08	0.000	0.01	0.0	0.0	0.000	A
A-B	1.44	1.44			1.44				
A-C	22.65	22.65			22.65				
D-A	0.00	0.00	141.88	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.91	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	148.15	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	19.31	19.31			19.31				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	152.75	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	60.47	0.000	0.02	0.0	0.0	0.000	A
A-BCD	0.00	0.00	120.07	0.000	0.00	0.0	0.0	0.000	A
A-B	1.21	1.21			1.21				
A-C	12.07	12.07			12.07				
D-A	0.00	0.00	144.65	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.97	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	152.21	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	24.14	24.14			24.14				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	163.40	0.007	1.20	0.0	0.0	5.548	A
B-AD	0.00	0.00	100.70	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	135.61	0.000	0.00	0.0	0.0	0.000	A
A-B	1.44	1.44			1.44				
A-C	21.95	21.95			21.95				
D-A	1.21	1.21	154.40	0.008	1.20	0.0	0.0	6.669	A
D-BC	0.00	0.00	84.12	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.36	1.36	142.22	0.010	1.35	0.0	0.0	6.387	A
C-D	0.00	0.00			0.00				
C-A	15.77	15.77			15.77				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.44	1.44	82.38	0.018	1.43	0.0	0.0	8.570	A
B-AD	2.65	2.65	123.92	0.021	2.62	0.0	0.0	10.106	B
A-BCD	1.52	1.52	140.54	0.011	1.51	0.0	0.0	5.938	A
A-B	2.39	2.39			2.39				
A-C	26.26	26.26			26.26				
D-A	0.00	0.00	151.94	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	81.44	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	132.73	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	23.16	23.16			23.16				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	81.60	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	122.95	0.000	0.03	0.0	0.0	0.000	A
A-BCD	1.45	1.45	132.62	0.011	1.45	0.0	0.0	6.664	A
A-B	1.42	1.42			1.42				
A-C	20.24	20.24			20.24				
D-A	0.00	0.00	147.08	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.88	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.44	1.44	144.61	0.010	1.43	0.0	0.0	6.227	A
C-D	0.00	0.00			0.00				
C-A	23.39	23.39			23.39				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	158.42	0.008	1.20	0.0	0.0	8.872	A
B-AD	0.00	0.00	106.50	0.000	0.00	0.0	0.0	0.000	A
A-BCD	0.00	0.00	115.09	0.000	0.01	0.0	0.0	0.000	A
A-B	2.65	2.65			2.65				
A-C	22.19	22.19			22.19				
D-A	0.00	0.00	145.11	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	103.87	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	127.33	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	27.25	27.25			27.25				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	145.88	0.000	0.01	0.0	0.0	0.000	A
B-AD	2.65	2.65	59.84	0.044	2.61	0.0	0.0	11.657	B
A-BCD	0.00	0.00	130.32	0.000	0.00	0.0	0.0	0.000	A
A-B	1.44	1.44			1.44				
A-C	27.01	27.01			27.01				
D-A	1.21	1.21	147.43	0.008	1.20	0.0	0.0	6.154	A
D-BC	0.00	0.00	78.92	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.53	1.53	150.58	0.010	1.52	0.0	0.0	6.051	A
C-D	0.00	0.00			0.00				
C-A	31.52	31.52			31.52				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	161.27	0.007	1.20	0.0	0.0	5.622	A
B-AD	1.21	1.21	118.43	0.010	1.22	0.0	0.0	12.692	B
A-BCD	1.50	1.50	171.22	0.009	1.49	0.0	0.0	5.983	A
A-B	2.62	2.62			2.62				
A-C	30.60	30.60			30.60				
D-A	0.00	0.00	150.80	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	79.89	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	129.04	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	26.78	26.78			26.78				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	154.78	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	113.90	0.000	0.02	0.0	0.0	0.000	A
A-BCD	0.00	0.00	143.91	0.000	0.01	0.0	0.0	0.000	A
A-B	0.00	0.00			0.00				
A-C	39.31	39.31			39.31				
D-A	0.00	0.00	144.12	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	103.50	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	153.74	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	41.26	41.26			41.26				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	144.83	0.000	0.00	0.0	0.0	0.000	A
B-AD	1.44	1.44	112.62	0.013	1.43	0.0	0.0	7.867	A
A-BCD	0.00	0.00	142.42	0.000	0.00	0.0	0.0	0.000	A
A-B	2.41	2.41			2.41				
A-C	25.34	25.34			25.34				
D-A	0.00	0.00	147.22	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.52	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	140.86	0.000	0.00	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	13.51	13.51			13.51				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.41	2.41	162.27	0.015	2.40	0.0	0.0	5.629	A
B-AD	0.00	0.00	104.81	0.000	0.01	0.0	0.0	0.000	A
A-BCD	0.00	0.00	131.86	0.000	0.00	0.0	0.0	0.000	A
A-B	1.44	1.44			1.44				
A-C	25.34	25.34			25.34				
D-A	1.21	1.21	152.64	0.008	1.20	0.0	0.0	5.942	A
D-BC	0.00	0.00	82.44	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.38	1.38	141.39	0.010	1.37	0.0	0.0	6.395	A
C-D	0.00	0.00			0.00				
C-A	17.93	17.93			17.93				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	129.99	0.009	1.21	0.0	0.0	6.010	A
B-AD	1.44	1.44	122.30	0.012	1.43	0.0	0.0	7.686	A
A-BCD	0.00	0.00	132.56	0.000	0.00	0.0	0.0	0.000	A
A-B	1.21	1.21			1.21				
A-C	19.31	19.31			19.31				
D-A	0.00	0.00	150.67	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	81.01	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.50	1.50	150.64	0.010	1.50	0.0	0.0	6.161	A
C-D	0.00	0.00			0.00				
C-A	29.13	29.13			29.13				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	129.66	0.000	0.01	0.0	0.0	0.000	A
B-AD	0.00	0.00	126.00	0.000	0.01	0.0	0.0	0.000	A
A-BCD	2.72	2.72	161.47	0.017	2.70	0.0	0.0	5.648	A
A-B	2.37	2.37			2.37				
A-C	15.42	15.42			15.42				
D-A	0.00	0.00	147.79	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.21	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.40	1.40	180.10	0.008	1.40	0.0	0.0	5.558	A
C-D	0.00	0.00			0.00				
C-A	23.95	23.95			23.95				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	134.38	0.009	1.20	0.0	0.0	6.757	A
B-AD	1.21	1.21	126.17	0.010	1.20	0.0	0.0	7.201	A
A-BCD	0.00	0.00	153.41	0.000	0.02	0.0	0.0	5.836	A
A-B	1.44	1.44			1.44				
A-C	10.86	10.86			10.86				
D-A	1.21	1.21	151.12	0.008	1.20	0.0	0.0	6.002	A
D-BC	0.00	0.00	82.94	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.00	0.00	166.81	0.000	0.01	0.0	0.0	0.000	A
C-D	0.00	0.00			0.00				
C-A	14.48	14.48			14.48				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	83.52	0.014	1.20	0.0	0.0	8.933	A
B-AD	2.65	2.65	128.92	0.021	2.63	0.0	0.0	7.126	A
A-BCD	1.31	1.31	160.95	0.008	1.30	0.0	0.0	5.637	A
A-B	0.00	0.00			0.00				
A-C	12.20	12.20			12.20				
D-A	0.00	0.00	153.80	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.43	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.65	2.65	178.47	0.015	2.63	0.0	0.0	5.138	A
C-D	0.00	0.00			0.00				
C-A	15.46	15.46			15.46				

Openign Year + Adj + Dev, 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	A - R619 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - R619 S - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	D - Local Access - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Glannoge Cross	Right-Left Stagger	Two-way		1.55	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D10	Openign Year + Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D2+D5+D6

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - R619 N		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - R619 S		DIRECT	✓	100.000
D - Local Access		DIRECT	✓	100.000

Origin-Destination Data

Demand (Veh/TS)

07:00 - 07:15

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.63	18.40	0.00
	B - L5361	1.92	0.00	0.51	0.00
	C - R619 S	15.28	0.79	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

Demand (Veh/TS)

07:15 - 07:30

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.65	20.40	0.00
	B - L5361	1.91	0.00	1.53	0.00
	C - R619 S	18.36	0.79	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	4.92	18.43	0.00
	B - L5361	2.92	0.00	0.51	0.00
	C - R619 S	13.25	0.89	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.84	20.43	0.00
	B - L5361	1.91	0.00	1.53	0.00
	C - R619 S	18.42	0.89	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:00 - 08:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.31	19.40	0.00
	B - L5361	0.94	0.00	1.56	0.00
	C - R619 S	24.47	0.63	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:15 - 08:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.31	18.34	0.00
	B - L5361	2.99	0.00	0.54	0.00
	C - R619 S	21.42	0.63	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.09	14.28	0.00
	B - L5361	0.94	0.00	1.58	0.00
	C - R619 S	26.51	1.55	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.15	19.40	0.00
	B - L5361	4.03	0.00	1.56	0.00
	C - R619 S	21.43	0.53	0.00	1.02
	D - Local Access	0.00	0.00	1.02	0.00

09:00 - 09:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	16.32	0.00
	B - L5361	1.06	0.00	1.63	0.00
	C - R619 S	25.47	0.65	0.00	0.00
	D - Local Access	1.02	0.00	1.02	0.00

09:15 - 09:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	11.26	1.02
	B - L5361	2.08	0.00	0.61	1.02
	C - R619 S	11.25	1.67	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	11.23	0.00
	B - L5361	2.08	0.00	0.61	0.00
	C - R619 S	11.25	1.69	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	9.19	0.00
	B - L5361	1.06	0.00	0.61	0.00
	C - R619 S	14.32	0.65	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:00 - 10:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.85	14.32	0.00
	B - L5361	2.92	0.00	0.50	0.00
	C - R619 S	11.21	0.41	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.85	9.21	1.02
	B - L5361	0.87	0.00	0.50	0.00
	C - R619 S	12.25	0.41	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.88	10.21	0.00
	B - L5361	0.87	0.00	0.50	0.00
	C - R619 S	9.19	0.41	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.85	14.28	0.00
	B - L5361	0.87	0.00	0.50	0.00
	C - R619 S	18.40	0.41	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.88	11.28	0.00
	B - L5361	1.79	0.00	0.45	0.00
	C - R619 S	10.21	0.43	0.00	1.02
	D - Local Access	0.00	0.00	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.88	7.13	0.00
	B - L5361	1.81	0.00	0.45	0.00
	C - R619 S	14.28	0.43	0.00	0.00
	D - Local Access	0.00	1.02	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.92	18.38	0.00
	B - L5361	1.79	0.00	0.45	0.00
	C - R619 S	16.34	0.43	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.88	15.32	0.00
	B - L5361	1.81	0.00	0.45	0.00
	C - R619 S	9.19	0.43	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.67	11.21	0.00
	B - L5361	1.79	0.00	2.49	0.00
	C - R619 S	13.25	0.32	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:15 - 12:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.69	14.32	0.00
	B - L5361	0.78	0.00	0.45	0.00
	C - R619 S	9.21	1.34	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.65	10.21	0.00
	B - L5361	1.81	0.00	0.45	0.00
	C - R619 S	11.25	0.32	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:45 - 13:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.65	9.21	0.00
	B - L5361	0.78	0.00	0.45	0.00
	C - R619 S	10.25	0.32	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.09	7.13	0.00
	B - L5361	1.08	0.00	0.63	0.00
	C - R619 S	7.15	2.56	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.09	14.30	0.00
	B - L5361	2.10	0.00	1.64	0.00
	C - R619 S	11.25	1.54	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.07	5.09	0.00
	B - L5361	1.08	0.00	0.63	0.00
	C - R619 S	5.11	1.54	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:45 - 14:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.09	14.30	0.00
	B - L5361	2.10	0.00	0.63	0.00
	C - R619 S	10.23	0.52	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.21	17.42	0.00
	B - L5361	2.17	0.00	1.69	0.00
	C - R619 S	16.36	0.58	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

14:15 - 14:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.23	6.13	0.00
	B - L5361	1.15	0.00	0.67	0.00
	C - R619 S	11.21	1.60	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.19	4.08	0.00
	B - L5361	2.19	0.00	0.67	0.00
	C - R619 S	19.38	0.58	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

14:45 - 15:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.19	12.26	0.00
	B - L5361	1.15	0.00	1.70	0.00
	C - R619 S	19.42	0.58	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:00 - 15:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.03	13.25	1.02
	B - L5361	1.79	0.00	0.44	0.00
	C - R619 S	15.32	0.46	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:15 - 15:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.99	18.42	0.00
	B - L5361	1.79	0.00	1.46	0.00
	C - R619 S	16.30	0.46	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.97	10.19	0.00
	B - L5361	0.76	0.00	0.44	0.00
	C - R619 S	20.38	0.46	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.99	18.36	0.00
	B - L5361	0.76	0.00	1.46	0.00
	C - R619 S	13.26	1.48	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

16:00 - 16:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.78	22.42	1.02
	B - L5361	2.76	0.00	1.45	0.00
	C - R619 S	19.38	0.36	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.78	16.40	1.02
	B - L5361	0.71	0.00	0.41	0.00
	C - R619 S	19.42	1.38	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.80	18.38	0.00
	B - L5361	0.71	0.00	1.43	0.00
	C - R619 S	22.47	0.36	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.78	22.45	0.00
	B - L5361	2.96	0.00	0.53	0.00
	C - R619 S	26.53	1.38	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

17:00 - 17:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.31	25.53	1.02
	B - L5361	2.06	0.00	1.63	0.00
	C - R619 S	22.43	0.12	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:15 - 17:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.26	32.66	0.00
	B - L5361	1.04	0.00	0.61	0.00
	C - R619 S	34.66	0.12	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.30	21.40	0.00
	B - L5361	2.08	0.00	0.61	0.00
	C - R619 S	11.23	0.12	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.30	21.40	0.00
	B - L5361	0.85	0.00	2.53	0.00
	C - R619 S	15.28	1.14	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.56	16.30	0.00
	B - L5361	1.28	0.00	1.16	0.00
	C - R619 S	24.49	1.28	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.57	13.25	2.04
	B - L5361	0.24	0.00	0.14	0.00
	C - R619 S	20.38	1.28	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.57	9.17	0.00
	B - L5361	1.26	0.00	1.16	0.00
	C - R619 S	12.23	0.26	0.00	0.00
	D - Local Access	1.02	0.00	0.00	0.00

18:45 - 19:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.54	10.21	1.02
	B - L5361	2.30	0.00	1.16	0.00
	C - R619 S	13.25	2.30	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	96	0
	B - L5361	0	0	100	0
	C - R619 S	5	100	0	0
	D - Local Access	0	0	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	53	19	0
	B - L5361	94	0	100	0
	C - R619 S	33	100	0	0
	D - Local Access	0	0	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	55	0	100	0
	C - R619 S	9	100	0	0
	D - Local Access	0	0	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	38	0
	B - L5361	35	0	100	0
	C - R619 S	69	100	0	0
	D - Local Access	0	0	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	88	0
	B - L5361	55	0	0	0
	C - R619 S	0	9	0	0
	D - Local Access	0	0	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	25	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

09:00 - 09:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	3	0
	B - L5361	100	0	9	0
	C - R619 S	16	100	0	0
	D - Local Access	0	0	0	0

09:15 - 09:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	95	0
	B - L5361	41	0	100	0
	C - R619 S	15	24	0	0
	D - Local Access	0	0	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	0	0
	B - L5361	41	0	100	0
	C - R619 S	47	100	0	0
	D - Local Access	0	0	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	10	0
	B - L5361	55	0	100	0
	C - R619 S	33	100	0	0
	D - Local Access	0	0	0	0

10:00 - 10:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	0	0
	B - L5361	25	0	100	0
	C - R619 S	20	100	0	0
	D - Local Access	0	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	100	0	100	0
	C - R619 S	1	100	0	0
	D - Local Access	0	0	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	27	0
	B - L5361	100	0	100	0
	C - R619 S	100	100	0	0
	D - Local Access	0	0	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	93	0
	B - L5361	100	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	39	0	100	0
	C - R619 S	39	100	0	0
	D - Local Access	0	0	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	100	0
	B - L5361	100	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	89	11	0
	B - L5361	0	0	100	0
	C - R619 S	25	100	0	0
	D - Local Access	0	0	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	23	0
	B - L5361	0	0	100	0
	C - R619 S	80	100	0	0
	D - Local Access	0	0	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	35	0	0
	B - L5361	0	0	0	0
	C - R619 S	72	100	0	0
	D - Local Access	0	0	0	0

12:15 - 12:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	61	0
	B - L5361	100	0	100	0
	C - R619 S	21	0	0	0
	D - Local Access	0	0	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	37	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

12:45 - 13:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	100	0
	C - R619 S	24	100	0	0
	D - Local Access	0	0	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	38	0	0
	B - L5361	55	0	100	0
	C - R619 S	8	0	0	0
	D - Local Access	0	0	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	38	0	0
	B - L5361	90	0	10	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	55	0	100	0
	C - R619 S	67	100	0	0
	D - Local Access	0	0	0	0

13:45 - 14:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	38	0	0
	B - L5361	0	0	100	0
	C - R619 S	1	100	0	0
	D - Local Access	0	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	38	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

14:15 - 14:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	55	0	100	0
	C - R619 S	48	100	0	0
	D - Local Access	0	0	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	0	0	100	0
	C - R619 S	8	100	0	0
	D - Local Access	27	0	0	0

14:45 - 15:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	13	0
	C - R619 S	37	100	0	0
	D - Local Access	0	0	0	0

15:00 - 15:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	5	0
	B - L5361	95	0	100	0
	C - R619 S	23	100	0	0
	D - Local Access	0	0	0	0

15:15 - 15:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	0	0
	C - R619 S	38	100	0	0
	D - Local Access	0	0	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	89	100	0
	B - L5361	100	0	100	0
	C - R619 S	20	100	0	0
	D - Local Access	0	0	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	36	0	0
	B - L5361	100	0	0	0
	C - R619 S	0	87	0	0
	D - Local Access	0	0	0	0

16:00 - 16:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	23	0	27
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	35	47	27
	B - L5361	55	0	100	0
	C - R619 S	26	77	0	0
	D - Local Access	0	0	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	22	81	0
	B - L5361	55	0	0	0
	C - R619 S	34	100	0	0
	D - Local Access	0	0	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	100	0
	C - R619 S	20	77	0	0
	D - Local Access	0	0	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	15	0
	B - L5361	0	0	19	0
	C - R619 S	9	100	0	0
	D - Local Access	0	0	0	0

17:15 - 17:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	36	0
	B - L5361	47	0	100	0
	C - R619 S	100	100	0	0
	D - Local Access	0	0	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	7	0
	C - R619 S	27	48	0	0
	D - Local Access	0	0	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	38	0
	B - L5361	0	0	46	0
	C - R619 S	0	66	0	0
	D - Local Access	0	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	35	0
	B - L5361	55	0	100	0
	C - R619 S	7	0	0	0
	D - Local Access	0	0	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	0	0	46	0
	C - R619 S	86	100	0	0
	D - Local Access	0	0	0	0

18:45 - 19:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	11	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.02	11.79	0.0	B	0.94	45.34
B-AD	0.05	15.05	0.1	C	1.65	79.08
A-BCD	0.01	6.76	0.0	A	0.22	10.33
A-B					1.70	81.46
A-C					14.83	711.62
D-A	0.01	6.74	0.0	A	0.19	9.17
D-BC	0.01	8.37	0.0	A	0.06	3.06
C-ABD	0.02	10.17	0.0	B	0.96	46.03
C-D					0.04	2.03
C-A					15.98	766.98

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.51	0.51	80.47	0.006	0.51	0.0	0.0	11.256	B
B-AD	1.92	1.92	131.32	0.015	1.91	0.0	0.0	6.954	A
A-BCD	0.00	0.00	137.07	0.000	0.00	0.0	0.0	0.000	A
A-B	1.63	1.63			1.63				
A-C	18.40	18.40			18.40				
D-A	0.00	0.00	149.97	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.41	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.94	0.94	95.84	0.010	0.93	0.0	0.0	9.481	A
C-D	0.00	0.00			0.00				
C-A	15.13	15.13			15.13				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.53	1.53	163.05	0.009	1.53	0.0	0.0	6.959	A
B-AD	1.91	1.91	127.70	0.015	1.91	0.0	0.0	7.153	A
A-BCD	0.00	0.00	144.18	0.000	0.00	0.0	0.0	0.000	A
A-B	2.65	2.65			2.65				
A-C	20.40	20.40			20.40				
D-A	0.00	0.00	149.23	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.42	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.97	0.97	98.14	0.010	0.97	0.0	0.0	9.337	A
C-D	0.00	0.00			0.00				
C-A	18.17	18.17			18.17				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.51	0.51	77.23	0.007	0.52	0.0	0.0	7.407	A
B-AD	2.92	2.92	118.18	0.025	2.91	0.0	0.0	7.808	A
A-BCD	0.00	0.00	133.66	0.000	0.00	0.0	0.0	0.000	A
A-B	4.92	4.92			4.92				
A-C	18.43	18.43			18.43				
D-A	0.00	0.00	150.05	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.66	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.05	1.05	91.47	0.011	1.04	0.0	0.0	9.823	A
C-D	0.00	0.00			0.00				
C-A	13.09	13.09			13.09				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.53	1.53	81.14	0.019	1.52	0.0	0.0	11.302	B
B-AD	1.91	1.91	65.16	0.029	1.91	0.0	0.0	10.038	B
A-BCD	0.00	0.00	129.61	0.000	0.00	0.0	0.0	0.000	A
A-B	1.84	1.84			1.84				
A-C	20.43	20.43			20.43				
D-A	0.00	0.00	147.29	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.09	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.11	1.11	96.53	0.011	1.11	0.0	0.0	9.410	A
C-D	0.00	0.00			0.00				
C-A	18.20	18.20			18.20				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.56	1.56	79.52	0.020	1.56	0.0	0.0	11.544	B
B-AD	0.94	0.94	77.48	0.012	0.94	0.0	0.0	13.692	B
A-BCD	0.00	0.00	125.05	0.000	0.00	0.0	0.0	0.000	A
A-B	1.31	1.31			1.31				
A-C	19.40	19.40			19.40				
D-A	0.00	0.00	147.33	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.83	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.83	0.83	102.86	0.008	0.84	0.0	0.0	9.074	A
C-D	0.00	0.00			0.00				
C-A	24.27	24.27			24.27				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.54	0.54	76.92	0.007	0.56	0.0	0.0	11.787	B
B-AD	2.99	2.99	87.66	0.034	2.97	0.0	0.0	11.006	B
A-BCD	0.00	0.00	115.93	0.000	0.00	0.0	0.0	0.000	A
A-B	1.31	1.31			1.31				
A-C	18.34	18.34			18.34				
D-A	0.00	0.00	144.37	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	105.32	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.81	0.81	97.33	0.008	0.81	0.0	0.0	8.960	A
C-D	0.00	0.00			0.00				
C-A	21.23	21.23			21.23				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.58	1.58	163.78	0.010	1.58	0.0	0.0	6.953	A
B-AD	0.94	0.94	79.80	0.012	0.96	0.0	0.0	10.333	B
A-BCD	0.00	0.00	109.95	0.000	0.00	0.0	0.0	0.000	A
A-B	1.09	1.09			1.09				
A-C	14.28	14.28			14.28				
D-A	0.00	0.00	147.35	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.87	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.84	1.84	167.80	0.011	1.83	0.0	0.0	6.733	A
C-D	0.00	0.00			0.00				
C-A	26.22	26.22			26.22				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.56	1.56	81.60	0.019	1.56	0.0	0.0	8.408	A
B-AD	4.03	4.03	127.15	0.032	4.01	0.0	0.0	8.077	A
A-BCD	0.00	0.00	124.27	0.000	0.00	0.0	0.0	0.000	A
A-B	3.15	3.15			3.15				
A-C	19.40	19.40			19.40				
D-A	0.00	0.00	108.66	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.02	1.02	115.03	0.009	1.01	0.0	0.0	7.893	A
C-ABD	0.68	0.68	102.24	0.007	0.69	0.0	0.0	6.363	A
C-D	1.01	1.01			1.01				
C-A	21.29	21.29			21.29				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.63	1.63	150.50	0.011	1.63	0.0	0.0	8.505	A
B-AD	1.06	1.06	64.31	0.017	1.08	0.0	0.0	8.686	A
A-BCD	0.00	0.00	127.92	0.000	0.00	0.0	0.0	0.000	A
A-B	1.34	1.34			1.34				
A-C	16.32	16.32			16.32				
D-A	1.02	1.02	145.96	0.007	1.01	0.0	0.0	6.208	A
D-BC	1.02	1.02	108.53	0.009	1.02	0.0	0.0	8.371	A
C-ABD	0.86	0.86	103.59	0.008	0.86	0.0	0.0	8.726	A
C-D	0.00	0.00			0.00				
C-A	25.26	25.26			25.26				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	78.62	0.008	0.62	0.0	0.0	7.777	A
B-AD	3.10	3.10	95.57	0.032	3.07	0.0	0.0	11.165	B
A-BCD	1.11	1.11	157.94	0.007	1.10	0.0	0.0	5.737	A
A-B	1.33	1.33			1.33				
A-C	11.19	11.19			11.19				
D-A	1.02	1.02	154.17	0.007	1.02	0.0	0.0	5.878	A
D-BC	0.00	0.00	84.23	0.000	0.01	0.0	0.0	0.000	A
C-ABD	1.81	1.81	140.61	0.013	1.81	0.0	0.0	7.425	A
C-D	0.00	0.00			0.00				
C-A	11.10	11.10			11.10				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	80.27	0.008	0.61	0.0	0.0	11.297	B
B-AD	2.08	2.08	87.50	0.024	2.09	0.0	0.0	9.940	A
A-BCD	0.00	0.00	142.26	0.000	0.01	0.0	0.0	0.000	A
A-B	1.34	1.34			1.34				
A-C	11.23	11.23			11.23				
D-A	0.00	0.00	153.51	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.59	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.92	1.92	92.88	0.021	1.92	0.0	0.0	8.149	A
C-D	0.00	0.00			0.00				
C-A	11.01	11.01			11.01				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	82.95	0.007	0.61	0.0	0.0	10.930	B
B-AD	1.06	1.06	84.66	0.013	1.07	0.0	0.0	10.146	B
A-BCD	0.00	0.00	118.51	0.000	0.00	0.0	0.0	0.000	A
A-B	1.34	1.34			1.34				
A-C	9.19	9.19			9.19				
D-A	0.00	0.00	149.10	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.73	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.77	0.77	95.29	0.008	0.78	0.0	0.0	9.654	A
C-D	0.00	0.00			0.00				
C-A	14.20	14.20			14.20				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	78.47	0.006	0.50	0.0	0.0	11.544	B
B-AD	2.92	2.92	99.51	0.029	2.90	0.0	0.0	9.907	A
A-BCD	0.00	0.00	127.54	0.000	0.00	0.0	0.0	0.000	A
A-B	0.85	0.85			0.85				
A-C	14.32	14.32			14.32				
D-A	0.00	0.00	150.00	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.16	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.47	0.47	92.89	0.005	0.47	0.0	0.0	9.727	A
C-D	0.00	0.00			0.00				
C-A	11.15	11.15			11.15				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	80.81	0.006	0.50	0.0	0.0	11.206	B
B-AD	0.87	0.87	66.74	0.013	0.89	0.0	0.0	9.822	A
A-BCD	1.09	1.09	157.59	0.007	1.08	0.0	0.0	5.784	A
A-B	0.84	0.84			0.84				
A-C	9.14	9.14			9.14				
D-A	0.00	0.00	150.71	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.86	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.47	0.47	93.48	0.005	0.47	0.0	0.0	9.759	A
C-D	0.00	0.00			0.00				
C-A	12.18	12.18			12.18				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	81.57	0.006	0.50	0.0	0.0	11.103	B
B-AD	0.87	0.87	66.03	0.013	0.86	0.0	0.0	13.810	B
A-BCD	0.00	0.00	143.78	0.000	0.01	0.0	0.0	0.000	A
A-B	1.88	1.88			1.88				
A-C	10.21	10.21			10.21				
D-A	1.02	1.02	153.35	0.007	1.01	0.0	0.0	5.907	A
D-BC	0.00	0.00	84.32	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.46	0.46	90.03	0.005	0.46	0.0	0.0	9.721	A
C-D	0.00	0.00			0.00				
C-A	9.14	9.14			9.14				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	79.62	0.006	0.50	0.0	0.0	11.374	B
B-AD	0.87	0.87	64.14	0.014	0.87	0.0	0.0	14.223	B
A-BCD	0.00	0.00	110.56	0.000	0.00	0.0	0.0	0.000	A
A-B	0.85	0.85			0.85				
A-C	14.28	14.28			14.28				
D-A	0.00	0.00	153.35	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.79	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.51	0.51	97.26	0.005	0.51	0.0	0.0	9.759	A
C-D	0.00	0.00			0.00				
C-A	18.30	18.30			18.30				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	78.42	0.006	0.45	0.0	0.0	11.545	B
B-AD	1.79	1.79	87.43	0.020	1.78	0.0	0.0	12.005	B
A-BCD	0.00	0.00	106.50	0.000	0.00	0.0	0.0	0.000	A
A-B	0.88	0.88			0.88				
A-C	11.28	11.28			11.28				
D-A	0.00	0.00	149.99	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.93	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.49	0.49	91.43	0.005	0.49	0.0	0.0	9.610	A
C-D	1.01	1.01			1.01				
C-A	10.15	10.15			10.15				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	78.13	0.006	0.45	0.0	0.0	11.588	B
B-AD	1.81	1.81	62.60	0.029	1.81	0.0	0.0	12.550	B
A-BCD	0.00	0.00	109.14	0.000	0.00	0.0	0.0	0.000	A
A-B	0.88	0.88			0.88				
A-C	7.13	7.13			7.13				
D-A	0.00	0.00	110.09	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.02	1.02	118.03	0.009	1.01	0.0	0.0	7.691	A
C-ABD	0.50	0.50	95.62	0.005	0.50	0.0	0.0	9.639	A
C-D	0.00	0.00			0.00				
C-A	14.21	14.21			14.21				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	79.83	0.006	0.45	0.0	0.0	11.340	B
B-AD	1.79	1.79	119.09	0.015	1.80	0.0	0.0	11.457	B
A-BCD	0.00	0.00	114.74	0.000	0.00	0.0	0.0	0.000	A
A-B	1.92	1.92			1.92				
A-C	18.38	18.38			18.38				
D-A	0.00	0.00	109.55	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	115.78	0.000	0.01	0.0	0.0	0.000	A
C-ABD	0.52	0.52	95.60	0.005	0.52	0.0	0.0	9.412	A
C-D	0.00	0.00			0.00				
C-A	16.25	16.25			16.25				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	80.15	0.006	0.45	0.0	0.0	11.292	B
B-AD	1.81	1.81	121.89	0.015	1.82	0.0	0.0	7.498	A
A-BCD	0.00	0.00	116.38	0.000	0.00	0.0	0.0	0.000	A
A-B	0.88	0.88			0.88				
A-C	15.32	15.32			15.32				
D-A	0.00	0.00	149.69	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.18	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.48	0.48	89.61	0.005	0.48	0.0	0.0	9.812	A
C-D	0.00	0.00			0.00				
C-A	9.14	9.14			9.14				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.49	2.49	170.55	0.015	2.48	0.0	0.0	6.175	A
B-AD	1.79	1.79	126.17	0.014	1.80	0.0	0.0	7.235	A
A-BCD	0.00	0.00	126.22	0.000	0.00	0.0	0.0	0.000	A
A-B	1.67	1.67			1.67				
A-C	11.21	11.21			11.21				
D-A	0.00	0.00	148.19	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.81	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.37	0.37	93.39	0.004	0.37	0.0	0.0	9.729	A
C-D	0.00	0.00			0.00				
C-A	13.19	13.19			13.19				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	81.81	0.006	0.46	0.0	0.0	6.485	A
B-AD	0.78	0.78	65.82	0.012	0.78	0.0	0.0	9.054	A
A-BCD	0.00	0.00	131.50	0.000	0.00	0.0	0.0	0.000	A
A-B	1.69	1.69			1.69				
A-C	14.32	14.32			14.32				
D-A	0.00	0.00	151.08	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.87	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.41	1.41	170.37	0.008	1.41	0.0	0.0	6.356	A
C-D	0.00	0.00			0.00				
C-A	9.13	9.13			9.13				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	80.03	0.006	0.45	0.0	0.0	11.308	B
B-AD	1.81	1.81	91.19	0.020	1.80	0.0	0.0	11.448	B
A-BCD	0.00	0.00	127.34	0.000	0.00	0.0	0.0	0.000	A
A-B	0.65	0.65			0.65				
A-C	10.21	10.21			10.21				
D-A	0.00	0.00	150.81	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.46	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.36	0.36	95.15	0.004	0.37	0.0	0.0	6.076	A
C-D	0.00	0.00			0.00				
C-A	11.20	11.20			11.20				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	82.09	0.005	0.45	0.0	0.0	11.024	B
B-AD	0.78	0.78	67.69	0.012	0.79	0.0	0.0	10.578	B
A-BCD	0.00	0.00	125.36	0.000	0.00	0.0	0.0	0.000	A
A-B	0.65	0.65			0.65				
A-C	9.21	9.21			9.21				
D-A	0.00	0.00	150.69	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.50	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.36	0.36	92.69	0.004	0.36	0.0	0.0	9.654	A
C-D	0.00	0.00			0.00				
C-A	10.21	10.21			10.21				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.63	0.63	83.36	0.008	0.62	0.0	0.0	10.878	B
B-AD	1.08	1.08	85.63	0.013	1.07	0.0	0.0	11.931	B
A-BCD	0.00	0.00	133.77	0.000	0.00	0.0	0.0	0.000	A
A-B	2.09	2.09			2.09				
A-C	7.13	7.13			7.13				
D-A	0.00	0.00	151.86	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	114.63	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.67	2.67	173.72	0.015	2.65	0.0	0.0	5.826	A
C-D	0.00	0.00			0.00				
C-A	7.04	7.04			7.04				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.64	1.64	144.98	0.011	1.64	0.0	0.0	7.687	A
B-AD	2.10	2.10	64.82	0.032	2.08	0.0	0.0	13.427	B
A-BCD	0.00	0.00	136.54	0.000	0.00	0.0	0.0	0.000	A
A-B	2.09	2.09			2.09				
A-C	14.30	14.30			14.30				
D-A	0.00	0.00	150.45	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.34	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.75	1.75	93.54	0.019	1.76	0.0	0.0	7.046	A
C-D	0.00	0.00			0.00				
C-A	11.03	11.03			11.03				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.63	0.63	83.72	0.008	0.63	0.0	0.0	7.353	A
B-AD	1.08	1.08	84.72	0.013	1.09	0.0	0.0	12.333	B
A-BCD	0.00	0.00	118.23	0.000	0.00	0.0	0.0	0.000	A
A-B	1.07	1.07			1.07				
A-C	5.09	5.09			5.09				
D-A	0.00	0.00	151.67	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	114.13	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.63	1.63	88.11	0.019	1.63	0.0	0.0	10.129	B
C-D	0.00	0.00			0.00				
C-A	5.02	5.02			5.02				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.63	0.63	81.38	0.008	0.62	0.0	0.0	11.144	B
B-AD	2.10	2.10	132.16	0.016	2.09	0.0	0.0	8.199	A
A-BCD	0.00	0.00	128.55	0.000	0.00	0.0	0.0	0.000	A
A-B	2.09	2.09			2.09				
A-C	14.30	14.30			14.30				
D-A	0.00	0.00	151.13	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.96	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.59	0.59	92.21	0.006	0.60	0.0	0.0	10.169	B
C-D	0.00	0.00			0.00				
C-A	10.16	10.16			10.16				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.69	1.69	84.98	0.020	1.67	0.0	0.0	10.802	B
B-AD	2.17	2.17	124.61	0.017	2.17	0.0	0.0	7.349	A
A-BCD	0.00	0.00	133.29	0.000	0.00	0.0	0.0	0.000	A
A-B	2.21	2.21			2.21				
A-C	17.42	17.42			17.42				
D-A	1.02	1.02	153.75	0.007	1.01	0.0	0.0	5.892	A
D-BC	0.00	0.00	83.99	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.70	0.70	96.82	0.007	0.70	0.0	0.0	9.495	A
C-D	0.00	0.00			0.00				
C-A	16.24	16.24			16.24				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.67	0.67	82.78	0.008	0.68	0.0	0.0	10.965	B
B-AD	1.15	1.15	84.34	0.014	1.16	0.0	0.0	8.336	A
A-BCD	0.00	0.00	127.81	0.000	0.00	0.0	0.0	0.000	A
A-B	2.23	2.23			2.23				
A-C	6.13	6.13			6.13				
D-A	0.00	0.00	153.80	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.66	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.82	1.82	92.40	0.020	1.80	0.0	0.0	9.781	A
C-D	0.00	0.00			0.00				
C-A	10.99	10.99			10.99				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.67	0.67	82.32	0.008	0.67	0.0	0.0	11.021	B
B-AD	2.19	2.19	132.02	0.017	2.18	0.0	0.0	8.244	A
A-BCD	0.00	0.00	112.74	0.000	0.00	0.0	0.0	0.000	A
A-B	1.19	1.19			1.19				
A-C	4.08	4.08			4.08				
D-A	1.02	1.02	120.33	0.008	1.01	0.0	0.0	6.738	A
D-BC	0.00	0.00	84.28	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.72	0.72	100.30	0.007	0.74	0.0	0.0	9.450	A
C-D	0.00	0.00			0.00				
C-A	19.23	19.23			19.23				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.70	1.70	146.47	0.012	1.70	0.0	0.0	7.552	A
B-AD	1.15	1.15	64.74	0.018	1.16	0.0	0.0	9.543	A
A-BCD	0.00	0.00	115.97	0.000	0.00	0.0	0.0	0.000	A
A-B	1.19	1.19			1.19				
A-C	12.26	12.26			12.26				
D-A	0.00	0.00	119.18	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.87	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.72	0.72	98.76	0.007	0.72	0.0	0.0	9.039	A
C-D	0.00	0.00			0.00				
C-A	19.27	19.27			19.27				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.44	0.44	79.30	0.006	0.45	0.0	0.0	7.555	A
B-AD	1.79	1.79	63.70	0.028	1.78	0.0	0.0	14.692	B
A-BCD	1.13	1.13	162.92	0.007	1.12	0.0	0.0	5.724	A
A-B	3.01	3.01			3.01				
A-C	13.15	13.15			13.15				
D-A	0.00	0.00	139.37	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.48	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.55	0.55	95.79	0.006	0.55	0.0	0.0	9.448	A
C-D	0.00	0.00			0.00				
C-A	15.23	15.23			15.23				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.46	1.46	157.82	0.009	1.45	0.0	0.0	7.083	A
B-AD	1.79	1.79	60.78	0.030	1.79	0.0	0.0	15.048	C
A-BCD	0.00	0.00	150.81	0.000	0.01	0.0	0.0	0.000	A
A-B	1.99	1.99			1.99				
A-C	18.42	18.42			18.42				
D-A	0.00	0.00	143.01	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.49	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.56	0.56	95.64	0.006	0.56	0.0	0.0	9.423	A
C-D	0.00	0.00			0.00				
C-A	16.21	16.21			16.21				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.44	0.44	81.45	0.005	0.45	0.0	0.0	6.914	A
B-AD	0.76	0.76	64.52	0.012	0.77	0.0	0.0	14.120	B
A-BCD	0.00	0.00	122.15	0.000	0.00	0.0	0.0	0.000	A
A-B	1.97	1.97			1.97				
A-C	10.19	10.19			10.19				
D-A	0.00	0.00	145.37	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.97	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.58	0.58	98.84	0.006	0.58	0.0	0.0	9.301	A
C-D	0.00	0.00			0.00				
C-A	20.26	20.26			20.26				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.46	1.46	165.46	0.009	1.45	0.0	0.0	6.754	A
B-AD	0.76	0.76	63.75	0.012	0.76	0.0	0.0	14.289	B
A-BCD	0.00	0.00	132.43	0.000	0.00	0.0	0.0	0.000	A
A-B	1.99	1.99			1.99				
A-C	18.36	18.36			18.36				
D-A	1.02	1.02	154.68	0.007	1.01	0.0	0.0	6.647	A
D-BC	0.00	0.00	84.56	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.71	1.71	99.90	0.017	1.70	0.0	0.0	9.273	A
C-D	0.00	0.00			0.00				
C-A	13.04	13.04			13.04				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.45	1.45	82.82	0.018	1.44	0.0	0.0	8.279	A
B-AD	2.76	2.76	125.02	0.022	2.75	0.0	0.0	8.944	A
A-BCD	1.25	1.25	138.49	0.009	1.24	0.0	0.0	5.991	A
A-B	2.75	2.75			2.75				
A-C	22.21	22.21			22.21				
D-A	0.00	0.00	152.84	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.52	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.45	0.45	99.02	0.005	0.47	0.0	0.0	8.964	A
C-D	0.00	0.00			0.00				
C-A	19.29	19.29			19.29				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.41	0.41	81.25	0.005	0.42	0.0	0.0	11.134	B
B-AD	0.71	0.71	82.40	0.009	0.73	0.0	0.0	7.998	A
A-BCD	1.18	1.18	130.71	0.009	1.18	0.0	0.0	6.755	A
A-B	1.76	1.76			1.76				
A-C	16.25	16.25			16.25				
D-A	0.00	0.00	147.92	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.34	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.68	1.68	107.78	0.016	1.67	0.0	0.0	8.608	A
C-D	0.00	0.00			0.00				
C-A	19.11	19.11			19.11				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	163.89	0.009	1.42	0.0	0.0	6.761	A
B-AD	0.71	0.71	77.29	0.009	0.70	0.0	0.0	11.750	B
A-BCD	0.00	0.00	116.03	0.000	0.01	0.0	0.0	0.000	A
A-B	2.80	2.80			2.80				
A-C	18.38	18.38			18.38				
D-A	0.00	0.00	146.54	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.06	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.47	0.47	98.81	0.005	0.48	0.0	0.0	8.526	A
C-D	0.00	0.00			0.00				
C-A	22.36	22.36			22.36				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.53	0.53	76.69	0.007	0.54	0.0	0.0	7.562	A
B-AD	2.96	2.96	60.03	0.049	2.92	0.0	0.0	15.042	C
A-BCD	0.00	0.00	129.32	0.000	0.00	0.0	0.0	0.000	A
A-B	1.78	1.78			1.78				
A-C	22.45	22.45			22.45				
D-A	1.02	1.02	148.96	0.007	1.01	0.0	0.0	6.082	A
D-BC	0.00	0.00	80.40	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.80	1.80	113.69	0.016	1.78	0.0	0.0	8.257	A
C-D	0.00	0.00			0.00				
C-A	26.11	26.11			26.11				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.63	1.63	136.08	0.012	1.62	0.0	0.0	7.811	A
B-AD	2.06	2.06	121.33	0.017	2.08	0.0	0.0	11.837	B
A-BCD	1.22	1.22	168.47	0.007	1.21	0.0	0.0	6.087	A
A-B	2.30	2.30			2.30				
A-C	25.34	25.34			25.34				
D-A	0.00	0.00	151.71	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	81.20	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.16	0.16	101.61	0.002	0.18	0.0	0.0	8.277	A
C-D	0.00	0.00			0.00				
C-A	22.39	22.39			22.39				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	79.75	0.008	0.62	0.0	0.0	8.080	A
B-AD	1.04	1.04	63.10	0.017	1.06	0.0	0.0	9.765	A
A-BCD	0.00	0.00	145.42	0.000	0.01	0.0	0.0	0.000	A
A-B	0.26	0.26			0.26				
A-C	32.66	32.66			32.66				
D-A	0.00	0.00	145.22	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	105.35	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.18	0.18	110.16	0.002	0.18	0.0	0.0	8.405	A
C-D	0.00	0.00			0.00				
C-A	34.60	34.60			34.60				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	77.77	0.008	0.61	0.0	0.0	11.663	B
B-AD	2.08	2.08	80.83	0.026	2.06	0.0	0.0	12.810	B
A-BCD	0.00	0.00	135.65	0.000	0.00	0.0	0.0	0.000	A
A-B	2.30	2.30			2.30				
A-C	21.40	21.40			21.40				
D-A	0.00	0.00	147.95	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.08	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.14	0.14	89.25	0.002	0.14	0.0	0.0	9.218	A
C-D	0.00	0.00			0.00				
C-A	11.21	11.21			11.21				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.53	2.53	157.36	0.016	2.52	0.0	0.0	6.791	A
B-AD	0.85	0.85	62.02	0.014	0.86	0.0	0.0	12.027	B
A-BCD	0.00	0.00	129.00	0.000	0.00	0.0	0.0	0.000	A
A-B	1.30	1.30			1.30				
A-C	21.40	21.40			21.40				
D-A	1.02	1.02	153.11	0.007	1.01	0.0	0.0	5.917	A
D-BC	0.00	0.00	83.19	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.31	1.31	122.68	0.011	1.30	0.0	0.0	7.690	A
C-D	0.00	0.00			0.00				
C-A	15.12	15.12			15.12				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.16	1.16	115.00	0.010	1.17	0.0	0.0	6.470	A
B-AD	1.28	1.28	121.83	0.010	1.28	0.0	0.0	10.387	B
A-BCD	0.00	0.00	133.03	0.000	0.00	0.0	0.0	0.000	A
A-B	1.56	1.56			1.56				
A-C	16.30	16.30			16.30				
D-A	0.00	0.00	151.94	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.41	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.61	1.61	119.19	0.014	1.61	0.0	0.0	7.494	A
C-D	0.00	0.00			0.00				
C-A	24.16	24.16			24.16				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.14	0.14	83.45	0.002	0.15	0.0	0.0	8.348	A
B-AD	0.24	0.24	84.62	0.003	0.25	0.0	0.0	7.641	A
A-BCD	2.26	2.26	161.37	0.014	2.24	0.0	0.0	5.645	A
A-B	2.54	2.54			2.54				
A-C	13.06	13.06			13.06				
D-A	0.00	0.00	148.79	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.74	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.45	1.45	178.28	0.008	1.45	0.0	0.0	6.443	A
C-D	0.00	0.00			0.00				
C-A	20.21	20.21			20.21				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.16	1.16	116.96	0.010	1.15	0.0	0.0	8.078	A
B-AD	1.26	1.26	126.69	0.010	1.25	0.0	0.0	7.808	A
A-BCD	0.00	0.00	147.80	0.000	0.02	0.0	0.0	0.000	A
A-B	1.57	1.57			1.57				
A-C	9.17	9.17			9.17				
D-A	1.02	1.02	152.39	0.007	1.01	0.0	0.0	5.945	A
D-BC	0.00	0.00	83.94	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.30	0.30	94.21	0.003	0.31	0.0	0.0	5.783	A
C-D	0.00	0.00			0.00				
C-A	12.19	12.19			12.19				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.16	1.16	84.28	0.014	1.16	0.0	0.0	9.382	A
B-AD	2.30	2.30	129.22	0.018	2.29	0.0	0.0	7.090	A
A-BCD	1.09	1.09	160.58	0.007	1.08	0.0	0.0	5.710	A
A-B	0.53	0.53			0.53				
A-C	10.14	10.14			10.14				
D-A	0.00	0.00	154.50	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	85.10	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.48	2.48	177.20	0.014	2.47	0.0	0.0	5.700	A
C-D	0.00	0.00			0.00				
C-A	13.06	13.06			13.06				

+5 + Adj+Dev, 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	A - R619 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - R619 S - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	D - Local Access - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Glannoge Cross	Right-Left Stagger	Two-way		1.50	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D11	+5 + Adj+Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D3+D5+D6

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - R619 N		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - R619 S		DIRECT	✓	100.000
D - Local Access		DIRECT	✓	100.000

Origin-Destination Data

Demand (Veh/TS)

07:00 - 07:15

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.63	20.28	0.00
	B - L5361	2.11	0.00	0.51	0.00
	C - R619 S	16.62	0.79	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

Demand (Veh/TS)

07:15 - 07:30

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.74	22.27	0.00
	B - L5361	1.99	0.00	1.62	0.00
	C - R619 S	20.05	0.79	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	5.28	20.51	0.00
	B - L5361	3.10	0.00	0.51	0.00
	C - R619 S	14.40	0.89	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.84	22.50	0.00
	B - L5361	1.99	0.00	1.62	0.00
	C - R619 S	20.40	0.89	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:00 - 08:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.31	21.28	0.00
	B - L5361	0.94	0.00	1.65	0.00
	C - R619 S	26.70	0.63	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:15 - 08:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.31	19.94	0.00
	B - L5361	3.27	0.00	0.54	0.00
	C - R619 S	23.38	0.63	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.09	15.62	0.00
	B - L5361	0.94	0.00	1.77	0.00
	C - R619 S	28.91	1.64	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.42	21.28	0.00
	B - L5361	4.49	0.00	1.65	0.00
	C - R619 S	23.49	0.53	0.00	1.11
	D - Local Access	0.00	0.00	1.11	0.00

09:00 - 09:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	17.84	0.00
	B - L5361	1.06	0.00	1.72	0.00
	C - R619 S	27.69	0.65	0.00	0.00
	D - Local Access	1.11	0.00	1.11	0.00

09:15 - 09:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	12.53	1.11
	B - L5361	2.17	0.00	0.61	1.11
	C - R619 S	12.41	1.76	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	12.30	0.00
	B - L5361	2.17	0.00	0.61	0.00
	C - R619 S	12.41	1.87	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	10.08	0.00
	B - L5361	1.06	0.00	0.61	0.00
	C - R619 S	15.85	0.65	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:00 - 10:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.85	15.85	0.00
	B - L5361	3.20	0.00	0.50	0.00
	C - R619 S	12.18	0.41	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.85	10.20	1.11
	B - L5361	0.87	0.00	0.50	0.00
	C - R619 S	13.41	0.41	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.07	11.19	0.00
	B - L5361	0.87	0.00	0.50	0.00
	C - R619 S	10.08	0.41	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.85	15.62	0.00
	B - L5361	0.87	0.00	0.50	0.00
	C - R619 S	20.28	0.41	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.88	12.64	0.00
	B - L5361	1.88	0.00	0.45	0.00
	C - R619 S	11.19	0.43	0.00	1.11
	D - Local Access	0.00	0.00	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.88	7.75	0.00
	B - L5361	2.00	0.00	0.45	0.00
	C - R619 S	15.62	0.43	0.00	0.00
	D - Local Access	0.00	1.11	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.10	20.17	0.00
	B - L5361	1.88	0.00	0.45	0.00
	C - R619 S	17.95	0.43	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.88	16.85	0.00
	B - L5361	2.00	0.00	0.45	0.00
	C - R619 S	10.08	0.43	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.76	12.18	0.00
	B - L5361	1.88	0.00	2.67	0.00
	C - R619 S	14.40	0.32	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:15 - 12:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.88	15.85	0.00
	B - L5361	0.78	0.00	0.45	0.00
	C - R619 S	10.20	1.42	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.65	11.19	0.00
	B - L5361	2.00	0.00	0.45	0.00
	C - R619 S	12.41	0.32	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:45 - 13:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.65	10.20	0.00
	B - L5361	0.78	0.00	0.45	0.00
	C - R619 S	11.42	0.32	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.18	7.75	0.00
	B - L5361	1.08	0.00	0.63	0.00
	C - R619 S	7.87	2.74	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.18	15.74	0.00
	B - L5361	2.19	0.00	1.73	0.00
	C - R619 S	12.41	1.63	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.07	5.54	0.00
	B - L5361	1.08	0.00	0.63	0.00
	C - R619 S	5.65	1.63	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:45 - 14:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.18	15.74	0.00
	B - L5361	2.19	0.00	0.63	0.00
	C - R619 S	11.31	0.52	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.30	19.40	0.00
	B - L5361	2.26	0.00	1.77	0.00
	C - R619 S	18.07	0.58	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

14:15 - 14:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.41	6.76	0.00
	B - L5361	1.15	0.00	0.67	0.00
	C - R619 S	12.18	1.68	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.19	4.43	0.00
	B - L5361	2.37	0.00	0.67	0.00
	C - R619 S	21.16	0.58	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

14:45 - 15:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.19	13.52	0.00
	B - L5361	1.15	0.00	1.89	0.00
	C - R619 S	21.39	0.58	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:00 - 15:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.40	14.40	1.11
	B - L5361	1.98	0.00	0.44	0.00
	C - R619 S	16.85	0.46	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:15 - 15:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.18	20.40	0.00
	B - L5361	1.98	0.00	1.55	0.00
	C - R619 S	17.72	0.46	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.06	11.08	0.00
	B - L5361	0.76	0.00	0.44	0.00
	C - R619 S	22.15	0.46	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.18	20.05	0.00
	B - L5361	0.76	0.00	1.55	0.00
	C - R619 S	14.51	1.57	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

16:00 - 16:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.96	24.37	1.11
	B - L5361	3.04	0.00	1.63	0.00
	C - R619 S	21.16	0.36	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.96	18.30	1.11
	B - L5361	0.71	0.00	0.41	0.00
	C - R619 S	21.39	1.47	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.07	20.17	0.00
	B - L5361	0.71	0.00	1.52	0.00
	C - R619 S	24.71	0.36	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.96	24.60	0.00
	B - L5361	3.23	0.00	0.53	0.00
	C - R619 S	29.03	1.47	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

17:00 - 17:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.59	28.04	1.11
	B - L5361	2.15	0.00	1.72	0.00
	C - R619 S	24.48	0.12	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:15 - 17:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.26	35.79	0.00
	B - L5361	1.04	0.00	0.61	0.00
	C - R619 S	37.78	0.12	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.47	23.26	0.00
	B - L5361	2.26	0.00	0.61	0.00
	C - R619 S	12.30	0.12	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.48	23.26	0.00
	B - L5361	0.85	0.00	2.71	0.00
	C - R619 S	16.62	1.23	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.64	17.72	0.00
	B - L5361	1.46	0.00	1.25	0.00
	C - R619 S	26.81	1.37	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.75	14.40	2.22
	B - L5361	0.24	0.00	0.14	0.00
	C - R619 S	22.15	1.37	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.76	9.97	0.00
	B - L5361	1.35	0.00	1.25	0.00
	C - R619 S	13.29	0.26	0.00	0.00
	D - Local Access	1.11	0.00	0.00	0.00

18:45 - 19:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.54	11.19	1.11
	B - L5361	2.57	0.00	1.25	0.00
	C - R619 S	14.40	2.48	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	97	0
	B - L5361	0	0	100	0
	C - R619 S	7	100	0	0
	D - Local Access	0	0	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	53	18	0
	B - L5361	100	0	100	0
	C - R619 S	36	100	0	0
	D - Local Access	0	0	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	55	0	100	0
	C - R619 S	10	100	0	0
	D - Local Access	0	0	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	40	0
	B - L5361	30	0	100	0
	C - R619 S	68	100	0	0
	D - Local Access	0	0	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	88	0
	B - L5361	55	0	0	0
	C - R619 S	0	3	0	0
	D - Local Access	0	0	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

09:00 - 09:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	2	0
	B - L5361	100	0	3	0
	C - R619 S	16	100	0	0
	D - Local Access	0	0	0	0

09:15 - 09:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	91	0
	B - L5361	41	0	100	0
	C - R619 S	13	18	0	0
	D - Local Access	0	0	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	0	0
	B - L5361	41	0	100	0
	C - R619 S	46	100	0	0
	D - Local Access	0	0	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	11	0
	B - L5361	55	0	100	0
	C - R619 S	32	100	0	0
	D - Local Access	0	0	0	0

10:00 - 10:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	0	0
	B - L5361	27	0	100	0
	C - R619 S	25	100	0	0
	D - Local Access	0	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	100	0	100	0
	C - R619 S	4	100	0	0
	D - Local Access	0	0	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	26	0
	B - L5361	100	0	100	0
	C - R619 S	100	100	0	0
	D - Local Access	0	0	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	96	0
	B - L5361	100	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	38	0	100	0
	C - R619 S	38	100	0	0
	D - Local Access	0	0	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	100	0
	B - L5361	100	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	92	11	0
	B - L5361	0	0	100	0
	C - R619 S	25	100	0	0
	D - Local Access	0	0	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	24	0
	B - L5361	0	0	100	0
	C - R619 S	80	100	0	0
	D - Local Access	0	0	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	35	0	0
	B - L5361	0	0	0	0
	C - R619 S	75	100	0	0
	D - Local Access	0	0	0	0

12:15 - 12:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	59	0
	B - L5361	100	0	100	0
	C - R619 S	22	0	0	0
	D - Local Access	0	0	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	30	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

12:45 - 13:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	100	0
	C - R619 S	22	100	0	0
	D - Local Access	0	0	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	37	0	0
	B - L5361	55	0	100	0
	C - R619 S	7	0	0	0
	D - Local Access	0	0	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	37	0	0
	B - L5361	100	0	4	0
	C - R619 S	1	100	0	0
	D - Local Access	0	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	55	0	100	0
	C - R619 S	71	100	0	0
	D - Local Access	0	0	0	0

13:45 - 14:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	37	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	38	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

14:15 - 14:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	55	0	100	0
	C - R619 S	49	100	0	0
	D - Local Access	0	0	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	0	0	100	0
	C - R619 S	11	100	0	0
	D - Local Access	27	0	0	0

14:45 - 15:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	2	0
	C - R619 S	37	100	0	0
	D - Local Access	0	0	0	0

15:00 - 15:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	7	0
	B - L5361	97	0	100	0
	C - R619 S	24	100	0	0
	D - Local Access	0	0	0	0

15:15 - 15:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	0	0
	C - R619 S	41	100	0	0
	D - Local Access	0	0	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	100	0	100	0
	C - R619 S	20	100	0	0
	D - Local Access	0	0	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	30	0	0
	B - L5361	100	0	0	0
	C - R619 S	0	83	0	0
	D - Local Access	0	0	0	0

16:00 - 16:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	30	0	27
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	28	45	27
	B - L5361	55	0	100	0
	C - R619 S	25	74	0	0
	D - Local Access	0	0	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	25	81	0
	B - L5361	55	0	0	0
	C - R619 S	35	100	0	0
	D - Local Access	0	0	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	100	0
	C - R619 S	20	74	0	0
	D - Local Access	0	0	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	15	0
	B - L5361	0	0	13	0
	C - R619 S	9	100	0	0
	D - Local Access	0	0	0	0

17:15 - 17:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	38	0
	B - L5361	40	0	100	0
	C - R619 S	100	100	0	0
	D - Local Access	0	0	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	4	0
	C - R619 S	27	46	0	0
	D - Local Access	0	0	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	41	0
	B - L5361	0	0	45	0
	C - R619 S	0	63	0	0
	D - Local Access	0	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	36	0
	B - L5361	55	0	100	0
	C - R619 S	7	0	0	0
	D - Local Access	0	0	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	0	0	45	0
	C - R619 S	89	100	0	0
	D - Local Access	0	0	0	0

18:45 - 19:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	12	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.02	11.87	0.0	B	0.99	47.49
B-AD	0.05	15.31	0.1	C	1.75	83.90
A-BCD	0.02	6.71	0.0	A	0.24	11.36
A-B					1.79	86.08
A-C					16.27	780.78
D-A	0.01	6.77	0.0	A	0.21	9.97
D-BC	0.01	8.44	0.0	A	0.07	3.32
C-ABD	0.02	10.15	0.0	B	1.01	48.50
C-D					0.05	2.20
C-A					17.49	839.56

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.51	0.51	79.81	0.006	0.51	0.0	0.0	11.349	B
B-AD	2.11	2.11	121.26	0.017	2.09	0.0	0.0	7.552	A
A-BCD	0.00	0.00	136.73	0.000	0.00	0.0	0.0	0.000	A
A-B	1.63	1.63			1.63				
A-C	20.28	20.28			20.28				
D-A	0.00	0.00	149.60	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.81	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.95	0.95	96.68	0.010	0.94	0.0	0.0	9.399	A
C-D	0.00	0.00			0.00				
C-A	16.45	16.45			16.45				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.62	1.62	162.62	0.010	1.62	0.0	0.0	6.924	A
B-AD	1.99	1.99	126.88	0.016	2.00	0.0	0.0	7.208	A
A-BCD	0.00	0.00	143.76	0.000	0.00	0.0	0.0	0.000	A
A-B	2.74	2.74			2.74				
A-C	22.27	22.27			22.27				
D-A	0.00	0.00	148.79	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.75	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.99	0.99	99.27	0.010	0.99	0.0	0.0	9.238	A
C-D	0.00	0.00			0.00				
C-A	19.85	19.85			19.85				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.51	0.51	76.49	0.007	0.52	0.0	0.0	7.418	A
B-AD	3.10	3.10	117.01	0.027	3.09	0.0	0.0	7.901	A
A-BCD	0.00	0.00	133.22	0.000	0.00	0.0	0.0	0.000	A
A-B	5.28	5.28			5.28				
A-C	20.51	20.51			20.51				
D-A	0.00	0.00	149.66	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.67	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.06	1.06	91.77	0.012	1.06	0.0	0.0	9.776	A
C-D	0.00	0.00			0.00				
C-A	14.23	14.23			14.23				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.62	1.62	80.68	0.020	1.61	0.0	0.0	11.377	B
B-AD	1.99	1.99	62.65	0.032	2.00	0.0	0.0	10.293	B
A-BCD	0.00	0.00	128.90	0.000	0.00	0.0	0.0	0.000	A
A-B	1.84	1.84			1.84				
A-C	22.50	22.50			22.50				
D-A	0.00	0.00	146.44	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.99	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.13	1.13	97.63	0.012	1.13	0.0	0.0	9.298	A
C-D	0.00	0.00			0.00				
C-A	20.16	20.16			20.16				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.65	1.65	79.35	0.021	1.65	0.0	0.0	11.582	B
B-AD	0.94	0.94	76.62	0.012	0.95	0.0	0.0	14.186	B
A-BCD	0.00	0.00	124.50	0.000	0.00	0.0	0.0	0.000	A
A-B	1.31	1.31			1.31				
A-C	21.28	21.28			21.28				
D-A	0.00	0.00	146.66	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.96	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.85	0.85	104.34	0.008	0.86	0.0	0.0	8.967	A
C-D	0.00	0.00			0.00				
C-A	26.48	26.48			26.48				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.54	0.54	76.39	0.007	0.56	0.0	0.0	11.871	B
B-AD	3.27	3.27	89.81	0.036	3.24	0.0	0.0	10.836	B
A-BCD	0.00	0.00	115.04	0.000	0.00	0.0	0.0	0.000	A
A-B	1.31	1.31			1.31				
A-C	19.94	19.94			19.94				
D-A	0.00	0.00	143.55	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	104.20	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.83	0.83	98.39	0.008	0.83	0.0	0.0	8.847	A
C-D	0.00	0.00			0.00				
C-A	23.18	23.18			23.18				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.77	1.77	164.07	0.011	1.76	0.0	0.0	6.838	A
B-AD	0.94	0.94	78.80	0.012	0.97	0.0	0.0	10.197	B
A-BCD	0.00	0.00	109.39	0.000	0.00	0.0	0.0	0.000	A
A-B	1.09	1.09			1.09				
A-C	15.62	15.62			15.62				
D-A	0.00	0.00	146.76	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.98	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.96	1.96	176.78	0.011	1.95	0.0	0.0	6.481	A
C-D	0.00	0.00			0.00				
C-A	28.59	28.59			28.59				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.65	1.65	81.03	0.020	1.65	0.0	0.0	8.397	A
B-AD	4.49	4.49	126.61	0.035	4.46	0.0	0.0	8.081	A
A-BCD	0.00	0.00	123.39	0.000	0.00	0.0	0.0	0.000	A
A-B	3.42	3.42			3.42				
A-C	21.28	21.28			21.28				
D-A	0.00	0.00	108.18	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.11	1.11	114.10	0.010	1.10	0.0	0.0	7.964	A
C-ABD	0.70	0.70	103.76	0.007	0.71	0.0	0.0	6.099	A
C-D	1.10	1.10			1.10				
C-A	23.33	23.33			23.33				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.72	1.72	158.13	0.011	1.72	0.0	0.0	8.376	A
B-AD	1.06	1.06	64.00	0.017	1.09	0.0	0.0	8.621	A
A-BCD	0.00	0.00	127.23	0.000	0.00	0.0	0.0	0.000	A
A-B	1.34	1.34			1.34				
A-C	17.84	17.84			17.84				
D-A	1.11	1.11	145.25	0.008	1.10	0.0	0.0	6.243	A
D-BC	1.11	1.11	107.71	0.010	1.11	0.0	0.0	8.442	A
C-ABD	0.88	0.88	105.10	0.008	0.88	0.0	0.0	8.591	A
C-D	0.00	0.00			0.00				
C-A	27.46	27.46			27.46				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	78.28	0.008	0.62	0.0	0.0	7.520	A
B-AD	3.27	3.27	95.72	0.034	3.24	0.0	0.0	11.135	B
A-BCD	1.21	1.21	158.24	0.008	1.21	0.0	0.0	5.730	A
A-B	1.33	1.33			1.33				
A-C	12.43	12.43			12.43				
D-A	1.11	1.11	153.85	0.007	1.11	0.0	0.0	5.894	A
D-BC	0.00	0.00	83.80	0.000	0.01	0.0	0.0	0.000	A
C-ABD	1.92	1.92	147.85	0.013	1.91	0.0	0.0	7.163	A
C-D	0.00	0.00			0.00				
C-A	12.25	12.25			12.25				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	79.98	0.008	0.61	0.0	0.0	11.339	B
B-AD	2.17	2.17	87.47	0.025	2.18	0.0	0.0	9.937	A
A-BCD	0.00	0.00	141.33	0.000	0.01	0.0	0.0	0.000	A
A-B	1.34	1.34			1.34				
A-C	12.30	12.30			12.30				
D-A	0.00	0.00	153.07	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.19	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.16	2.16	93.59	0.023	2.16	0.0	0.0	8.024	A
C-D	0.00	0.00			0.00				
C-A	12.13	12.13			12.13				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	82.80	0.007	0.61	0.0	0.0	10.950	B
B-AD	1.06	1.06	84.30	0.013	1.07	0.0	0.0	10.155	B
A-BCD	0.00	0.00	118.28	0.000	0.00	0.0	0.0	0.000	A
A-B	1.34	1.34			1.34				
A-C	10.08	10.08			10.08				
D-A	0.00	0.00	148.65	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.17	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.78	0.78	96.34	0.008	0.80	0.0	0.0	9.571	A
C-D	0.00	0.00			0.00				
C-A	15.72	15.72			15.72				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	77.91	0.006	0.50	0.0	0.0	11.629	B
B-AD	3.20	3.20	97.44	0.033	3.17	0.0	0.0	10.065	B
A-BCD	0.00	0.00	127.15	0.000	0.00	0.0	0.0	0.000	A
A-B	0.85	0.85			0.85				
A-C	15.85	15.85			15.85				
D-A	0.00	0.00	149.46	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.46	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.47	0.47	93.33	0.005	0.48	0.0	0.0	9.647	A
C-D	0.00	0.00			0.00				
C-A	12.12	12.12			12.12				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	80.54	0.006	0.50	0.0	0.0	11.244	B
B-AD	0.87	0.87	66.43	0.013	0.89	0.0	0.0	9.922	A
A-BCD	1.19	1.19	157.55	0.008	1.18	0.0	0.0	5.783	A
A-B	0.84	0.84			0.84				
A-C	10.12	10.12			10.12				
D-A	0.00	0.00	150.35	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.22	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.48	0.48	94.10	0.005	0.48	0.0	0.0	9.712	A
C-D	0.00	0.00			0.00				
C-A	13.34	13.34			13.34				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	81.41	0.006	0.50	0.0	0.0	11.124	B
B-AD	0.87	0.87	65.73	0.013	0.86	0.0	0.0	13.874	B
A-BCD	0.00	0.00	142.51	0.000	0.01	0.0	0.0	0.000	A
A-B	2.07	2.07			2.07				
A-C	11.19	11.19			11.19				
D-A	1.11	1.11	152.91	0.007	1.10	0.0	0.0	5.928	A
D-BC	0.00	0.00	83.89	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.46	0.46	90.42	0.005	0.46	0.0	0.0	9.657	A
C-D	0.00	0.00			0.00				
C-A	10.03	10.03			10.03				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	79.22	0.006	0.50	0.0	0.0	11.432	B
B-AD	0.87	0.87	63.59	0.014	0.87	0.0	0.0	14.348	B
A-BCD	0.00	0.00	109.98	0.000	0.00	0.0	0.0	0.000	A
A-B	0.85	0.85			0.85				
A-C	15.62	15.62			15.62				
D-A	0.00	0.00	152.88	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.16	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.52	0.52	98.40	0.005	0.52	0.0	0.0	9.688	A
C-D	0.00	0.00			0.00				
C-A	20.18	20.18			20.18				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	77.90	0.006	0.45	0.0	0.0	11.619	B
B-AD	1.88	1.88	87.24	0.022	1.87	0.0	0.0	12.018	B
A-BCD	0.00	0.00	106.14	0.000	0.00	0.0	0.0	0.000	A
A-B	0.88	0.88			0.88				
A-C	12.64	12.64			12.64				
D-A	0.00	0.00	149.65	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.25	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.49	0.49	91.91	0.005	0.49	0.0	0.0	9.533	A
C-D	1.10	1.10			1.10				
C-A	11.13	11.13			11.13				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	77.64	0.006	0.45	0.0	0.0	11.658	B
B-AD	2.00	2.00	62.41	0.032	2.00	0.0	0.0	12.656	B
A-BCD	0.00	0.00	108.78	0.000	0.00	0.0	0.0	0.000	A
A-B	0.88	0.88			0.88				
A-C	7.75	7.75			7.75				
D-A	0.00	0.00	109.76	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.11	1.11	117.45	0.009	1.10	0.0	0.0	7.735	A
C-ABD	0.51	0.51	96.54	0.005	0.51	0.0	0.0	9.558	A
C-D	0.00	0.00			0.00				
C-A	15.54	15.54			15.54				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	79.34	0.006	0.45	0.0	0.0	11.410	B
B-AD	1.88	1.88	118.30	0.016	1.89	0.0	0.0	11.634	B
A-BCD	0.00	0.00	113.99	0.000	0.00	0.0	0.0	0.000	A
A-B	2.10	2.10			2.10				
A-C	20.17	20.17			20.17				
D-A	0.00	0.00	109.18	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	114.94	0.000	0.01	0.0	0.0	0.000	A
C-ABD	0.52	0.52	96.54	0.005	0.52	0.0	0.0	9.318	A
C-D	0.00	0.00			0.00				
C-A	17.85	17.85			17.85				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	79.48	0.006	0.45	0.0	0.0	11.387	B
B-AD	2.00	2.00	121.36	0.016	2.01	0.0	0.0	7.543	A
A-BCD	0.00	0.00	115.73	0.000	0.00	0.0	0.0	0.000	A
A-B	0.88	0.88			0.88				
A-C	16.85	16.85			16.85				
D-A	0.00	0.00	149.24	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.48	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.48	0.48	89.94	0.005	0.48	0.0	0.0	9.749	A
C-D	0.00	0.00			0.00				
C-A	10.03	10.03			10.03				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.67	2.67	170.42	0.016	2.65	0.0	0.0	6.140	A
B-AD	1.88	1.88	125.41	0.015	1.88	0.0	0.0	7.285	A
A-BCD	0.00	0.00	125.57	0.000	0.00	0.0	0.0	0.000	A
A-B	1.76	1.76			1.76				
A-C	12.18	12.18			12.18				
D-A	0.00	0.00	147.58	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.10	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.38	0.38	93.95	0.004	0.38	0.0	0.0	9.664	A
C-D	0.00	0.00			0.00				
C-A	14.34	14.34			14.34				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	81.60	0.006	0.47	0.0	0.0	6.458	A
B-AD	0.78	0.78	65.42	0.012	0.78	0.0	0.0	9.044	A
A-BCD	0.00	0.00	131.35	0.000	0.00	0.0	0.0	0.000	A
A-B	1.88	1.88			1.88				
A-C	15.85	15.85			15.85				
D-A	0.00	0.00	150.74	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.23	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.52	1.52	170.25	0.009	1.51	0.0	0.0	6.316	A
C-D	0.00	0.00			0.00				
C-A	10.11	10.11			10.11				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	79.74	0.006	0.45	0.0	0.0	11.350	B
B-AD	2.00	2.00	95.88	0.021	1.98	0.0	0.0	11.022	B
A-BCD	0.00	0.00	127.14	0.000	0.00	0.0	0.0	0.000	A
A-B	0.65	0.65			0.65				
A-C	11.19	11.19			11.19				
D-A	0.00	0.00	150.50	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.04	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.37	0.37	96.05	0.004	0.37	0.0	0.0	6.018	A
C-D	0.00	0.00			0.00				
C-A	12.37	12.37			12.37				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	81.95	0.006	0.45	0.0	0.0	11.044	B
B-AD	0.78	0.78	67.56	0.012	0.79	0.0	0.0	10.181	B
A-BCD	0.00	0.00	125.13	0.000	0.00	0.0	0.0	0.000	A
A-B	0.65	0.65			0.65				
A-C	10.20	10.20			10.20				
D-A	0.00	0.00	150.38	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.07	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.36	0.36	93.49	0.004	0.36	0.0	0.0	9.568	A
C-D	0.00	0.00			0.00				
C-A	11.38	11.38			11.38				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.63	0.63	83.27	0.008	0.62	0.0	0.0	10.889	B
B-AD	1.08	1.08	85.41	0.013	1.07	0.0	0.0	11.962	B
A-BCD	0.00	0.00	133.71	0.000	0.00	0.0	0.0	0.000	A
A-B	2.18	2.18			2.18				
A-C	7.75	7.75			7.75				
D-A	0.00	0.00	151.70	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	114.38	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.87	2.87	174.00	0.016	2.85	0.0	0.0	5.790	A
C-D	0.00	0.00			0.00				
C-A	7.74	7.74			7.74				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.73	1.73	151.64	0.011	1.73	0.0	0.0	7.455	A
B-AD	2.19	2.19	61.45	0.036	2.17	0.0	0.0	14.027	B
A-BCD	0.00	0.00	136.30	0.000	0.00	0.0	0.0	0.000	A
A-B	2.18	2.18			2.18				
A-C	15.74	15.74			15.74				
D-A	0.00	0.00	150.05	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.77	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.88	1.88	94.28	0.020	1.88	0.0	0.0	7.012	A
C-D	0.00	0.00			0.00				
C-A	12.16	12.16			12.16				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.63	0.63	83.65	0.008	0.64	0.0	0.0	7.087	A
B-AD	1.08	1.08	84.22	0.013	1.10	0.0	0.0	12.863	B
A-BCD	0.00	0.00	118.05	0.000	0.00	0.0	0.0	0.000	A
A-B	1.07	1.07			1.07				
A-C	5.54	5.54			5.54				
D-A	0.00	0.00	151.38	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.74	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.74	1.74	88.32	0.020	1.74	0.0	0.0	10.084	B
C-D	0.00	0.00			0.00				
C-A	5.54	5.54			5.54				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.63	0.63	81.00	0.008	0.62	0.0	0.0	11.196	B
B-AD	2.19	2.19	131.88	0.017	2.18	0.0	0.0	8.188	A
A-BCD	0.00	0.00	128.42	0.000	0.00	0.0	0.0	0.000	A
A-B	2.18	2.18			2.18				
A-C	15.74	15.74			15.74				
D-A	0.00	0.00	150.87	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.51	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.59	0.59	92.90	0.006	0.61	0.0	0.0	10.153	B
C-D	0.00	0.00			0.00				
C-A	11.23	11.23			11.23				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.77	1.77	84.72	0.021	1.76	0.0	0.0	10.847	B
B-AD	2.26	2.26	123.77	0.018	2.26	0.0	0.0	7.405	A
A-BCD	0.00	0.00	133.02	0.000	0.00	0.0	0.0	0.000	A
A-B	2.30	2.30			2.30				
A-C	19.40	19.40			19.40				
D-A	1.11	1.11	153.30	0.007	1.10	0.0	0.0	5.912	A
D-BC	0.00	0.00	83.47	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.71	0.71	97.94	0.007	0.71	0.0	0.0	9.394	A
C-D	0.00	0.00			0.00				
C-A	17.94	17.94			17.94				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.67	0.67	82.60	0.008	0.68	0.0	0.0	10.987	B
B-AD	1.15	1.15	83.92	0.014	1.16	0.0	0.0	8.344	A
A-BCD	0.00	0.00	127.52	0.000	0.00	0.0	0.0	0.000	A
A-B	2.41	2.41			2.41				
A-C	6.76	6.76			6.76				
D-A	0.00	0.00	153.39	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.23	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.94	1.94	92.88	0.021	1.92	0.0	0.0	9.729	A
C-D	0.00	0.00			0.00				
C-A	11.93	11.93			11.93				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.67	0.67	81.87	0.008	0.67	0.0	0.0	11.085	B
B-AD	2.37	2.37	131.92	0.018	2.36	0.0	0.0	8.195	A
A-BCD	0.00	0.00	112.23	0.000	0.00	0.0	0.0	0.000	A
A-B	1.19	1.19			1.19				
A-C	4.43	4.43			4.43				
D-A	1.11	1.11	119.76	0.009	1.10	0.0	0.0	6.775	A
D-BC	0.00	0.00	83.72	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.73	0.73	101.49	0.007	0.75	0.0	0.0	9.360	A
C-D	0.00	0.00			0.00				
C-A	21.00	21.00			21.00				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.89	1.89	161.93	0.012	1.88	0.0	0.0	7.024	A
B-AD	1.15	1.15	64.40	0.018	1.16	0.0	0.0	9.469	A
A-BCD	0.00	0.00	115.45	0.000	0.00	0.0	0.0	0.000	A
A-B	1.19	1.19			1.19				
A-C	13.52	13.52			13.52				
D-A	0.00	0.00	118.64	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	82.28	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.74	0.74	100.07	0.007	0.74	0.0	0.0	8.931	A
C-D	0.00	0.00			0.00				
C-A	21.23	21.23			21.23				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.44	0.44	78.90	0.006	0.45	0.0	0.0	7.007	A
B-AD	1.98	1.98	62.57	0.032	1.96	0.0	0.0	14.921	B
A-BCD	1.24	1.24	163.25	0.008	1.23	0.0	0.0	5.729	A
A-B	3.37	3.37			3.37				
A-C	14.29	14.29			14.29				
D-A	0.00	0.00	138.81	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.65	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.56	0.56	96.70	0.006	0.56	0.0	0.0	9.357	A
C-D	0.00	0.00			0.00				
C-A	16.75	16.75			16.75				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.55	1.55	156.93	0.010	1.54	0.0	0.0	7.070	A
B-AD	1.98	1.98	60.36	0.033	1.98	0.0	0.0	15.308	C
A-BCD	0.00	0.00	149.83	0.000	0.01	0.0	0.0	0.000	A
A-B	2.18	2.18			2.18				
A-C	20.40	20.40			20.40				
D-A	0.00	0.00	142.32	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.53	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.57	0.57	96.31	0.006	0.57	0.0	0.0	9.339	A
C-D	0.00	0.00			0.00				
C-A	17.62	17.62			17.62				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.44	0.44	81.24	0.005	0.45	0.0	0.0	6.879	A
B-AD	0.76	0.76	64.11	0.012	0.78	0.0	0.0	14.214	B
A-BCD	0.00	0.00	120.33	0.000	0.00	0.0	0.0	0.000	A
A-B	2.06	2.06			2.06				
A-C	11.08	11.08			11.08				
D-A	0.00	0.00	144.85	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.20	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.60	0.60	99.94	0.006	0.60	0.0	0.0	9.224	A
C-D	0.00	0.00			0.00				
C-A	22.02	22.02			22.02				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.55	1.55	165.52	0.009	1.54	0.0	0.0	6.700	A
B-AD	0.76	0.76	63.21	0.012	0.76	0.0	0.0	14.408	B
A-BCD	0.00	0.00	132.26	0.000	0.00	0.0	0.0	0.000	A
A-B	2.18	2.18			2.18				
A-C	20.05	20.05			20.05				
D-A	1.11	1.11	154.37	0.007	1.10	0.0	0.0	6.665	A
D-BC	0.00	0.00	84.16	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.83	1.83	102.23	0.018	1.82	0.0	0.0	9.099	A
C-D	0.00	0.00			0.00				
C-A	14.25	14.25			14.25				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.63	1.63	82.57	0.020	1.63	0.0	0.0	8.402	A
B-AD	3.04	3.04	124.08	0.024	3.02	0.0	0.0	8.923	A
A-BCD	1.38	1.38	139.61	0.010	1.37	0.0	0.0	5.958	A
A-B	2.93	2.93			2.93				
A-C	24.13	24.13			24.13				
D-A	0.00	0.00	152.33	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	81.90	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.46	0.46	100.27	0.005	0.48	0.0	0.0	8.771	A
C-D	0.00	0.00			0.00				
C-A	21.06	21.06			21.06				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.41	0.41	80.91	0.005	0.42	0.0	0.0	11.181	B
B-AD	0.71	0.71	81.81	0.009	0.73	0.0	0.0	8.007	A
A-BCD	1.31	1.31	131.70	0.010	1.31	0.0	0.0	6.705	A
A-B	1.94	1.94			1.94				
A-C	18.11	18.11			18.11				
D-A	0.00	0.00	147.39	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.47	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.82	1.82	110.45	0.016	1.81	0.0	0.0	8.423	A
C-D	0.00	0.00			0.00				
C-A	21.04	21.04			21.04				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.52	1.52	163.51	0.009	1.51	0.0	0.0	6.726	A
B-AD	0.71	0.71	76.20	0.009	0.70	0.0	0.0	11.921	B
A-BCD	0.00	0.00	115.43	0.000	0.01	0.0	0.0	0.000	A
A-B	3.07	3.07			3.07				
A-C	20.17	20.17			20.17				
D-A	0.00	0.00	145.75	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	104.85	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.48	0.48	100.11	0.005	0.50	0.0	0.0	8.319	A
C-D	0.00	0.00			0.00				
C-A	24.59	24.59			24.59				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.53	0.53	76.16	0.007	0.54	0.0	0.0	7.551	A
B-AD	3.23	3.23	59.54	0.054	3.19	0.0	0.1	15.288	C
A-BCD	0.00	0.00	128.96	0.000	0.00	0.0	0.0	0.000	A
A-B	1.96	1.96			1.96				
A-C	24.60	24.60			24.60				
D-A	1.11	1.11	148.03	0.007	1.10	0.0	0.0	6.124	A
D-BC	0.00	0.00	79.52	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.95	1.95	116.70	0.017	1.94	0.0	0.0	8.065	A
C-D	0.00	0.00			0.00				
C-A	28.54	28.54			28.54				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.72	1.72	142.42	0.012	1.71	0.0	0.0	7.560	A
B-AD	2.15	2.15	120.39	0.017	2.17	0.1	0.0	12.019	B
A-BCD	1.35	1.35	169.72	0.008	1.34	0.0	0.0	6.042	A
A-B	2.57	2.57			2.57				
A-C	27.81	27.81			27.81				
D-A	0.00	0.00	151.15	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	80.48	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.17	0.17	103.10	0.002	0.19	0.0	0.0	8.103	A
C-D	0.00	0.00			0.00				
C-A	24.44	24.44			24.44				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	79.39	0.008	0.62	0.0	0.0	7.811	A
B-AD	1.04	1.04	62.48	0.017	1.06	0.0	0.0	9.799	A
A-BCD	0.00	0.00	144.46	0.000	0.01	0.0	0.0	0.000	A
A-B	0.26	0.26			0.26				
A-C	35.79	35.79			35.79				
D-A	0.00	0.00	144.46	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	104.23	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.19	0.19	112.32	0.002	0.19	0.0	0.0	8.253	A
C-D	0.00	0.00			0.00				
C-A	37.71	37.71			37.71				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	77.24	0.008	0.61	0.0	0.0	11.745	B
B-AD	2.26	2.26	84.16	0.027	2.24	0.0	0.0	12.484	B
A-BCD	0.00	0.00	134.90	0.000	0.00	0.0	0.0	0.000	A
A-B	2.47	2.47			2.47				
A-C	23.26	23.26			23.26				
D-A	0.00	0.00	147.40	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.14	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.14	0.14	89.54	0.002	0.15	0.0	0.0	9.122	A
C-D	0.00	0.00			0.00				
C-A	12.28	12.28			12.28				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.71	2.71	161.47	0.017	2.69	0.0	0.0	6.626	A
B-AD	0.85	0.85	61.60	0.014	0.87	0.0	0.0	11.677	B
A-BCD	0.00	0.00	128.53	0.000	0.00	0.0	0.0	0.000	A
A-B	1.48	1.48			1.48				
A-C	23.26	23.26			23.26				
D-A	1.11	1.11	152.68	0.007	1.10	0.0	0.0	5.936	A
D-BC	0.00	0.00	82.68	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.42	1.42	124.30	0.011	1.41	0.0	0.0	7.588	A
C-D	0.00	0.00			0.00				
C-A	16.43	16.43			16.43				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	115.17	0.011	1.26	0.0	0.0	6.400	A
B-AD	1.46	1.46	121.37	0.012	1.46	0.0	0.0	10.221	B
A-BCD	0.00	0.00	131.91	0.000	0.00	0.0	0.0	0.000	A
A-B	1.64	1.64			1.64				
A-C	17.72	17.72			17.72				
D-A	0.00	0.00	151.31	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	81.71	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.76	1.76	122.04	0.014	1.75	0.0	0.0	7.355	A
C-D	0.00	0.00			0.00				
C-A	26.43	26.43			26.43				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.14	0.14	83.30	0.002	0.15	0.0	0.0	8.284	A
B-AD	0.24	0.24	84.28	0.003	0.26	0.0	0.0	7.624	A
A-BCD	2.48	2.48	161.55	0.015	2.46	0.0	0.0	5.642	A
A-B	2.71	2.71			2.71				
A-C	14.18	14.18			14.18				
D-A	0.00	0.00	148.27	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.95	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.56	1.56	178.83	0.009	1.57	0.0	0.0	6.347	A
C-D	0.00	0.00			0.00				
C-A	21.96	21.96			21.96				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	117.86	0.011	1.24	0.0	0.0	8.013	A
B-AD	1.35	1.35	126.11	0.011	1.34	0.0	0.0	7.815	A
A-BCD	0.00	0.00	154.17	0.000	0.02	0.0	0.0	5.795	A
A-B	1.76	1.76			1.76				
A-C	9.97	9.97			9.97				
D-A	1.11	1.11	151.77	0.007	1.10	0.0	0.0	5.973	A
D-BC	0.00	0.00	83.40	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.30	0.30	94.78	0.003	0.31	0.0	0.0	5.712	A
C-D	0.00	0.00			0.00				
C-A	13.25	13.25			13.25				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	83.91	0.015	1.25	0.0	0.0	9.395	A
B-AD	2.57	2.57	128.92	0.020	2.56	0.0	0.0	7.122	A
A-BCD	1.19	1.19	160.81	0.007	1.19	0.0	0.0	5.638	A
A-B	0.53	0.53			0.53				
A-C	11.11	11.11			11.11				
D-A	0.00	0.00	154.14	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.71	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.69	2.69	177.61	0.015	2.68	0.0	0.0	5.663	A
C-D	0.00	0.00			0.00				
C-A	14.18	14.18			14.18				

+15+ Adj + Dev , 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	A - R619 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - R619 S - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Minor arm flare	D - Local Access - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Glannoge Cross	Right-Left Stagger	Two-way		1.46	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D12	+15+ Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D4+D5+D6

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - R619 N		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - R619 S		DIRECT	✓	100.000
D - Local Access		DIRECT	✓	100.000

Origin-Destination Data

Demand (Veh/TS)

07:00 - 07:15

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.63	22.42	0.00
	B - L5361	2.33	0.00	0.51	0.00
	C - R619 S	18.10	0.79	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

Demand (Veh/TS)

07:15 - 07:30

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.84	24.37	0.00
	B - L5361	2.09	0.00	1.72	0.00
	C - R619 S	21.95	0.79	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	5.69	22.88	0.00
	B - L5361	3.30	0.00	0.51	0.00
	C - R619 S	15.69	0.89	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.84	24.83	0.00
	B - L5361	2.09	0.00	1.72	0.00
	C - R619 S	22.65	0.89	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:00 - 08:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.31	23.39	0.00
	B - L5361	0.94	0.00	1.75	0.00
	C - R619 S	29.20	0.63	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:15 - 08:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.31	21.72	0.00
	B - L5361	3.58	0.00	0.54	0.00
	C - R619 S	25.58	0.63	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.09	17.13	0.00
	B - L5361	0.94	0.00	1.98	0.00
	C - R619 S	31.61	1.74	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.74	23.39	0.00
	B - L5361	5.02	0.00	1.75	0.00
	C - R619 S	25.81	0.53	0.00	1.21
	D - Local Access	0.00	0.00	1.21	0.00

09:00 - 09:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	19.54	0.00
	B - L5361	1.06	0.00	1.82	0.00
	C - R619 S	30.17	0.65	0.00	0.00
	D - Local Access	1.21	0.00	1.21	0.00

09:15 - 09:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	13.97	1.21
	B - L5361	2.26	0.00	0.61	1.21
	C - R619 S	13.74	1.86	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	13.51	0.00
	B - L5361	2.26	0.00	0.61	0.00
	C - R619 S	13.74	2.09	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.34	11.09	0.00
	B - L5361	1.06	0.00	0.61	0.00
	C - R619 S	17.59	0.65	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:00 - 10:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.85	17.59	0.00
	B - L5361	3.51	0.00	0.50	0.00
	C - R619 S	13.28	0.41	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.85	11.32	1.21
	B - L5361	0.87	0.00	0.50	0.00
	C - R619 S	14.71	0.41	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.29	12.30	0.00
	B - L5361	0.87	0.00	0.50	0.00
	C - R619 S	11.09	0.41	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.85	17.13	0.00
	B - L5361	0.87	0.00	0.50	0.00
	C - R619 S	22.42	0.41	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.88	14.20	0.00
	B - L5361	1.98	0.00	0.45	0.00
	C - R619 S	12.30	0.43	0.00	1.21
	D - Local Access	0.00	0.00	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.88	8.45	0.00
	B - L5361	2.21	0.00	0.45	0.00
	C - R619 S	17.13	0.43	0.00	0.00
	D - Local Access	0.00	1.21	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.32	22.19	0.00
	B - L5361	1.98	0.00	0.45	0.00
	C - R619 S	19.77	0.43	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.88	18.57	0.00
	B - L5361	2.21	0.00	0.45	0.00
	C - R619 S	11.09	0.43	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.86	13.28	0.00
	B - L5361	1.98	0.00	2.86	0.00
	C - R619 S	15.69	0.32	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:15 - 12:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.09	17.59	0.00
	B - L5361	0.78	0.00	0.45	0.00
	C - R619 S	11.32	1.52	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.65	12.30	0.00
	B - L5361	2.21	0.00	0.45	0.00
	C - R619 S	13.74	0.32	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

12:45 - 13:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.65	11.32	0.00
	B - L5361	0.78	0.00	0.45	0.00
	C - R619 S	12.76	0.32	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.28	8.45	0.00
	B - L5361	1.08	0.00	0.63	0.00
	C - R619 S	8.68	2.93	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.28	17.36	0.00
	B - L5361	2.28	0.00	1.83	0.00
	C - R619 S	13.74	1.73	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.07	6.03	0.00
	B - L5361	1.08	0.00	0.63	0.00
	C - R619 S	6.27	1.73	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

13:45 - 14:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.28	17.36	0.00
	B - L5361	2.28	0.00	0.63	0.00
	C - R619 S	12.53	0.52	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.40	21.67	0.00
	B - L5361	2.36	0.00	1.87	0.00
	C - R619 S	20.00	0.58	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

14:15 - 14:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.63	7.47	0.00
	B - L5361	1.15	0.00	0.67	0.00
	C - R619 S	13.28	1.78	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.19	4.83	0.00
	B - L5361	2.59	0.00	0.67	0.00
	C - R619 S	23.16	0.58	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

14:45 - 15:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.19	14.95	0.00
	B - L5361	1.15	0.00	2.11	0.00
	C - R619 S	23.62	0.58	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:00 - 15:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.83	15.69	1.21
	B - L5361	2.19	0.00	0.44	0.00
	C - R619 S	18.57	0.46	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:15 - 15:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.39	22.65	0.00
	B - L5361	2.19	0.00	1.65	0.00
	C - R619 S	19.31	0.46	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.16	12.07	0.00
	B - L5361	0.76	0.00	0.44	0.00
	C - R619 S	24.14	0.46	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.39	21.95	0.00
	B - L5361	0.76	0.00	1.65	0.00
	C - R619 S	15.92	1.67	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

16:00 - 16:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.15	26.55	1.21
	B - L5361	3.35	0.00	1.85	0.00
	C - R619 S	23.16	0.36	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.18	20.47	1.21
	B - L5361	0.71	0.00	0.41	0.00
	C - R619 S	23.62	1.57	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	3.39	22.19	0.00
	B - L5361	0.71	0.00	1.62	0.00
	C - R619 S	27.25	0.36	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.18	27.01	0.00
	B - L5361	3.55	0.00	0.53	0.00
	C - R619 S	31.84	1.57	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

17:00 - 17:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.90	30.87	1.21
	B - L5361	2.25	0.00	1.82	0.00
	C - R619 S	26.78	0.12	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:15 - 17:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.26	39.31	0.00
	B - L5361	1.04	0.00	0.61	0.00
	C - R619 S	41.26	0.12	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.67	25.34	0.00
	B - L5361	2.48	0.00	0.61	0.00
	C - R619 S	13.51	0.12	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.70	25.34	0.00
	B - L5361	0.85	0.00	2.91	0.00
	C - R619 S	18.10	1.33	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.74	19.31	0.00
	B - L5361	1.68	0.00	1.35	0.00
	C - R619 S	29.43	1.47	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	2.95	15.69	2.41
	B - L5361	0.24	0.00	0.14	0.00
	C - R619 S	24.14	1.47	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	1.97	10.86	0.00
	B - L5361	1.45	0.00	1.35	0.00
	C - R619 S	14.48	0.26	0.00	0.00
	D - Local Access	1.21	0.00	0.00	0.00

18:45 - 19:00

Demand (Veh/TS)

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0.00	0.54	12.30	1.21
	B - L5361	2.89	0.00	1.35	0.00
	C - R619 S	15.69	2.67	0.00	0.00
	D - Local Access	0.00	0.00	0.00	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	0	0	0	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	97	0
	B - L5361	0	0	100	0
	C - R619 S	8	100	0	0
	D - Local Access	0	0	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	53	18	0
	B - L5361	100	0	100	0
	C - R619 S	39	100	0	0
	D - Local Access	0	0	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	55	0	100	0
	C - R619 S	11	100	0	0
	D - Local Access	0	0	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	42	0
	B - L5361	26	0	100	0
	C - R619 S	68	100	0	0
	D - Local Access	0	0	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	89	0
	B - L5361	55	0	0	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	29	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

09:00 - 09:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	2	0
	B - L5361	100	0	0	0
	C - R619 S	17	100	0	0
	D - Local Access	0	0	0	0

09:15 - 09:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	86	0
	B - L5361	40	0	100	0
	C - R619 S	11	12	0	0
	D - Local Access	0	0	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	0	0
	B - L5361	40	0	100	0
	C - R619 S	46	100	0	0
	D - Local Access	0	0	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	12	0
	B - L5361	55	0	100	0
	C - R619 S	31	100	0	0
	D - Local Access	0	0	0	0

10:00 - 10:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	0	0
	B - L5361	30	0	100	0
	C - R619 S	30	100	0	0
	D - Local Access	0	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	100	0	100	0
	C - R619 S	6	100	0	0
	D - Local Access	0	0	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	24	0
	B - L5361	100	0	100	0
	C - R619 S	100	100	0	0
	D - Local Access	0	0	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	99	0
	B - L5361	100	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	38	0	100	0
	C - R619 S	37	100	0	0
	D - Local Access	0	0	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	48	100	0
	B - L5361	100	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	95	11	0
	B - L5361	0	0	100	0
	C - R619 S	25	100	0	0
	D - Local Access	0	0	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	25	0
	B - L5361	0	0	100	0
	C - R619 S	81	100	0	0
	D - Local Access	0	0	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	34	0	0
	B - L5361	0	0	0	0
	C - R619 S	78	100	0	0
	D - Local Access	0	0	0	0

12:15 - 12:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	57	0
	B - L5361	100	0	100	0
	C - R619 S	24	0	0	0
	D - Local Access	0	0	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	23	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

12:45 - 13:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	100	0
	C - R619 S	21	100	0	0
	D - Local Access	0	0	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	37	0	0
	B - L5361	55	0	100	0
	C - R619 S	6	0	0	0
	D - Local Access	0	0	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	37	0	0
	B - L5361	100	0	0	0
	C - R619 S	3	100	0	0
	D - Local Access	0	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	55	0	100	0
	C - R619 S	76	100	0	0
	D - Local Access	0	0	0	0

13:45 - 14:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	37	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	38	0	0
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

14:15 - 14:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	100	0
	B - L5361	55	0	100	0
	C - R619 S	51	100	0	0
	D - Local Access	0	0	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	0	0	100	0
	C - R619 S	15	100	0	0
	D - Local Access	27	0	0	0

14:45 - 15:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	0	0
	C - R619 S	37	100	0	0
	D - Local Access	0	0	0	0

15:00 - 15:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	8	0
	B - L5361	100	0	100	0
	C - R619 S	25	100	0	0
	D - Local Access	0	0	0	0

15:15 - 15:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	0	0
	C - R619 S	45	100	0	0
	D - Local Access	0	0	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	100	0
	B - L5361	100	0	100	0
	C - R619 S	20	100	0	0
	D - Local Access	0	0	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	23	0	0
	B - L5361	100	0	0	0
	C - R619 S	0	80	0	0
	D - Local Access	0	0	0	0

16:00 - 16:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	37	0	27
	B - L5361	0	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	21	44	27
	B - L5361	55	0	100	0
	C - R619 S	23	71	0	0
	D - Local Access	0	0	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	27	80	0
	B - L5361	55	0	0	0
	C - R619 S	37	100	0	0
	D - Local Access	0	0	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	0	0
	B - L5361	100	0	100	0
	C - R619 S	21	71	0	0
	D - Local Access	0	0	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	15	0
	B - L5361	0	0	7	0
	C - R619 S	9	100	0	0
	D - Local Access	0	0	0	0

17:15 - 17:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	100	0
	C - R619 S	0	100	0	0
	D - Local Access	0	0	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	40	0
	B - L5361	33	0	100	0
	C - R619 S	100	100	0	0
	D - Local Access	0	0	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	0	0
	B - L5361	100	0	2	0
	C - R619 S	27	45	0	0
	D - Local Access	0	0	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	45	0
	B - L5361	0	0	44	0
	C - R619 S	0	61	0	0
	D - Local Access	0	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	0	38	0
	B - L5361	55	0	100	0
	C - R619 S	8	0	0	0
	D - Local Access	0	0	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	95	0	0
	B - L5361	0	0	44	0
	C - R619 S	92	100	0	0
	D - Local Access	0	0	0	0

18:45 - 19:00

Heavy Vehicle Percentages

		To			
		A - R619 N	B - L5361	C - R619 S	D - Local Access
From	A - R619 N	0	100	13	0
	B - L5361	0	0	100	0
	C - R619 S	0	0	0	0
	D - Local Access	0	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.02	11.96	0.0	B	1.04	49.92
B-AD	0.06	15.59	0.1	C	1.86	89.43
A-BCD	0.02	6.65	0.0	A	0.26	12.54
A-B					1.90	91.39
A-C					17.89	858.72
D-A	0.01	6.82	0.0	A	0.23	10.86
D-BC	0.01	8.52	0.0	A	0.08	3.62
C-ABD	0.03	10.13	0.0	B	1.07	51.35
C-D					0.05	2.40
C-A					19.19	921.15

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.51	0.51	79.13	0.007	0.51	0.0	0.0	11.447	B
B-AD	2.33	2.33	120.73	0.019	2.31	0.0	0.0	7.599	A
A-BCD	0.00	0.00	136.35	0.000	0.00	0.0	0.0	0.000	A
A-B	1.63	1.63			1.63				
A-C	22.42	22.42			22.42				
D-A	0.00	0.00	149.19	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.13	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.97	0.97	97.62	0.010	0.96	0.0	0.0	9.310	A
C-D	0.00	0.00			0.00				
C-A	17.92	17.92			17.92				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.72	1.72	162.13	0.011	1.72	0.0	0.0	6.892	A
B-AD	2.09	2.09	125.96	0.017	2.10	0.0	0.0	7.267	A
A-BCD	0.00	0.00	143.29	0.000	0.00	0.0	0.0	0.000	A
A-B	2.84	2.84			2.84				
A-C	24.37	24.37			24.37				
D-A	0.00	0.00	148.31	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.00	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.01	1.01	100.54	0.010	1.01	0.0	0.0	9.130	A
C-D	0.00	0.00			0.00				
C-A	21.73	21.73			21.73				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.51	0.51	75.67	0.007	0.52	0.0	0.0	7.439	A
B-AD	3.30	3.30	115.66	0.029	3.29	0.0	0.0	8.008	A
A-BCD	0.00	0.00	132.74	0.000	0.00	0.0	0.0	0.000	A
A-B	5.69	5.69			5.69				
A-C	22.88	22.88			22.88				
D-A	0.00	0.00	149.22	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.54	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.08	1.08	92.10	0.012	1.08	0.0	0.0	9.725	A
C-D	0.00	0.00			0.00				
C-A	15.50	15.50			15.50				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.72	1.72	80.34	0.021	1.70	0.0	0.0	11.443	B
B-AD	2.09	2.09	61.99	0.034	2.10	0.0	0.0	10.394	B
A-BCD	0.00	0.00	128.10	0.000	0.00	0.0	0.0	0.000	A
A-B	1.84	1.84			1.84				
A-C	24.83	24.83			24.83				
D-A	0.00	0.00	145.50	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	105.77	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.16	1.16	98.88	0.012	1.16	0.0	0.0	9.172	A
C-D	0.00	0.00			0.00				
C-A	22.38	22.38			22.38				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.75	1.75	79.15	0.022	1.75	0.0	0.0	11.626	B
B-AD	0.94	0.94	75.76	0.012	0.95	0.0	0.0	14.384	B
A-BCD	0.00	0.00	123.87	0.000	0.00	0.0	0.0	0.000	A
A-B	1.31	1.31			1.31				
A-C	23.39	23.39			23.39				
D-A	0.00	0.00	145.90	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.98	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.88	0.88	106.00	0.008	0.88	0.0	0.0	8.852	A
C-D	0.00	0.00			0.00				
C-A	28.95	28.95			28.95				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.54	0.54	75.82	0.007	0.56	0.0	0.0	11.963	B
B-AD	3.58	3.58	92.03	0.039	3.56	0.0	0.0	10.662	B
A-BCD	0.00	0.00	114.07	0.000	0.00	0.0	0.0	0.000	A
A-B	1.31	1.31			1.31				
A-C	21.72	21.72			21.72				
D-A	0.00	0.00	142.64	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	102.96	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.85	0.85	99.59	0.009	0.86	0.0	0.0	8.725	A
C-D	0.00	0.00			0.00				
C-A	25.35	25.35			25.35				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.98	1.98	164.29	0.012	1.98	0.0	0.0	6.730	A
B-AD	0.94	0.94	77.72	0.012	0.97	0.0	0.0	10.058	B
A-BCD	0.00	0.00	108.78	0.000	0.00	0.0	0.0	0.000	A
A-B	1.09	1.09			1.09				
A-C	17.13	17.13			17.13				
D-A	0.00	0.00	146.11	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	105.98	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.10	2.10	182.51	0.011	2.09	0.0	0.0	6.303	A
C-D	0.00	0.00			0.00				
C-A	31.24	31.24			31.24				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.75	1.75	80.41	0.022	1.75	0.0	0.0	8.389	A
B-AD	5.02	5.02	125.94	0.040	4.99	0.0	0.0	8.098	A
A-BCD	0.00	0.00	122.44	0.000	0.00	0.0	0.0	0.000	A
A-B	3.74	3.74			3.74				
A-C	23.39	23.39			23.39				
D-A	0.00	0.00	107.64	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.21	1.21	113.05	0.011	1.20	0.0	0.0	8.046	A
C-ABD	0.72	0.72	105.46	0.007	0.73	0.0	0.0	5.918	A
C-D	1.20	1.20			1.20				
C-A	25.63	25.63			25.63				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.82	1.82	162.61	0.011	1.82	0.0	0.0	8.312	A
B-AD	1.06	1.06	63.58	0.017	1.09	0.0	0.0	8.574	A
A-BCD	0.00	0.00	126.45	0.000	0.00	0.0	0.0	0.000	A
A-B	1.34	1.34			1.34				
A-C	19.54	19.54			19.54				
D-A	1.21	1.21	144.45	0.008	1.20	0.0	0.0	6.282	A
D-BC	1.21	1.21	106.79	0.011	1.21	0.0	0.0	8.523	A
C-ABD	0.91	0.91	106.79	0.009	0.90	0.0	0.0	8.443	A
C-D	0.00	0.00			0.00				
C-A	29.91	29.91			29.91				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	77.89	0.008	0.63	0.0	0.0	7.372	A
B-AD	3.47	3.47	95.82	0.036	3.44	0.0	0.0	11.106	B
A-BCD	1.34	1.34	158.61	0.008	1.33	0.0	0.0	5.721	A
A-B	1.33	1.33			1.33				
A-C	13.85	13.85			13.85				
D-A	1.21	1.21	153.49	0.008	1.21	0.0	0.0	5.909	A
D-BC	0.00	0.00	83.32	0.000	0.01	0.0	0.0	0.000	A
C-ABD	2.04	2.04	155.87	0.013	2.03	0.0	0.0	6.897	A
C-D	0.00	0.00			0.00				
C-A	13.56	13.56			13.56				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	79.65	0.008	0.61	0.0	0.0	11.386	B
B-AD	2.26	2.26	87.39	0.026	2.28	0.0	0.0	9.944	A
A-BCD	0.00	0.00	140.32	0.000	0.01	0.0	0.0	0.000	A
A-B	1.34	1.34			1.34				
A-C	13.51	13.51			13.51				
D-A	0.00	0.00	152.57	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	83.73	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.45	2.45	94.41	0.026	2.44	0.0	0.0	7.907	A
C-D	0.00	0.00			0.00				
C-A	13.38	13.38			13.38				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	82.63	0.007	0.61	0.0	0.0	10.974	B
B-AD	1.06	1.06	83.89	0.013	1.07	0.0	0.0	10.171	B
A-BCD	0.00	0.00	118.00	0.000	0.00	0.0	0.0	0.000	A
A-B	1.34	1.34			1.34				
A-C	11.09	11.09			11.09				
D-A	0.00	0.00	148.13	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.53	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.80	0.80	97.54	0.008	0.81	0.0	0.0	9.479	A
C-D	0.00	0.00			0.00				
C-A	17.44	17.44			17.44				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	77.31	0.007	0.50	0.0	0.0	11.717	B
B-AD	3.51	3.51	95.29	0.037	3.48	0.0	0.0	10.249	B
A-BCD	0.00	0.00	126.70	0.000	0.00	0.0	0.0	0.000	A
A-B	0.85	0.85			0.85				
A-C	17.59	17.59			17.59				
D-A	0.00	0.00	148.84	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.65	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.48	0.48	93.82	0.005	0.48	0.0	0.0	9.559	A
C-D	0.00	0.00			0.00				
C-A	13.21	13.21			13.21				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	80.23	0.006	0.50	0.0	0.0	11.290	B
B-AD	0.87	0.87	66.08	0.013	0.90	0.0	0.0	10.038	B
A-BCD	1.31	1.31	157.50	0.008	1.30	0.0	0.0	5.781	A
A-B	0.84	0.84			0.84				
A-C	11.23	11.23			11.23				
D-A	0.00	0.00	149.93	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.49	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.49	0.49	94.79	0.005	0.49	0.0	0.0	9.660	A
C-D	0.00	0.00			0.00				
C-A	14.64	14.64			14.64				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	81.24	0.006	0.50	0.0	0.0	11.149	B
B-AD	0.87	0.87	65.39	0.013	0.86	0.0	0.0	13.947	B
A-BCD	0.00	0.00	141.09	0.000	0.01	0.0	0.0	0.000	A
A-B	2.29	2.29			2.29				
A-C	12.30	12.30			12.30				
D-A	1.21	1.21	152.40	0.008	1.20	0.0	0.0	5.951	A
D-BC	0.00	0.00	83.39	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.47	0.47	90.87	0.005	0.47	0.0	0.0	9.590	A
C-D	0.00	0.00			0.00				
C-A	11.04	11.04			11.04				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.50	0.50	78.76	0.006	0.50	0.0	0.0	11.499	B
B-AD	0.87	0.87	62.96	0.014	0.87	0.0	0.0	14.492	B
A-BCD	0.00	0.00	109.36	0.000	0.00	0.0	0.0	0.000	A
A-B	0.85	0.85			0.85				
A-C	17.13	17.13			17.13				
D-A	0.00	0.00	152.34	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	81.44	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.53	0.53	99.70	0.005	0.53	0.0	0.0	9.609	A
C-D	0.00	0.00			0.00				
C-A	22.30	22.30			22.30				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	77.33	0.006	0.45	0.0	0.0	11.708	B
B-AD	1.98	1.98	86.96	0.023	1.97	0.0	0.0	12.041	B
A-BCD	0.00	0.00	105.76	0.000	0.00	0.0	0.0	0.000	A
A-B	0.88	0.88			0.88				
A-C	14.20	14.20			14.20				
D-A	0.00	0.00	149.28	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.47	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.50	0.50	92.45	0.005	0.50	0.0	0.0	9.451	A
C-D	1.20	1.20			1.20				
C-A	12.23	12.23			12.23				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	77.13	0.006	0.45	0.0	0.0	11.736	B
B-AD	2.21	2.21	62.19	0.036	2.21	0.0	0.0	12.780	B
A-BCD	0.00	0.00	108.38	0.000	0.00	0.0	0.0	0.000	A
A-B	0.88	0.88			0.88				
A-C	8.45	8.45			8.45				
D-A	0.00	0.00	109.39	0.000	0.00	0.0	0.0	0.000	A
D-BC	1.21	1.21	116.79	0.010	1.20	0.0	0.0	7.786	A
C-ABD	0.52	0.52	97.57	0.005	0.52	0.0	0.0	9.467	A
C-D	0.00	0.00			0.00				
C-A	17.04	17.04			17.04				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	78.81	0.006	0.45	0.0	0.0	11.487	B
B-AD	1.98	1.98	117.39	0.017	1.99	0.0	0.0	11.835	B
A-BCD	0.00	0.00	113.21	0.000	0.00	0.0	0.0	0.000	A
A-B	2.32	2.32			2.32				
A-C	22.19	22.19			22.19				
D-A	0.00	0.00	108.76	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.99	0.000	0.01	0.0	0.0	0.000	A
C-ABD	0.54	0.54	97.61	0.005	0.54	0.0	0.0	9.216	A
C-D	0.00	0.00			0.00				
C-A	19.66	19.66			19.66				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	78.77	0.006	0.45	0.0	0.0	11.490	B
B-AD	2.21	2.21	120.72	0.018	2.22	0.0	0.0	7.597	A
A-BCD	0.00	0.00	115.04	0.000	0.00	0.0	0.0	0.000	A
A-B	0.88	0.88			0.88				
A-C	18.57	18.57			18.57				
D-A	0.00	0.00	148.74	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.69	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.49	0.49	90.30	0.005	0.49	0.0	0.0	9.679	A
C-D	0.00	0.00			0.00				
C-A	11.03	11.03			11.03				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.86	2.86	170.26	0.017	2.85	0.0	0.0	6.108	A
B-AD	1.98	1.98	124.57	0.016	1.99	0.0	0.0	7.343	A
A-BCD	0.00	0.00	124.87	0.000	0.00	0.0	0.0	0.000	A
A-B	1.86	1.86			1.86				
A-C	13.28	13.28			13.28				
D-A	0.00	0.00	146.90	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	109.31	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.38	0.38	94.58	0.004	0.38	0.0	0.0	9.591	A
C-D	0.00	0.00			0.00				
C-A	15.62	15.62			15.62				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	81.36	0.006	0.47	0.0	0.0	6.436	A
B-AD	0.78	0.78	64.97	0.012	0.78	0.0	0.0	9.040	A
A-BCD	0.00	0.00	131.16	0.000	0.00	0.0	0.0	0.000	A
A-B	2.09	2.09			2.09				
A-C	17.59	17.59			17.59				
D-A	0.00	0.00	150.35	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	110.50	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.63	1.63	170.10	0.010	1.62	0.0	0.0	6.278	A
C-D	0.00	0.00			0.00				
C-A	11.22	11.22			11.22				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	79.42	0.006	0.45	0.0	0.0	11.395	B
B-AD	2.21	2.21	101.03	0.022	2.20	0.0	0.0	10.585	B
A-BCD	0.00	0.00	126.92	0.000	0.00	0.0	0.0	0.000	A
A-B	0.65	0.65			0.65				
A-C	12.30	12.30			12.30				
D-A	0.00	0.00	150.15	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.57	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.37	0.37	97.08	0.004	0.38	0.0	0.0	5.960	A
C-D	0.00	0.00			0.00				
C-A	13.68	13.68			13.68				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.45	0.45	81.80	0.006	0.45	0.0	0.0	11.062	B
B-AD	0.78	0.78	67.41	0.012	0.79	0.0	0.0	9.769	A
A-BCD	0.00	0.00	124.86	0.000	0.00	0.0	0.0	0.000	A
A-B	0.65	0.65			0.65				
A-C	11.32	11.32			11.32				
D-A	0.00	0.00	150.01	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	112.58	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.37	0.37	94.41	0.004	0.37	0.0	0.0	9.472	A
C-D	0.00	0.00			0.00				
C-A	12.71	12.71			12.71				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.63	0.63	83.17	0.008	0.62	0.0	0.0	10.902	B
B-AD	1.08	1.08	85.17	0.013	1.07	0.0	0.0	11.998	B
A-BCD	0.00	0.00	133.63	0.000	0.00	0.0	0.0	0.000	A
A-B	2.28	2.28			2.28				
A-C	8.45	8.45			8.45				
D-A	0.00	0.00	151.51	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	114.10	0.000	0.00	0.0	0.0	0.000	A
C-ABD	3.09	3.09	174.32	0.018	3.07	0.0	0.0	5.753	A
C-D	0.00	0.00			0.00				
C-A	8.53	8.53			8.53				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.83	1.83	157.43	0.012	1.83	0.0	0.0	7.247	A
B-AD	2.28	2.28	61.12	0.037	2.26	0.0	0.0	14.162	B
A-BCD	0.00	0.00	136.02	0.000	0.00	0.0	0.0	0.000	A
A-B	2.28	2.28			2.28				
A-C	17.36	17.36			17.36				
D-A	0.00	0.00	149.62	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.13	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.02	2.02	95.08	0.021	2.03	0.0	0.0	6.975	A
C-D	0.00	0.00			0.00				
C-A	13.44	13.44			13.44				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.63	0.63	83.57	0.008	0.64	0.0	0.0	6.867	A
B-AD	1.08	1.08	83.84	0.013	1.10	0.0	0.0	12.948	B
A-BCD	0.00	0.00	117.84	0.000	0.00	0.0	0.0	0.000	A
A-B	1.07	1.07			1.07				
A-C	6.03	6.03			6.03				
D-A	0.00	0.00	151.05	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	113.31	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.86	1.86	88.55	0.021	1.85	0.0	0.0	10.038	B
C-D	0.00	0.00			0.00				
C-A	6.13	6.13			6.13				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.63	0.63	80.59	0.008	0.62	0.0	0.0	11.254	B
B-AD	2.28	2.28	131.53	0.017	2.28	0.0	0.0	8.181	A
A-BCD	0.00	0.00	128.23	0.000	0.00	0.0	0.0	0.000	A
A-B	2.28	2.28			2.28				
A-C	17.36	17.36			17.36				
D-A	0.00	0.00	150.55	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	111.98	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.60	0.60	93.66	0.006	0.62	0.0	0.0	10.131	B
C-D	0.00	0.00			0.00				
C-A	12.45	12.45			12.45				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.87	1.87	84.43	0.022	1.86	0.0	0.0	10.899	B
B-AD	2.36	2.36	122.83	0.019	2.36	0.0	0.0	7.472	A
A-BCD	0.00	0.00	132.69	0.000	0.00	0.0	0.0	0.000	A
A-B	2.40	2.40			2.40				
A-C	21.67	21.67			21.67				
D-A	1.21	1.21	152.79	0.008	1.20	0.0	0.0	5.936	A
D-BC	0.00	0.00	82.88	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.72	0.72	99.21	0.007	0.72	0.0	0.0	9.285	A
C-D	0.00	0.00			0.00				
C-A	19.86	19.86			19.86				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.67	0.67	82.40	0.008	0.68	0.0	0.0	11.016	B
B-AD	1.15	1.15	83.44	0.014	1.16	0.0	0.0	8.357	A
A-BCD	0.00	0.00	127.18	0.000	0.00	0.0	0.0	0.000	A
A-B	2.63	2.63			2.63				
A-C	7.47	7.47			7.47				
D-A	0.00	0.00	152.92	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	83.75	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.08	2.08	93.41	0.022	2.06	0.0	0.0	9.674	A
C-D	0.00	0.00			0.00				
C-A	12.98	12.98			12.98				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.67	0.67	81.38	0.008	0.67	0.0	0.0	11.149	B
B-AD	2.59	2.59	131.77	0.020	2.57	0.0	0.0	8.148	A
A-BCD	0.00	0.00	111.65	0.000	0.00	0.0	0.0	0.000	A
A-B	1.19	1.19			1.19				
A-C	4.83	4.83			4.83				
D-A	1.21	1.21	119.12	0.010	1.20	0.0	0.0	6.817	A
D-BC	0.00	0.00	83.09	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.75	0.75	102.82	0.007	0.77	0.0	0.0	9.259	A
C-D	0.00	0.00			0.00				
C-A	22.99	22.99			22.99				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.11	2.11	165.52	0.013	2.10	0.0	0.0	6.825	A
B-AD	1.15	1.15	63.73	0.018	1.16	0.0	0.0	9.439	A
A-BCD	0.00	0.00	114.87	0.000	0.00	0.0	0.0	0.000	A
A-B	1.19	1.19			1.19				
A-C	14.95	14.95			14.95				
D-A	0.00	0.00	118.03	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	81.61	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.75	0.75	101.54	0.007	0.75	0.0	0.0	8.811	A
C-D	0.00	0.00			0.00				
C-A	23.45	23.45			23.45				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.44	0.44	78.42	0.006	0.45	0.0	0.0	6.871	A
B-AD	2.19	2.19	61.45	0.036	2.17	0.0	0.0	15.179	C
A-BCD	1.37	1.37	163.61	0.008	1.36	0.0	0.0	5.734	A
A-B	3.80	3.80			3.80				
A-C	15.56	15.56			15.56				
D-A	0.00	0.00	138.16	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.71	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.57	0.57	97.73	0.006	0.57	0.0	0.0	9.253	A
C-D	0.00	0.00			0.00				
C-A	18.46	18.46			18.46				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.65	1.65	155.92	0.011	1.64	0.0	0.0	7.062	A
B-AD	2.19	2.19	59.88	0.037	2.19	0.0	0.0	15.594	C
A-BCD	0.00	0.00	148.70	0.000	0.01	0.0	0.0	0.000	A
A-B	2.39	2.39			2.39				
A-C	22.65	22.65			22.65				
D-A	0.00	0.00	141.52	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.44	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.58	0.58	97.04	0.006	0.58	0.0	0.0	9.249	A
C-D	0.00	0.00			0.00				
C-A	19.19	19.19			19.19				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.44	0.44	81.01	0.005	0.45	0.0	0.0	6.844	A
B-AD	0.76	0.76	63.66	0.012	0.78	0.0	0.0	14.321	B
A-BCD	0.00	0.00	119.77	0.000	0.00	0.0	0.0	0.000	A
A-B	2.16	2.16			2.16				
A-C	12.07	12.07			12.07				
D-A	0.00	0.00	144.28	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	107.36	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.61	0.61	101.21	0.006	0.61	0.0	0.0	9.139	A
C-D	0.00	0.00			0.00				
C-A	23.99	23.99			23.99				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.65	1.65	165.54	0.010	1.64	0.0	0.0	6.646	A
B-AD	0.76	0.76	62.63	0.012	0.76	0.0	0.0	14.544	B
A-BCD	0.00	0.00	132.82	0.000	0.00	0.0	0.0	0.000	A
A-B	2.39	2.39			2.39				
A-C	21.95	21.95			21.95				
D-A	1.21	1.21	154.02	0.008	1.20	0.0	0.0	6.685	A
D-BC	0.00	0.00	83.71	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.97	1.97	104.69	0.019	1.95	0.0	0.0	8.921	A
C-D	0.00	0.00			0.00				
C-A	15.62	15.62			15.62				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	82.28	0.023	1.84	0.0	0.0	8.536	A
B-AD	3.35	3.35	123.04	0.027	3.33	0.0	0.0	8.911	A
A-BCD	1.53	1.53	140.86	0.011	1.52	0.0	0.0	5.923	A
A-B	3.12	3.12			3.12				
A-C	26.26	26.26			26.26				
D-A	0.00	0.00	151.75	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	81.20	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.47	0.47	101.67	0.005	0.49	0.0	0.0	8.572	A
C-D	0.00	0.00			0.00				
C-A	23.05	23.05			23.05				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.41	0.41	80.54	0.005	0.42	0.0	0.0	11.237	B
B-AD	0.71	0.71	81.14	0.009	0.73	0.0	0.0	8.028	A
A-BCD	1.46	1.46	132.87	0.011	1.46	0.0	0.0	6.652	A
A-B	2.15	2.15			2.15				
A-C	20.24	20.24			20.24				
D-A	0.00	0.00	146.81	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.48	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.98	1.98	113.28	0.017	1.96	0.0	0.0	8.233	A
C-D	0.00	0.00			0.00				
C-A	23.21	23.21			23.21				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.62	1.62	163.03	0.010	1.61	0.0	0.0	6.693	A
B-AD	0.71	0.71	74.98	0.009	0.70	0.0	0.0	12.115	B
A-BCD	0.00	0.00	114.77	0.000	0.01	0.0	0.0	0.000	A
A-B	3.39	3.39			3.39				
A-C	22.19	22.19			22.19				
D-A	0.00	0.00	144.85	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	103.47	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.50	0.50	101.57	0.005	0.51	0.0	0.0	8.102	A
C-D	0.00	0.00			0.00				
C-A	27.11	27.11			27.11				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.53	0.53	75.60	0.007	0.54	0.0	0.0	7.540	A
B-AD	3.55	3.55	58.98	0.060	3.49	0.0	0.1	15.573	C
A-BCD	0.00	0.00	128.49	0.000	0.00	0.0	0.0	0.000	A
A-B	2.18	2.18			2.18				
A-C	27.01	27.01			27.01				
D-A	1.21	1.21	146.97	0.008	1.20	0.0	0.0	6.173	A
D-BC	0.00	0.00	78.54	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.13	2.13	119.87	0.018	2.12	0.0	0.0	7.870	A
C-D	0.00	0.00			0.00				
C-A	31.27	31.27			31.27				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.82	1.82	149.39	0.012	1.81	0.0	0.0	7.302	A
B-AD	2.25	2.25	119.31	0.018	2.28	0.1	0.0	12.216	B
A-BCD	1.50	1.50	171.14	0.009	1.49	0.0	0.0	5.990	A
A-B	2.88	2.88			2.88				
A-C	30.59	30.59			30.59				
D-A	0.00	0.00	150.52	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	79.68	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.17	0.17	104.77	0.002	0.19	0.0	0.0	7.928	A
C-D	0.00	0.00			0.00				
C-A	26.73	26.73			26.73				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	78.99	0.008	0.62	0.0	0.0	7.538	A
B-AD	1.04	1.04	61.78	0.017	1.06	0.0	0.0	9.845	A
A-BCD	0.00	0.00	143.40	0.000	0.01	0.0	0.0	0.000	A
A-B	0.26	0.26			0.26				
A-C	39.31	39.31			39.31				
D-A	0.00	0.00	143.61	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	102.96	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.20	0.20	114.75	0.002	0.20	0.0	0.0	8.088	A
C-D	0.00	0.00			0.00				
C-A	41.19	41.19			41.19				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.61	0.61	76.64	0.008	0.61	0.0	0.0	11.837	B
B-AD	2.48	2.48	87.81	0.028	2.46	0.0	0.0	12.139	B
A-BCD	0.00	0.00	134.09	0.000	0.00	0.0	0.0	0.000	A
A-B	2.67	2.67			2.67				
A-C	25.34	25.34			25.34				
D-A	0.00	0.00	146.78	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	106.08	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.15	0.15	89.87	0.002	0.15	0.0	0.0	9.012	A
C-D	0.00	0.00			0.00				
C-A	13.48	13.48			13.48				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.91	2.91	165.64	0.017	2.89	0.0	0.0	6.463	A
B-AD	0.85	0.85	61.14	0.014	0.87	0.0	0.0	11.307	B
A-BCD	0.00	0.00	128.02	0.000	0.00	0.0	0.0	0.000	A
A-B	1.70	1.70			1.70				
A-C	25.34	25.34			25.34				
D-A	1.21	1.21	152.21	0.008	1.20	0.0	0.0	5.959	A
D-BC	0.00	0.00	82.10	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.56	1.56	125.94	0.012	1.54	0.0	0.0	7.488	A
C-D	0.00	0.00			0.00				
C-A	17.88	17.88			17.88				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.35	1.35	115.22	0.012	1.36	0.0	0.0	6.333	A
B-AD	1.68	1.68	120.74	0.014	1.67	0.0	0.0	10.072	B
A-BCD	0.00	0.00	130.70	0.000	0.00	0.0	0.0	0.000	A
A-B	1.74	1.74			1.74				
A-C	19.31	19.31			19.31				
D-A	0.00	0.00	150.61	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	80.91	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.92	1.92	125.02	0.015	1.92	0.0	0.0	7.216	A
C-D	0.00	0.00			0.00				
C-A	28.97	28.97			28.97				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.14	0.14	83.13	0.002	0.15	0.0	0.0	8.226	A
B-AD	0.24	0.24	83.90	0.003	0.26	0.0	0.0	7.618	A
A-BCD	2.73	2.73	161.74	0.017	2.71	0.0	0.0	5.639	A
A-B	2.90	2.90			2.90				
A-C	15.42	15.42			15.42				
D-A	0.00	0.00	147.70	0.000	0.00	0.0	0.0	0.000	A
D-BC	0.00	0.00	108.05	0.000	0.00	0.0	0.0	0.000	A
C-ABD	1.70	1.70	179.43	0.009	1.70	0.0	0.0	6.255	A
C-D	0.00	0.00			0.00				
C-A	23.91	23.91			23.91				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.35	1.35	118.72	0.011	1.34	0.0	0.0	7.951	A
B-AD	1.45	1.45	125.45	0.012	1.44	0.0	0.0	7.827	A
A-BCD	0.00	0.00	153.64	0.000	0.02	0.0	0.0	5.816	A
A-B	1.97	1.97			1.97				
A-C	10.86	10.86			10.86				
D-A	1.21	1.21	151.06	0.008	1.20	0.0	0.0	6.005	A
D-BC	0.00	0.00	82.79	0.000	0.00	0.0	0.0	0.000	A
C-ABD	0.31	0.31	95.42	0.003	0.32	0.0	0.0	5.636	A
C-D	0.00	0.00			0.00				
C-A	14.43	14.43			14.43				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.35	1.35	83.50	0.016	1.35	0.0	0.0	9.414	A
B-AD	2.89	2.89	128.56	0.022	2.88	0.0	0.0	7.160	A
A-BCD	1.31	1.31	161.06	0.008	1.30	0.0	0.0	5.634	A
A-B	0.53	0.53			0.53				
A-C	12.20	12.20			12.20				
D-A	0.00	0.00	153.74	0.000	0.01	0.0	0.0	0.000	A
D-BC	0.00	0.00	84.27	0.000	0.00	0.0	0.0	0.000	A
C-ABD	2.93	2.93	178.07	0.016	2.91	0.0	0.0	5.626	A
C-D	0.00	0.00			0.00				
C-A	15.43	15.43			15.43				

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.5.0.6896
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Filename: Site 04 Tobergal Bridge.j9
Path: W:\2021\P21-019\2024\Modelling\Site 04 - Tobergal Bridge
Report generation date: 29/07/2024 16:21:49

»Opening Year + Adj, 12 hrs
»+5 + Adj , 12 hrs
»+15 + Adj , 12 hrs
»Opening Year + Adj + Dev, 12 hrs
»+5 + Adj +Dev, 12 hrs
»+15 + Adj +Dev , 12 hrs

Summary of junction performance

	12 hrs			
	Queue (Veh)	Delay (s)	RFC	LOS
	Opening Year + Adj			
Stream B-C	0.0	8.67	0.03	A
Stream B-A	0.0	15.40	0.03	C
Stream C-AB	0.0	11.87	0.02	B
	+5 + Adj			
Stream B-C	0.0	8.93	0.03	A
Stream B-A	0.1	15.88	0.04	C
Stream C-AB	0.0	12.11	0.02	B
	+15 + Adj			
Stream B-C	0.0	9.22	0.04	A
Stream B-A	0.1	16.33	0.05	C
Stream C-AB	0.0	12.28	0.03	B
	Opening Year + Adj + Dev			
Stream B-C	0.0	7.23	0.02	A
Stream B-A	0.1	16.13	0.06	C
Stream C-AB	0.0	11.92	0.02	B
	+5 + Adj +Dev			
Stream B-C	0.0	7.63	0.03	A
Stream B-A	0.1	16.25	0.06	C
Stream C-AB	0.0	12.16	0.02	B
	+15 + Adj +Dev			
Stream B-C	0.0	8.10	0.04	A
Stream B-A	0.1	16.49	0.07	C
Stream C-AB	0.0	12.33	0.03	B

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

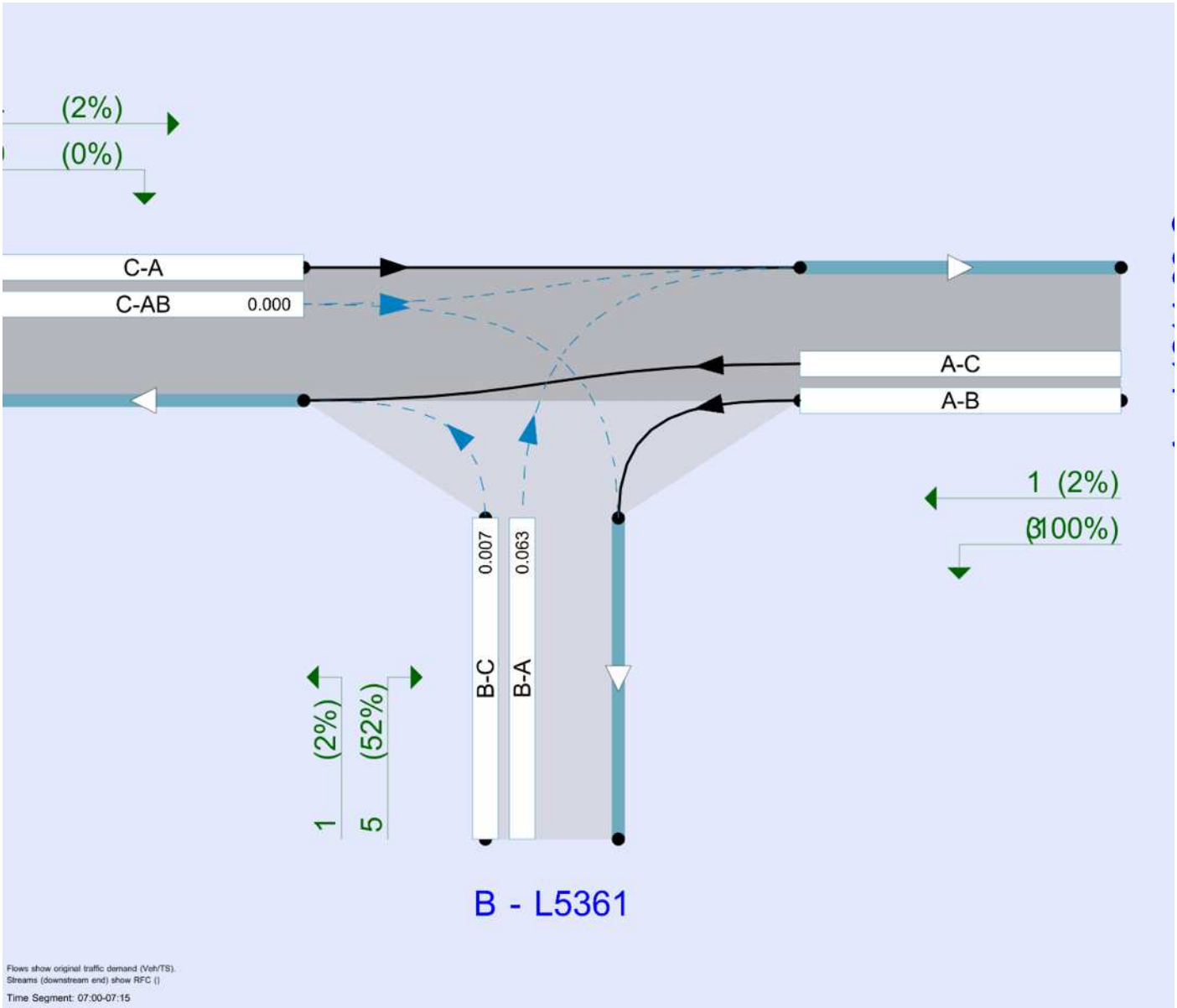
File summary

File Description

Title	Carrigcleena More
Location	Bweeng, Co.Cork
Site number	4
Date	25/07/2024
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	P21-019
Enumerator	PMCE\papadakisa
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perTimeSegment	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D1	Base Year	12 hrs	DIRECT	07:00	19:00	720	15			
D2	Opening Year	12 hrs	DIRECT	07:00	19:00	720	15			
D3	+5	12 hrs	DIRECT	07:00	19:00	720	15			
D4	+15	12 hrs	DIRECT	07:00	19:00	720	15			
D5	Adjacent Dev Traffic	12 hrs	DIRECT	07:00	19:00	720	15			
D6	Development Traffic	12 hrs	DIRECT	07:00	19:00	720	15			
D7	Opening Year + Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D2+D5
D8	+5 + Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D3+D5
D9	+15 + Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D4+D5
D10	Opening Year + Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D2+ D5 +D6
D11	+5 + Adj +Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D3+D5 + D6
D12	+15 + Adj +Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D4+D5 + D6

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

Opening Year + Adj, 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - L1214-10 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Tobergal Bridge	T-Junction	Two-way		3.14	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	L1214-38 S		Major
B	L5361		Minor
C	L1214-10 N		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C - L1214-10 N	5.50			0.0	✓	0.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B - L5361	One lane plus flare	10.00	3.00	2.20	2.20	2.20	✓	1.00	0	0

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (Veh/TS)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	118.506	0.088	0.223	0.140	0.319
1	B-C	187.218	0.117	0.296	-	-
1	C-B	143.491	0.227	0.227	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.
Streams may be combined, in which case capacity will be adjusted.
Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D7	Opening Year + Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D2+D5

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - L1214-38 S		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - L1214-10 N		DIRECT	✓	100.000

Origin-Destination Data

07:00 - 07:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.04	1.02
	B - L5361	2.04	0.00	1.02
	C - L1214-10 N	3.06	0.00	0.00

07:15 - 07:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - L5361	0.00	0.00	1.02
	C - L1214-10 N	1.02	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - L5361	1.04	0.00	1.02
	C - L1214-10 N	1.04	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	4.08
	B - L5361	0.00	0.00	1.02
	C - L1214-10 N	0.00	1.02	0.00

08:00 - 08:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.02	1.02	0.00

08:15 - 08:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.08	4.08
	B - L5361	0.00	0.00	1.02
	C - L1214-10 N	1.04	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	1.02
	C - L1214-10 N	3.08	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.02	2.04
	B - L5361	1.02	0.00	3.08
	C - L1214-10 N	3.06	1.02	0.00

09:00 - 09:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.02	3.06
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.04	2.06	0.00

09:15 - 09:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - L5361	2.04	0.00	0.00
	C - L1214-10 N	2.04	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	5.09
	B - L5361	1.04	0.00	1.02
	C - L1214-10 N	2.04	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.06	2.04	0.00

10:00 - 10:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.06	0.00
	B - L5361	1.02	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	3.06
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.06	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	3.06
	B - L5361	1.04	0.00	0.00
	C - L1214-10 N	2.04	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.06	2.04
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.06	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.06	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - L5361	1.02	0.00	0.00
	C - L1214-10 N	1.02	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	4.09
	B - L5361	1.04	0.00	0.00
	C - L1214-10 N	2.04	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.04	1.02
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.04	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.06	1.02	0.00

12:15 - 12:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	4.09
	B - L5361	1.04	0.00	2.04
	C - L1214-10 N	4.08	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.04	3.06
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.02	1.02	0.00

12:45 - 13:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	3.08
	B - L5361	1.02	0.00	0.00
	C - L1214-10 N	3.06	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	5.11	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.02	1.02	0.00

13:45 - 14:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	5.09
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.02	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	4.09	1.02	0.00

14:15 - 14:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - L5361	1.04	0.00	1.04
	C - L1214-10 N	2.04	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.08	2.04
	B - L5361	0.00	0.00	1.02
	C - L1214-10 N	3.08	1.02	0.00

14:45 - 15:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.04
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.04	2.04	0.00

15:00 - 15:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.04	1.02
	B - L5361	1.04	0.00	1.02
	C - L1214-10 N	1.02	2.04	0.00

15:15 - 15:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.09	5.11
	B - L5361	1.04	0.00	0.00
	C - L1214-10 N	1.02	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - L5361	2.06	0.00	1.02
	C - L1214-10 N	2.04	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.02	2.06
	B - L5361	1.04	0.00	0.00
	C - L1214-10 N	0.00	1.02	0.00

16:00 - 16:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.08	1.02
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	4.09	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - L5361	1.04	0.00	0.00
	C - L1214-10 N	3.08	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.02	2.04
	B - L5361	1.04	0.00	0.00
	C - L1214-10 N	1.04	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.06	4.11
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.04	1.02	0.00

17:00 - 17:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.04	3.08
	B - L5361	2.08	0.00	1.02
	C - L1214-10 N	2.04	1.04	0.00

17:15 - 17:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.04	4.08
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.06	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.02	5.09
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.06	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.04	4.08
	B - L5361	1.04	0.00	1.02
	C - L1214-10 N	1.02	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.06	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.02	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	4.08
	B - L5361	1.04	0.00	0.00
	C - L1214-10 N	0.00	1.02	0.00

18:45 - 19:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.04	2.06
	B - L5361	1.02	0.00	0.00
	C - L1214-10 N	0.00	1.02	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	93	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	93	0	0
	C - L1214-10 N	93	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	93	0
	B - L5361	0	0	0
	C - L1214-10 N	93	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	30	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	30
	C - L1214-10 N	0	0	0

09:00 - 09:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	93	46	0

09:15 - 09:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	93	0	0
	C - L1214-10 N	0	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	46	0	0

10:00 - 10:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	46	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	93	0	0
	C - L1214-10 N	0	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	46	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	22
	B - L5361	93	0	0
	C - L1214-10 N	0	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	93	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	46	0	0

12:15 - 12:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	22
	B - L5361	93	0	0
	C - L1214-10 N	0	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	93	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

12:45 - 13:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	30
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	17	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

13:45 - 14:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	22	0	0

14:15 - 14:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	93	0	93
	C - L1214-10 N	0	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	93	0
	B - L5361	0	0	0
	C - L1214-10 N	30	0	0

14:45 - 15:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	93
	B - L5361	0	0	0
	C - L1214-10 N	93	0	0

15:00 - 15:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	93	0
	B - L5361	93	0	0
	C - L1214-10 N	0	0	0

15:15 - 15:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	62	17
	B - L5361	93	0	0
	C - L1214-10 N	0	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	46	0	0
	C - L1214-10 N	0	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	46
	B - L5361	93	0	0
	C - L1214-10 N	0	0	0

16:00 - 16:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	93	0
	B - L5361	0	0	0
	C - L1214-10 N	22	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	93	0	0
	C - L1214-10 N	30	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	93	0	0
	C - L1214-10 N	93	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	46	46
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	93	30
	B - L5361	93	0	0
	C - L1214-10 N	0	93	0

17:15 - 17:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	93	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	93	0
	B - L5361	93	0	0
	C - L1214-10 N	0	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	46	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	93	0	0
	C - L1214-10 N	0	0	0

18:45 - 19:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	93	46
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.03	8.67	0.0	A	0.38	18.38
B-A	0.03	15.40	0.0	C	0.56	26.79
C-AB	0.02	11.87	0.0	B	0.45	21.67
C-A					1.83	87.63
A-B					0.67	31.96
A-C					2.21	106.15

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	185.87	0.005	1.01	0.0	0.0	4.868	A
B-A	2.04	2.04	117.67	0.017	2.02	0.0	0.0	7.781	A
C-AB	0.00	0.00	142.80	0.000	0.00	0.0	0.0	0.000	A
C-A	3.06	3.06			3.06				
A-B	1.04	1.04			1.04				
A-C	1.02	1.02			1.02				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	154.48	0.007	1.02	0.0	0.0	5.864	A
B-A	0.00	0.00	142.94	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	143.26	0.000	0.00	0.0	0.0	0.000	A
C-A	1.02	1.02			1.02				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	186.12	0.005	1.02	0.0	0.0	4.863	A
B-A	1.04	1.04	61.22	0.017	1.03	0.0	0.0	10.128	B
C-AB	0.00	0.00	116.30	0.000	0.00	0.0	0.0	0.000	A
C-A	1.04	1.04			1.04				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	153.73	0.007	1.02	0.0	0.0	5.892	A
B-A	0.00	0.00	73.62	0.000	0.01	0.0	0.0	0.000	A
C-AB	1.02	1.02	142.56	0.007	1.01	0.0	0.0	6.357	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	4.08	4.08			4.08				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	154.73	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	115.94	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.03	1.03	144.18	0.007	1.03	0.0	0.0	6.286	A
C-A	1.01	1.01			1.01				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	153.35	0.007	1.01	0.0	0.0	5.907	A
B-A	0.00	0.00	126.81	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	141.66	0.000	0.01	0.0	0.0	0.000	A
C-A	1.04	1.04			1.04				
A-B	2.08	2.08			2.08				
A-C	4.08	4.08			4.08				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	154.73	0.007	1.02	0.0	0.0	5.854	A
B-A	0.00	0.00	134.89	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	120.47	0.000	0.00	0.0	0.0	0.000	A
C-A	3.08	3.08			3.08				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	3.08	3.08	118.36	0.026	3.06	0.0	0.0	7.349	A
B-A	1.02	1.02	141.81	0.007	1.01	0.0	0.0	9.413	A
C-AB	1.04	1.04	144.88	0.007	1.03	0.0	0.0	6.256	A
C-A	3.03	3.03			3.03				
A-B	1.02	1.02			1.02				
A-C	2.04	2.04			2.04				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	118.32	0.000	0.02	0.0	0.0	0.000	A
B-A	0.00	0.00	140.95	0.000	0.01	0.0	0.0	0.000	A
C-AB	2.08	2.08	98.45	0.021	2.07	0.0	0.0	8.340	A
C-A	1.02	1.02			1.02				
A-B	1.02	1.02			1.02				
A-C	3.06	3.06			3.06				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	173.10	0.000	0.00	0.0	0.0	0.000	A
B-A	2.04	2.04	117.98	0.017	2.02	0.0	0.0	7.760	A
C-AB	0.00	0.00	99.46	0.000	0.02	0.0	0.0	9.111	A
C-A	2.04	2.04			2.04				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	184.91	0.006	1.01	0.0	0.0	6.006	A
B-A	1.04	1.04	61.24	0.017	1.04	0.0	0.0	10.213	B
C-AB	0.00	0.00	142.33	0.000	0.00	0.0	0.0	0.000	A
C-A	2.04	2.04			2.04				
A-B	0.00	0.00			0.00				
A-C	5.09	5.09			5.09				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.60	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	60.70	0.000	0.01	0.0	0.0	0.000	A
C-AB	2.07	2.07	144.13	0.014	2.05	0.0	0.0	6.334	A
C-A	2.03	2.03			2.03				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.46	0.000	0.00	0.0	0.0	0.000	A
B-A	1.02	1.02	118.24	0.009	1.01	0.0	0.0	11.313	B
C-AB	0.00	0.00	141.88	0.000	0.02	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	2.06	2.06			2.06				
A-C	0.00	0.00			0.00				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.31	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	117.40	0.000	0.01	0.0	0.0	0.000	A
C-AB	0.00	0.00	135.05	0.000	0.00	0.0	0.0	0.000	A
C-A	3.06	3.06			3.06				
A-B	0.00	0.00			0.00				
A-C	3.06	3.06			3.06				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.52	0.000	0.00	0.0	0.0	0.000	A
B-A	1.04	1.04	60.98	0.017	1.02	0.0	0.0	11.384	B
C-AB	0.00	0.00	138.82	0.000	0.00	0.0	0.0	0.000	A
C-A	2.04	2.04			2.04				
A-B	0.00	0.00			0.00				
A-C	3.06	3.06			3.06				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.25	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	60.89	0.000	0.01	0.0	0.0	0.000	A
C-AB	0.00	0.00	140.34	0.000	0.00	0.0	0.0	0.000	A
C-A	3.06	3.06			3.06				
A-B	2.06	2.06			2.06				
A-C	2.04	2.04			2.04				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	187.22	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	95.86	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	142.47	0.000	0.00	0.0	0.0	0.000	A
C-A	3.06	3.06			3.06				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.51	0.000	0.00	0.0	0.0	0.000	A
B-A	1.02	1.02	118.14	0.009	1.01	0.0	0.0	11.323	B
C-AB	0.00	0.00	142.75	0.000	0.00	0.0	0.0	0.000	A
C-A	1.02	1.02			1.02				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.94	0.000	0.00	0.0	0.0	0.000	A
B-A	1.04	1.04	61.12	0.017	1.04	0.0	0.0	11.429	B
C-AB	0.00	0.00	142.10	0.000	0.00	0.0	0.0	0.000	A
C-A	2.04	2.04			2.04				
A-B	0.00	0.00			0.00				
A-C	4.09	4.09			4.09				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.67	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	61.13	0.000	0.01	0.0	0.0	0.000	A
C-AB	0.00	0.00	142.68	0.000	0.00	0.0	0.0	0.000	A
C-A	2.04	2.04			2.04				
A-B	1.04	1.04			1.04				
A-C	1.02	1.02			1.02				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.61	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	95.23	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.03	1.03	144.13	0.007	1.03	0.0	0.0	6.288	A
C-A	2.04	2.04			2.04				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.04	2.04	152.97	0.013	2.02	0.0	0.0	5.962	A
B-A	1.04	1.04	73.33	0.014	1.02	0.0	0.0	12.446	B
C-AB	0.00	0.00	141.42	0.000	0.01	0.0	0.0	0.000	A
C-A	4.08	4.08			4.08				
A-B	0.00	0.00			0.00				
A-C	4.09	4.09			4.09				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.07	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	60.80	0.000	0.01	0.0	0.0	0.000	A
C-AB	1.03	1.03	143.04	0.007	1.02	0.0	0.0	6.357	A
C-A	1.01	1.01			1.01				
A-B	1.04	1.04			1.04				
A-C	3.06	3.06			3.06				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.63	0.000	0.00	0.0	0.0	0.000	A
B-A	1.02	1.02	117.18	0.009	1.01	0.0	0.0	11.416	B
C-AB	0.00	0.00	142.58	0.000	0.01	0.0	0.0	0.000	A
C-A	3.06	3.06			3.06				
A-B	0.00	0.00			0.00				
A-C	3.08	3.08			3.08				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	187.21	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	117.66	0.000	0.01	0.0	0.0	0.000	A
C-AB	0.00	0.00	137.53	0.000	0.00	0.0	0.0	0.000	A
C-A	5.11	5.11			5.11				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.61	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	118.05	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	139.99	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	187.22	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	118.04	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.03	1.03	144.18	0.007	1.02	0.0	0.0	6.286	A
C-A	1.01	1.01			1.01				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.71	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	117.37	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	142.33	0.000	0.01	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	5.09	5.09			5.09				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	187.10	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	117.39	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.05	1.05	145.76	0.007	1.04	0.0	0.0	6.199	A
C-A	4.06	4.06			4.06				
A-B	1.02	1.02			1.02				
A-C	0.00	0.00			0.00				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.04	1.04	96.41	0.011	1.03	0.0	0.0	6.405	A
B-A	1.04	1.04	61.10	0.017	1.02	0.0	0.0	11.362	B
C-AB	0.00	0.00	142.14	0.000	0.01	0.0	0.0	0.000	A
C-A	2.04	2.04			2.04				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	152.82	0.007	1.02	0.0	0.0	8.671	A
B-A	0.00	0.00	73.33	0.000	0.01	0.0	0.0	0.000	A
C-AB	1.04	1.04	143.93	0.007	1.03	0.0	0.0	6.297	A
C-A	3.05	3.05			3.05				
A-B	2.08	2.08			2.08				
A-C	2.04	2.04			2.04				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	154.24	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	115.05	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.05	2.05	143.44	0.014	2.05	0.0	0.0	6.364	A
C-A	1.02	1.02			1.02				
A-B	0.00	0.00			0.00				
A-C	1.04	1.04			1.04				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	185.88	0.005	1.01	0.0	0.0	4.867	A
B-A	1.04	1.04	60.86	0.017	1.02	0.0	0.0	15.036	C
C-AB	2.05	2.05	143.49	0.014	2.05	0.0	0.0	6.386	A
C-A	1.00	1.00			1.00				
A-B	1.04	1.04			1.04				
A-C	1.02	1.02			1.02				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.05	0.000	0.01	0.0	0.0	0.000	A
B-A	1.04	1.04	60.49	0.017	1.04	0.0	0.0	15.137	C
C-AB	0.00	0.00	140.99	0.000	0.01	0.0	0.0	0.000	A
C-A	1.02	1.02			1.02				
A-B	3.09	3.09			3.09				
A-C	5.11	5.11			5.11				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	185.71	0.005	1.01	0.0	0.0	4.872	A
B-A	2.06	2.06	80.67	0.025	2.05	0.0	0.0	12.679	B
C-AB	0.00	0.00	143.26	0.000	0.00	0.0	0.0	0.000	A
C-A	2.04	2.04			2.04				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.40	0.000	0.01	0.0	0.0	0.000	A
B-A	1.04	1.04	61.33	0.017	1.05	0.0	0.0	12.568	B
C-AB	1.02	1.02	142.58	0.007	1.01	0.0	0.0	6.357	A
C-A	0.00	0.00			0.00				
A-B	1.02	1.02			1.02				
A-C	2.06	2.06			2.06				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.44	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	60.82	0.000	0.01	0.0	0.0	0.000	A
C-AB	0.00	0.00	142.35	0.000	0.01	0.0	0.0	0.000	A
C-A	4.09	4.09			4.09				
A-B	2.08	2.08			2.08				
A-C	1.02	1.02			1.02				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.82	0.000	0.00	0.0	0.0	0.000	A
B-A	1.04	1.04	60.96	0.017	1.02	0.0	0.0	15.012	C
C-AB	0.00	0.00	129.70	0.000	0.00	0.0	0.0	0.000	A
C-A	3.08	3.08			3.08				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.69	0.000	0.00	0.0	0.0	0.000	A
B-A	1.04	1.04	61.06	0.017	1.04	0.0	0.0	14.993	B
C-AB	0.00	0.00	111.28	0.000	0.00	0.0	0.0	0.000	A
C-A	1.04	1.04			1.04				
A-B	1.02	1.02			1.02				
A-C	2.04	2.04			2.04				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.07	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	60.34	0.000	0.02	0.0	0.0	0.000	A
C-AB	1.03	1.03	142.84	0.007	1.03	0.0	0.0	6.345	A
C-A	2.02	2.02			2.02				
A-B	2.06	2.06			2.06				
A-C	4.11	4.11			4.11				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	184.20	0.006	1.01	0.0	0.0	4.912	A
B-A	2.08	2.08	60.45	0.034	2.04	0.0	0.0	15.396	C
C-AB	1.07	1.07	75.71	0.014	1.06	0.0	0.0	9.243	A
C-A	2.01	2.01			2.01				
A-B	1.04	1.04			1.04				
A-C	3.08	3.08			3.08				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.75	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	60.70	0.000	0.03	0.0	0.0	0.000	A
C-AB	0.00	0.00	77.22	0.000	0.01	0.0	0.0	11.874	B
C-A	3.06	3.06			3.06				
A-B	1.04	1.04			1.04				
A-C	4.08	4.08			4.08				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.59	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	94.86	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	142.10	0.000	0.00	0.0	0.0	0.000	A
C-A	3.06	3.06			3.06				
A-B	1.02	1.02			1.02				
A-C	5.09	5.09			5.09				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	184.98	0.006	1.01	0.0	0.0	4.891	A
B-A	1.04	1.04	60.85	0.017	1.02	0.0	0.0	15.040	C
C-AB	0.00	0.00	134.32	0.000	0.00	0.0	0.0	0.000	A
C-A	1.02	1.02			1.02				
A-B	1.04	1.04			1.04				
A-C	4.08	4.08			4.08				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.85	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	61.35	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	138.79	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	2.06	2.06			2.06				
A-C	0.00	0.00			0.00				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.61	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	95.72	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	140.98	0.000	0.00	0.0	0.0	0.000	A
C-A	1.02	1.02			1.02				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.22	0.000	0.00	0.0	0.0	0.000	A
B-A	1.04	1.04	60.85	0.017	1.02	0.0	0.0	15.040	C
C-AB	1.02	1.02	142.56	0.007	1.01	0.0	0.0	6.357	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	4.08	4.08			4.08				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.68	0.000	0.00	0.0	0.0	0.000	A
B-A	1.02	1.02	115.55	0.009	1.02	0.0	0.0	11.407	B
C-AB	1.02	1.02	142.35	0.007	1.02	0.0	0.0	6.367	A
C-A	0.00	0.00			0.00				
A-B	1.04	1.04			1.04				
A-C	2.06	2.06			2.06				

+5 + Adj , 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - L1214-10 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Tobergal Bridge	T-Junction	Two-way		3.28	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D8	+5 + Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D3+D5

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - L1214-38 S		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - L1214-10 N		DIRECT	✓	100.000

Origin-Destination Data

07:00 - 07:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.22	1.11
	B - L5361	2.22	0.00	1.11
	C - L1214-10 N	3.32	0.00	0.00

07:15 - 07:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - L5361	0.00	0.00	1.11
	C - L1214-10 N	1.11	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - L5361	1.22	0.00	1.11
	C - L1214-10 N	1.22	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	4.43
	B - L5361	0.00	0.00	1.11
	C - L1214-10 N	0.00	1.11	0.00

08:00 - 08:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.11	1.11	0.00

08:15 - 08:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.45	4.43
	B - L5361	0.00	0.00	1.11
	C - L1214-10 N	1.22	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	1.11
	C - L1214-10 N	3.44	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.11	2.22
	B - L5361	1.11	0.00	3.44
	C - L1214-10 N	3.32	1.11	0.00

09:00 - 09:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.11	3.32
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.22	2.33	0.00

09:15 - 09:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - L5361	2.22	0.00	0.00
	C - L1214-10 N	2.22	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	5.54
	B - L5361	1.22	0.00	1.11
	C - L1214-10 N	2.22	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.33	2.22	0.00

10:00 - 10:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.33	0.00
	B - L5361	1.11	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	3.32
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.32	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	3.32
	B - L5361	1.22	0.00	0.00
	C - L1214-10 N	2.22	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.33	2.22
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.32	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.32	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - L5361	1.11	0.00	0.00
	C - L1214-10 N	1.11	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	4.55
	B - L5361	1.22	0.00	0.00
	C - L1214-10 N	2.22	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.22	1.11
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.22	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.33	1.11	0.00

12:15 - 12:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	4.55
	B - L5361	1.22	0.00	2.22
	C - L1214-10 N	4.43	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.22	3.32
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.11	1.11	0.00

12:45 - 13:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	3.44
	B - L5361	1.11	0.00	0.00
	C - L1214-10 N	3.32	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	5.65	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.11	1.11	0.00

13:45 - 14:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	5.54
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.11	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	4.55	1.11	0.00

14:15 - 14:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - L5361	1.22	0.00	1.22
	C - L1214-10 N	2.22	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.45	2.22
	B - L5361	0.00	0.00	1.11
	C - L1214-10 N	3.44	1.11	0.00

14:45 - 15:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.22
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.22	2.22	0.00

15:00 - 15:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.22	1.11
	B - L5361	1.22	0.00	1.11
	C - L1214-10 N	1.11	2.22	0.00

15:15 - 15:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.55	5.65
	B - L5361	1.22	0.00	0.00
	C - L1214-10 N	1.11	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - L5361	2.33	0.00	1.11
	C - L1214-10 N	2.22	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.11	2.33
	B - L5361	1.22	0.00	0.00
	C - L1214-10 N	0.00	1.11	0.00

16:00 - 16:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.45	1.11
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	4.55	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - L5361	1.22	0.00	0.00
	C - L1214-10 N	3.44	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.11	2.22
	B - L5361	1.22	0.00	0.00
	C - L1214-10 N	1.22	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.33	4.66
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.22	1.11	0.00

17:00 - 17:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.22	3.44
	B - L5361	2.45	0.00	1.11
	C - L1214-10 N	2.22	1.22	0.00

17:15 - 17:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.22	4.43
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.32	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.11	5.54
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.32	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.22	4.43
	B - L5361	1.22	0.00	1.11
	C - L1214-10 N	1.11	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.33	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.11	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	4.43
	B - L5361	1.22	0.00	0.00
	C - L1214-10 N	0.00	1.11	0.00

18:45 - 19:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.22	2.33
	B - L5361	1.11	0.00	0.00
	C - L1214-10 N	0.00	1.11	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	97	0	0
	C - L1214-10 N	97	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	0	0	0
	C - L1214-10 N	97	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	34	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	34
	C - L1214-10 N	0	0	0

09:00 - 09:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	97	50	0

09:15 - 09:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	50	0	0

10:00 - 10:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	50	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	50	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	25
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	50	0	0

12:15 - 12:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	25
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

12:45 - 13:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	34
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	20	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

13:45 - 14:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	25	0	0

14:15 - 14:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	97	0	97
	C - L1214-10 N	0	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	0	0	0
	C - L1214-10 N	34	0	0

14:45 - 15:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	97
	B - L5361	0	0	0
	C - L1214-10 N	97	0	0

15:00 - 15:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

15:15 - 15:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	66	20
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	50	0	0
	C - L1214-10 N	0	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	50
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

16:00 - 16:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	0	0	0
	C - L1214-10 N	25	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	97	0	0
	C - L1214-10 N	34	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	97	0	0
	C - L1214-10 N	97	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	50	50
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	34
	B - L5361	97	0	0
	C - L1214-10 N	0	97	0

17:15 - 17:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	50	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

18:45 - 19:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	50
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.03	8.93	0.0	A	0.42	20.17
B-A	0.04	15.88	0.1	C	0.64	30.63
C-AB	0.02	12.11	0.0	B	0.50	23.78
C-A					2.01	96.46
A-B					0.76	36.63
A-C					2.42	116.35

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	185.73	0.006	1.10	0.0	0.0	4.874	A
B-A	2.22	2.22	117.58	0.019	2.20	0.0	0.0	7.799	A
C-AB	0.00	0.00	142.69	0.000	0.00	0.0	0.0	0.000	A
C-A	3.32	3.32			3.32				
A-B	1.22	1.22			1.22				
A-C	1.11	1.11			1.11				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	154.46	0.007	1.11	0.0	0.0	5.868	A
B-A	0.00	0.00	142.90	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	143.24	0.000	0.00	0.0	0.0	0.000	A
C-A	1.11	1.11			1.11				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	185.93	0.006	1.11	0.0	0.0	4.869	A
B-A	1.22	1.22	59.90	0.020	1.21	0.0	0.0	10.403	B
C-AB	0.00	0.00	115.32	0.000	0.00	0.0	0.0	0.000	A
C-A	1.22	1.22			1.22				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	153.64	0.007	1.11	0.0	0.0	5.899	A
B-A	0.00	0.00	72.01	0.000	0.01	0.0	0.0	0.000	A
C-AB	1.11	1.11	142.48	0.008	1.10	0.0	0.0	6.365	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	4.43	4.43			4.43				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	154.73	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	114.94	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.12	1.12	144.25	0.008	1.12	0.0	0.0	6.287	A
C-A	1.10	1.10			1.10				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	153.18	0.007	1.10	0.0	0.0	5.917	A
B-A	0.00	0.00	126.01	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	141.39	0.000	0.01	0.0	0.0	0.000	A
C-A	1.22	1.22			1.22				
A-B	2.45	2.45			2.45				
A-C	4.43	4.43			4.43				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	154.73	0.007	1.11	0.0	0.0	5.857	A
B-A	0.00	0.00	134.46	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	119.00	0.000	0.00	0.0	0.0	0.000	A
C-A	3.44	3.44			3.44				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	3.44	3.44	114.92	0.030	3.42	0.0	0.0	7.563	A
B-A	1.11	1.11	141.67	0.008	1.10	0.0	0.0	9.692	A
C-AB	1.13	1.13	145.00	0.008	1.13	0.0	0.0	6.254	A
C-A	3.30	3.30			3.30				
A-B	1.11	1.11			1.11				
A-C	2.22	2.22			2.22				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	114.88	0.000	0.03	0.0	0.0	0.000	A
B-A	0.00	0.00	140.61	0.000	0.01	0.0	0.0	0.000	A
C-AB	2.36	2.36	95.57	0.025	2.35	0.0	0.0	8.582	A
C-A	1.19	1.19			1.19				
A-B	1.11	1.11			1.11				
A-C	3.32	3.32			3.32				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	171.49	0.000	0.00	0.0	0.0	0.000	A
B-A	2.22	2.22	117.94	0.019	2.20	0.0	0.0	7.775	A
C-AB	0.00	0.00	96.59	0.000	0.02	0.0	0.0	9.391	A
C-A	2.21	2.21			2.21				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	184.61	0.006	1.10	0.0	0.0	6.170	A
B-A	1.22	1.22	59.87	0.021	1.23	0.0	0.0	10.493	B
C-AB	0.00	0.00	142.23	0.000	0.00	0.0	0.0	0.000	A
C-A	2.22	2.22			2.22				
A-B	0.00	0.00			0.00				
A-C	5.54	5.54			5.54				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.55	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	59.34	0.000	0.01	0.0	0.0	0.000	A
C-AB	2.25	2.25	144.20	0.016	2.24	0.0	0.0	6.339	A
C-A	2.29	2.29			2.29				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.37	0.000	0.00	0.0	0.0	0.000	A
B-A	1.11	1.11	118.19	0.009	1.09	0.0	0.0	11.645	B
C-AB	0.00	0.00	141.54	0.000	0.02	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	2.33	2.33			2.33				
A-C	0.00	0.00			0.00				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.23	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	117.30	0.000	0.01	0.0	0.0	0.000	A
C-AB	0.00	0.00	134.28	0.000	0.00	0.0	0.0	0.000	A
C-A	3.32	3.32			3.32				
A-B	0.00	0.00			0.00				
A-C	3.32	3.32			3.32				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.28	0.000	0.00	0.0	0.0	0.000	A
B-A	1.22	1.22	59.67	0.020	1.21	0.0	0.0	11.733	B
C-AB	0.00	0.00	138.38	0.000	0.00	0.0	0.0	0.000	A
C-A	2.22	2.22			2.22				
A-B	0.00	0.00			0.00				
A-C	3.32	3.32			3.32				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.14	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	59.56	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	139.99	0.000	0.00	0.0	0.0	0.000	A
C-A	3.32	3.32			3.32				
A-B	2.33	2.33			2.33				
A-C	2.22	2.22			2.22				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	187.22	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	95.03	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	142.37	0.000	0.00	0.0	0.0	0.000	A
C-A	3.32	3.32			3.32				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.45	0.000	0.00	0.0	0.0	0.000	A
B-A	1.11	1.11	118.10	0.009	1.09	0.0	0.0	11.654	B
C-AB	0.00	0.00	142.68	0.000	0.00	0.0	0.0	0.000	A
C-A	1.11	1.11			1.11				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.57	0.000	0.00	0.0	0.0	0.000	A
B-A	1.22	1.22	59.74	0.021	1.22	0.0	0.0	11.793	B
C-AB	0.00	0.00	141.92	0.000	0.00	0.0	0.0	0.000	A
C-A	2.22	2.22			2.22				
A-B	0.00	0.00			0.00				
A-C	4.55	4.55			4.55				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.59	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	59.81	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	142.55	0.000	0.00	0.0	0.0	0.000	A
C-A	2.22	2.22			2.22				
A-B	1.22	1.22			1.22				
A-C	1.11	1.11			1.11				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.56	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	94.33	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.13	1.13	144.20	0.008	1.12	0.0	0.0	6.289	A
C-A	2.31	2.31			2.31				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.22	2.22	184.57	0.012	2.20	0.0	0.0	4.935	A
B-A	1.22	1.22	59.24	0.021	1.20	0.0	0.0	15.502	C
C-AB	0.00	0.00	141.04	0.000	0.01	0.0	0.0	0.000	A
C-A	4.43	4.43			4.43				
A-B	0.00	0.00			0.00				
A-C	4.55	4.55			4.55				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.93	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	59.46	0.000	0.02	0.0	0.0	0.000	A
C-AB	1.12	1.12	142.95	0.008	1.11	0.0	0.0	6.371	A
C-A	1.10	1.10			1.10				
A-B	1.22	1.22			1.22				
A-C	3.32	3.32			3.32				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.41	0.000	0.00	0.0	0.0	0.000	A
B-A	1.11	1.11	117.01	0.009	1.09	0.0	0.0	11.764	B
C-AB	0.00	0.00	142.44	0.000	0.01	0.0	0.0	0.000	A
C-A	3.32	3.32			3.32				
A-B	0.00	0.00			0.00				
A-C	3.44	3.44			3.44				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	187.21	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	117.55	0.000	0.01	0.0	0.0	0.000	A
C-AB	0.00	0.00	136.57	0.000	0.00	0.0	0.0	0.000	A
C-A	5.65	5.65			5.65				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.56	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	118.01	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	139.46	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	187.22	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	118.00	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.12	1.12	144.25	0.008	1.11	0.0	0.0	6.287	A
C-A	1.10	1.10			1.10				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.58	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	117.27	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	142.23	0.000	0.01	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	5.54	5.54			5.54				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	187.09	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	117.26	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.14	1.14	145.97	0.008	1.13	0.0	0.0	6.189	A
C-A	4.51	4.51			4.51				
A-B	1.11	1.11			1.11				
A-C	0.00	0.00			0.00				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	94.29	0.013	1.21	0.0	0.0	6.576	A
B-A	1.22	1.22	59.79	0.020	1.21	0.0	0.0	11.709	B
C-AB	0.00	0.00	141.86	0.000	0.01	0.0	0.0	0.000	A
C-A	2.22	2.22			2.22				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	152.53	0.007	1.11	0.0	0.0	8.926	A
B-A	0.00	0.00	71.66	0.000	0.02	0.0	0.0	0.000	A
C-AB	1.13	1.13	143.88	0.008	1.13	0.0	0.0	6.303	A
C-A	3.41	3.41			3.41				
A-B	2.45	2.45			2.45				
A-C	2.22	2.22			2.22				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	154.15	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	113.89	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.23	2.23	143.40	0.016	2.23	0.0	0.0	6.374	A
C-A	1.20	1.20			1.20				
A-B	0.00	0.00			0.00				
A-C	1.22	1.22			1.22				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	185.65	0.006	1.10	0.0	0.0	4.876	A
B-A	1.22	1.22	59.53	0.021	1.20	0.0	0.0	15.425	C
C-AB	2.23	2.23	143.44	0.016	2.23	0.0	0.0	6.399	A
C-A	1.09	1.09			1.09				
A-B	1.22	1.22			1.22				
A-C	1.11	1.11			1.11				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.54	0.000	0.01	0.0	0.0	0.000	A
B-A	1.22	1.22	59.08	0.021	1.22	0.0	0.0	15.554	C
C-AB	0.00	0.00	141.36	0.000	0.02	0.0	0.0	6.369	A
C-A	1.11	1.11			1.11				
A-B	3.55	3.55			3.55				
A-C	5.65	5.65			5.65				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	185.48	0.006	1.10	0.0	0.0	4.880	A
B-A	2.33	2.33	78.20	0.030	2.32	0.0	0.0	13.125	B
C-AB	0.00	0.00	143.24	0.000	0.00	0.0	0.0	0.000	A
C-A	2.22	2.22			2.22				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.07	0.000	0.01	0.0	0.0	0.000	A
B-A	1.22	1.22	59.96	0.021	1.24	0.0	0.0	13.001	B
C-AB	1.11	1.11	142.44	0.008	1.10	0.0	0.0	6.367	A
C-A	0.00	0.00			0.00				
A-B	1.11	1.11			1.11				
A-C	2.33	2.33			2.33				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.31	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	59.45	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	142.15	0.000	0.01	0.0	0.0	0.000	A
C-A	4.55	4.55			4.55				
A-B	2.45	2.45			2.45				
A-C	1.11	1.11			1.11				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.60	0.000	0.00	0.0	0.0	0.000	A
B-A	1.22	1.22	59.62	0.021	1.20	0.0	0.0	15.400	C
C-AB	0.00	0.00	128.07	0.000	0.00	0.0	0.0	0.000	A
C-A	3.44	3.44			3.44				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.46	0.000	0.00	0.0	0.0	0.000	A
B-A	1.22	1.22	59.73	0.020	1.22	0.0	0.0	15.382	C
C-AB	0.00	0.00	109.77	0.000	0.00	0.0	0.0	0.000	A
C-A	1.22	1.22			1.22				
A-B	1.11	1.11			1.11				
A-C	2.22	2.22			2.22				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.71	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	58.91	0.000	0.02	0.0	0.0	0.000	A
C-AB	1.13	1.13	142.62	0.008	1.12	0.0	0.0	6.359	A
C-A	2.20	2.20			2.20				
A-B	2.33	2.33			2.33				
A-C	4.66	4.66			4.66				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	183.64	0.006	1.10	0.0	0.0	4.930	A
B-A	2.45	2.45	59.02	0.041	2.40	0.0	0.0	15.883	C
C-AB	1.26	1.26	74.18	0.017	1.26	0.0	0.0	9.514	A
C-A	2.18	2.18			2.18				
A-B	1.22	1.22			1.22				
A-C	3.44	3.44			3.44				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.59	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	59.35	0.000	0.04	0.0	0.0	0.000	A
C-AB	0.00	0.00	75.92	0.000	0.01	0.0	0.0	12.106	B
C-A	3.32	3.32			3.32				
A-B	1.22	1.22			1.22				
A-C	4.43	4.43			4.43				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.45	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	93.96	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	141.98	0.000	0.00	0.0	0.0	0.000	A
C-A	3.32	3.32			3.32				
A-B	1.11	1.11			1.11				
A-C	5.54	5.54			5.54				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	184.67	0.006	1.10	0.0	0.0	4.902	A
B-A	1.22	1.22	59.51	0.021	1.20	0.0	0.0	15.429	C
C-AB	0.00	0.00	133.84	0.000	0.00	0.0	0.0	0.000	A
C-A	1.11	1.11			1.11				
A-B	1.22	1.22			1.22				
A-C	4.43	4.43			4.43				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.79	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	60.04	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	138.50	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	2.33	2.33			2.33				
A-C	0.00	0.00			0.00				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.56	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	94.88	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	140.86	0.000	0.00	0.0	0.0	0.000	A
C-A	1.11	1.11			1.11				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.95	0.000	0.00	0.0	0.0	0.000	A
B-A	1.22	1.22	59.52	0.021	1.20	0.0	0.0	15.427	C
C-AB	1.11	1.11	142.48	0.008	1.10	0.0	0.0	6.365	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	4.43	4.43			4.43				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.44	0.000	0.00	0.0	0.0	0.000	A
B-A	1.11	1.11	115.10	0.009	1.11	0.0	0.0	11.754	B
C-AB	1.11	1.11	142.15	0.008	1.11	0.0	0.0	6.380	A
C-A	0.00	0.00			0.00				
A-B	1.22	1.22			1.22				
A-C	2.33	2.33			2.33				

+15 + Adj , 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - L1214-10 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Tobergal Bridge	T-Junction	Two-way		3.39	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D9	+15 + Adj	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D4+D5

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - L1214-38 S		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - L1214-10 N		DIRECT	✓	100.000

Origin-Destination Data

07:00 - 07:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.44	1.21
	B - L5361	2.41	0.00	1.21
	C - L1214-10 N	3.62	0.00	0.00

07:15 - 07:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - L5361	0.00	0.00	1.21
	C - L1214-10 N	1.21	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - L5361	1.44	0.00	1.21
	C - L1214-10 N	1.44	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	4.83
	B - L5361	0.00	0.00	1.21
	C - L1214-10 N	0.00	1.21	0.00

08:00 - 08:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.21	1.21	0.00

08:15 - 08:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.88	4.83
	B - L5361	0.00	0.00	1.21
	C - L1214-10 N	1.44	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	1.21
	C - L1214-10 N	3.85	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.21	2.41
	B - L5361	1.21	0.00	3.85
	C - L1214-10 N	3.62	1.21	0.00

09:00 - 09:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.21	3.62
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.44	2.65	0.00

09:15 - 09:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - L5361	2.41	0.00	0.00
	C - L1214-10 N	2.41	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	6.03
	B - L5361	1.44	0.00	1.21
	C - L1214-10 N	2.41	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.65	2.41	0.00

10:00 - 10:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.65	0.00
	B - L5361	1.21	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	3.62
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.62	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	3.62
	B - L5361	1.44	0.00	0.00
	C - L1214-10 N	2.41	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.65	2.41
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.62	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.62	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - L5361	1.21	0.00	0.00
	C - L1214-10 N	1.21	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	5.06
	B - L5361	1.44	0.00	0.00
	C - L1214-10 N	2.41	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.44	1.21
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.41	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.65	1.21	0.00

12:15 - 12:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	5.06
	B - L5361	1.44	0.00	2.41
	C - L1214-10 N	4.83	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.44	3.62
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.21	1.21	0.00

12:45 - 13:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	3.85
	B - L5361	1.21	0.00	0.00
	C - L1214-10 N	3.62	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	6.27	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.21	1.21	0.00

13:45 - 14:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	6.03
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.21	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	5.06	1.21	0.00

14:15 - 14:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - L5361	1.44	0.00	1.44
	C - L1214-10 N	2.41	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.88	2.41
	B - L5361	0.00	0.00	1.21
	C - L1214-10 N	3.85	1.21	0.00

14:45 - 15:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.44
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.44	2.41	0.00

15:00 - 15:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.44	1.21
	B - L5361	1.44	0.00	1.21
	C - L1214-10 N	1.21	2.41	0.00

15:15 - 15:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	4.08	6.27
	B - L5361	1.44	0.00	0.00
	C - L1214-10 N	1.21	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - L5361	2.65	0.00	1.21
	C - L1214-10 N	2.41	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.21	2.65
	B - L5361	1.44	0.00	0.00
	C - L1214-10 N	0.00	1.21	0.00

16:00 - 16:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.88	1.21
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	5.06	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - L5361	1.44	0.00	0.00
	C - L1214-10 N	3.85	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.21	2.41
	B - L5361	1.44	0.00	0.00
	C - L1214-10 N	1.44	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.65	5.29
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	2.41	1.21	0.00

17:00 - 17:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.44	3.85
	B - L5361	2.88	0.00	1.21
	C - L1214-10 N	2.41	1.44	0.00

17:15 - 17:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.44	4.83
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.62	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.21	6.03
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	3.62	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.44	4.83
	B - L5361	1.44	0.00	1.21
	C - L1214-10 N	1.21	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.65	0.00
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - L5361	0.00	0.00	0.00
	C - L1214-10 N	1.21	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.00	4.83
	B - L5361	1.44	0.00	0.00
	C - L1214-10 N	0.00	1.21	0.00

18:45 - 19:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.44	2.65
	B - L5361	1.21	0.00	0.00
	C - L1214-10 N	0.00	1.21	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	2	0	2
	C - L1214-10 N	2	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	0	0	2
	C - L1214-10 N	2	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	100	0	2
	C - L1214-10 N	100	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	0	0	2
	C - L1214-10 N	0	2	0

08:00 - 08:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	2	2	0

08:15 - 08:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	0	0	2
	C - L1214-10 N	100	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	2
	C - L1214-10 N	42	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	2	2
	B - L5361	2	0	42
	C - L1214-10 N	2	2	0

09:00 - 09:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	2	2
	B - L5361	0	0	0
	C - L1214-10 N	100	60	0

09:15 - 09:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	2	0	0
	C - L1214-10 N	2	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	100	0	2
	C - L1214-10 N	2	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	0	0	0
	C - L1214-10 N	60	2	0

10:00 - 10:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	60	0
	B - L5361	2	0	0
	C - L1214-10 N	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	0	0	0
	C - L1214-10 N	2	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	100	0	0
	C - L1214-10 N	2	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	60	2
	B - L5361	0	0	0
	C - L1214-10 N	2	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	2	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	2	0	0
	C - L1214-10 N	2	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	33
	B - L5361	100	0	0
	C - L1214-10 N	2	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	0	0	0
	C - L1214-10 N	2	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	0	0	0
	C - L1214-10 N	60	2	0

12:15 - 12:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	33
	B - L5361	100	0	2
	C - L1214-10 N	2	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	0	0	0
	C - L1214-10 N	2	2	0

12:45 - 13:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	42
	B - L5361	2	0	0
	C - L1214-10 N	2	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	27	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	0
	B - L5361	0	0	0
	C - L1214-10 N	2	2	0

13:45 - 14:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	2	0
	B - L5361	0	0	0
	C - L1214-10 N	33	2	0

14:15 - 14:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	100	0	100
	C - L1214-10 N	2	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	0	0	2
	C - L1214-10 N	42	2	0

14:45 - 15:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	100
	B - L5361	0	0	0
	C - L1214-10 N	100	2	0

15:00 - 15:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	2
	C - L1214-10 N	2	2	0

15:15 - 15:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	77	27
	B - L5361	100	0	0
	C - L1214-10 N	2	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	60	0	2
	C - L1214-10 N	2	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	2	60
	B - L5361	100	0	0
	C - L1214-10 N	0	2	0

16:00 - 16:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	0	0	0
	C - L1214-10 N	33	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	100	0	0
	C - L1214-10 N	42	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	2	2
	B - L5361	100	0	0
	C - L1214-10 N	100	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	60	60
	B - L5361	0	0	0
	C - L1214-10 N	2	2	0

17:00 - 17:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	42
	B - L5361	100	0	2
	C - L1214-10 N	2	100	0

17:15 - 17:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	0	0	0
	C - L1214-10 N	2	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	2	2
	B - L5361	0	0	0
	C - L1214-10 N	2	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	2
	C - L1214-10 N	2	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	60	0
	B - L5361	0	0	0
	C - L1214-10 N	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	0	0	0
	C - L1214-10 N	2	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	0	2
	B - L5361	100	0	0
	C - L1214-10 N	0	2	0

18:45 - 19:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	60
	B - L5361	2	0	0
	C - L1214-10 N	0	2	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.04	9.22	0.0	A	0.46	22.19
B-A	0.05	16.33	0.1	C	0.73	35.08
C-AB	0.03	12.28	0.0	B	0.55	26.18
C-A					2.22	106.43
A-B					0.88	42.04
A-C					2.66	127.83

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	181.42	0.007	1.20	0.0	0.0	4.993	A
B-A	2.41	2.41	114.85	0.021	2.39	0.0	0.0	8.003	A
C-AB	0.00	0.00	140.96	0.000	0.00	0.0	0.0	0.000	A
C-A	3.62	3.62			3.62				
A-B	1.44	1.44			1.44				
A-C	1.21	1.21			1.21				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	151.00	0.008	1.21	0.0	0.0	6.007	A
B-A	0.00	0.00	139.67	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	141.61	0.000	0.00	0.0	0.0	0.000	A
C-A	1.21	1.21			1.21				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	181.59	0.007	1.21	0.0	0.0	4.988	A
B-A	1.44	1.44	58.91	0.024	1.42	0.0	0.0	10.775	B
C-AB	0.00	0.00	114.05	0.000	0.00	0.0	0.0	0.000	A
C-A	1.44	1.44			1.44				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	150.11	0.008	1.21	0.0	0.0	6.043	A
B-A	0.00	0.00	70.79	0.000	0.02	0.0	0.0	0.000	A
C-AB	1.21	1.21	139.21	0.009	1.20	0.0	0.0	6.520	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	4.83	4.83			4.83				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	151.30	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	114.16	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.22	1.22	141.13	0.009	1.22	0.0	0.0	6.431	A
C-A	1.20	1.20			1.20				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	149.58	0.008	1.20	0.0	0.0	6.065	A
B-A	0.00	0.00	125.29	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	137.93	0.000	0.01	0.0	0.0	0.000	A
C-A	1.44	1.44			1.44				
A-B	2.88	2.88			2.88				
A-C	4.83	4.83			4.83				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	151.30	0.008	1.21	0.0	0.0	5.995	A
B-A	0.00	0.00	134.07	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	116.10	0.000	0.00	0.0	0.0	0.000	A
C-A	3.85	3.85			3.85				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	3.85	3.85	108.22	0.036	3.83	0.0	0.0	8.028	A
B-A	1.21	1.21	138.33	0.009	1.19	0.0	0.0	10.017	B
C-AB	1.24	1.24	141.96	0.009	1.23	0.0	0.0	6.394	A
C-A	3.59	3.59			3.59				
A-B	1.21	1.21			1.21				
A-C	2.41	2.41			2.41				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	108.17	0.000	0.03	0.0	0.0	0.000	A
B-A	0.00	0.00	137.02	0.000	0.01	0.0	0.0	0.000	A
C-AB	2.69	2.69	89.82	0.030	2.67	0.0	0.0	9.119	A
C-A	1.40	1.40			1.40				
A-B	1.21	1.21			1.21				
A-C	3.62	3.62			3.62				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	168.18	0.000	0.00	0.0	0.0	0.000	A
B-A	2.41	2.41	115.26	0.021	2.39	0.0	0.0	7.974	A
C-AB	0.00	0.00	90.91	0.000	0.03	0.0	0.0	10.000	B
C-A	2.41	2.41			2.41				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	180.15	0.007	1.20	0.0	0.0	6.533	A
B-A	1.44	1.44	58.81	0.025	1.44	0.0	0.0	10.882	B
C-AB	0.00	0.00	138.94	0.000	0.00	0.0	0.0	0.000	A
C-A	2.41	2.41			2.41				
A-B	0.00	0.00			0.00				
A-C	6.03	6.03			6.03				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	182.34	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	58.29	0.000	0.02	0.0	0.0	0.000	A
C-AB	2.46	2.46	141.09	0.017	2.44	0.0	0.0	6.491	A
C-A	2.60	2.60			2.60				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.18	0.000	0.00	0.0	0.0	0.000	A
B-A	1.21	1.21	115.51	0.010	1.19	0.0	0.0	12.026	B
C-AB	0.00	0.00	137.90	0.000	0.02	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	2.65	2.65			2.65				
A-C	0.00	0.00			0.00				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.59	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	114.56	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	131.62	0.000	0.00	0.0	0.0	0.000	A
C-A	3.62	3.62			3.62				
A-B	0.00	0.00			0.00				
A-C	3.62	3.62			3.62				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.72	0.000	0.00	0.0	0.0	0.000	A
B-A	1.44	1.44	58.67	0.025	1.42	0.0	0.0	12.146	B
C-AB	0.00	0.00	136.17	0.000	0.00	0.0	0.0	0.000	A
C-A	2.41	2.41			2.41				
A-B	0.00	0.00			0.00				
A-C	3.62	3.62			3.62				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.84	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	58.53	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	137.90	0.000	0.00	0.0	0.0	0.000	A
C-A	3.62	3.62			3.62				
A-B	2.65	2.65			2.65				
A-C	2.41	2.41			2.41				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	187.15	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	94.39	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	140.62	0.000	0.00	0.0	0.0	0.000	A
C-A	3.62	3.62			3.62				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.33	0.000	0.00	0.0	0.0	0.000	A
B-A	1.21	1.21	115.44	0.010	1.19	0.0	0.0	12.033	B
C-AB	0.00	0.00	140.97	0.000	0.00	0.0	0.0	0.000	A
C-A	1.21	1.21			1.21				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.06	0.000	0.00	0.0	0.0	0.000	A
B-A	1.44	1.44	58.65	0.025	1.44	0.0	0.0	12.222	B
C-AB	0.00	0.00	140.06	0.000	0.00	0.0	0.0	0.000	A
C-A	2.41	2.41			2.41				
A-B	0.00	0.00			0.00				
A-C	5.06	5.06			5.06				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.49	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	58.82	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	140.80	0.000	0.00	0.0	0.0	0.000	A
C-A	2.41	2.41			2.41				
A-B	1.44	1.44			1.44				
A-C	1.21	1.21			1.21				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.48	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	93.57	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.23	1.23	141.09	0.009	1.22	0.0	0.0	6.434	A
C-A	2.62	2.62			2.62				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.41	2.41	180.00	0.013	2.40	0.0	0.0	5.067	A
B-A	1.44	1.44	58.16	0.025	1.41	0.0	0.0	15.855	C
C-AB	0.00	0.00	137.35	0.000	0.01	0.0	0.0	0.000	A
C-A	4.83	4.83			4.83				
A-B	0.00	0.00			0.00				
A-C	5.06	5.06			5.06				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	181.64	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	58.43	0.000	0.02	0.0	0.0	0.000	A
C-AB	1.22	1.22	139.67	0.009	1.21	0.0	0.0	6.534	A
C-A	1.20	1.20			1.20				
A-B	1.44	1.44			1.44				
A-C	3.62	3.62			3.62				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.06	0.000	0.00	0.0	0.0	0.000	A
B-A	1.21	1.21	114.18	0.011	1.19	0.0	0.0	12.169	B
C-AB	0.00	0.00	139.09	0.000	0.01	0.0	0.0	0.000	A
C-A	3.62	3.62			3.62				
A-B	0.00	0.00			0.00				
A-C	3.85	3.85			3.85				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.68	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	114.79	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	133.43	0.000	0.00	0.0	0.0	0.000	A
C-A	6.27	6.27			6.27				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.22	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	117.29	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	137.74	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	187.08	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	117.61	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.22	1.22	141.13	0.009	1.21	0.0	0.0	6.431	A
C-A	1.20	1.20			1.20				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.32	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	116.96	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	138.94	0.000	0.01	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	6.03	6.03			6.03				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	187.04	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	116.98	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.25	1.25	143.01	0.009	1.24	0.0	0.0	6.315	A
C-A	5.01	5.01			5.01				
A-B	1.21	1.21			1.21				
A-C	0.00	0.00			0.00				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.44	1.44	92.67	0.016	1.43	0.0	0.0	6.810	A
B-A	1.44	1.44	58.80	0.024	1.42	0.0	0.0	12.118	B
C-AB	0.00	0.00	138.30	0.000	0.01	0.0	0.0	0.000	A
C-A	2.41	2.41			2.41				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	148.88	0.008	1.21	0.0	0.0	9.220	A
B-A	0.00	0.00	70.35	0.000	0.02	0.0	0.0	0.000	A
C-AB	1.24	1.24	140.65	0.009	1.23	0.0	0.0	6.454	A
C-A	3.82	3.82			3.82				
A-B	2.88	2.88			2.88				
A-C	2.41	2.41			2.41				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	150.62	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	112.93	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.44	2.44	140.21	0.017	2.43	0.0	0.0	6.533	A
C-A	1.41	1.41			1.41				
A-B	0.00	0.00			0.00				
A-C	1.44	1.44			1.44				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	181.26	0.007	1.20	0.0	0.0	4.998	A
B-A	1.44	1.44	58.51	0.025	1.41	0.0	0.0	15.758	C
C-AB	2.43	2.43	140.21	0.017	2.43	0.0	0.0	6.566	A
C-A	1.19	1.19			1.19				
A-B	1.44	1.44			1.44				
A-C	1.21	1.21			1.21				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	178.80	0.000	0.01	0.0	0.0	0.000	A
B-A	1.44	1.44	57.96	0.025	1.44	0.0	0.0	15.923	C
C-AB	0.00	0.00	137.77	0.000	0.02	0.0	0.0	6.536	A
C-A	1.21	1.21			1.21				
A-B	4.08	4.08			4.08				
A-C	6.27	6.27			6.27				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	181.04	0.007	1.20	0.0	0.0	5.004	A
B-A	2.65	2.65	73.39	0.036	2.63	0.0	0.0	13.838	B
C-AB	0.00	0.00	140.04	0.000	0.00	0.0	0.0	0.000	A
C-A	2.41	2.41			2.41				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	180.55	0.000	0.01	0.0	0.0	0.000	A
B-A	1.44	1.44	58.85	0.025	1.46	0.0	0.0	13.699	B
C-AB	1.21	1.21	139.09	0.009	1.20	0.0	0.0	6.526	A
C-A	0.00	0.00			0.00				
A-B	1.21	1.21			1.21				
A-C	2.65	2.65			2.65				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.11	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	58.39	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	138.76	0.000	0.01	0.0	0.0	0.000	A
C-A	5.06	5.06			5.06				
A-B	2.88	2.88			2.88				
A-C	1.21	1.21			1.21				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.82	0.000	0.00	0.0	0.0	0.000	A
B-A	1.44	1.44	58.59	0.025	1.41	0.0	0.0	15.733	C
C-AB	0.00	0.00	124.26	0.000	0.00	0.0	0.0	0.000	A
C-A	3.85	3.85			3.85				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.92	0.000	0.00	0.0	0.0	0.000	A
B-A	1.44	1.44	58.72	0.025	1.44	0.0	0.0	15.711	C
C-AB	0.00	0.00	107.65	0.000	0.00	0.0	0.0	0.000	A
C-A	1.44	1.44			1.44				
A-B	1.21	1.21			1.21				
A-C	2.41	2.41			2.41				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.06	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	57.75	0.000	0.02	0.0	0.0	0.000	A
C-AB	1.23	1.23	139.14	0.009	1.22	0.0	0.0	6.524	A
C-A	2.39	2.39			2.39				
A-B	2.65	2.65			2.65				
A-C	5.29	5.29			5.29				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	178.88	0.007	1.20	0.0	0.0	5.065	A
B-A	2.88	2.88	57.88	0.050	2.83	0.0	0.1	16.332	C
C-AB	1.49	1.49	73.04	0.020	1.48	0.0	0.0	9.831	A
C-A	2.36	2.36			2.36				
A-B	1.44	1.44			1.44				
A-C	3.85	3.85			3.85				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	181.27	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	58.31	0.000	0.05	0.1	0.0	0.000	A
C-AB	0.00	0.00	75.00	0.000	0.02	0.0	0.0	12.276	B
C-A	3.62	3.62			3.62				
A-B	1.44	1.44			1.44				
A-C	4.83	4.83			4.83				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.20	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	93.20	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	138.66	0.000	0.00	0.0	0.0	0.000	A
C-A	3.62	3.62			3.62				
A-B	1.21	1.21			1.21				
A-C	6.03	6.03			6.03				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	180.19	0.007	1.20	0.0	0.0	5.027	A
B-A	1.44	1.44	58.49	0.025	1.41	0.0	0.0	15.762	C
C-AB	0.00	0.00	131.97	0.000	0.00	0.0	0.0	0.000	A
C-A	1.21	1.21			1.21				
A-B	1.44	1.44			1.44				
A-C	4.83	4.83			4.83				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	182.56	0.000	0.01	0.0	0.0	0.000	A
B-A	0.00	0.00	59.07	0.000	0.02	0.0	0.0	0.000	A
C-AB	0.00	0.00	137.45	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	2.65	2.65			2.65				
A-C	0.00	0.00			0.00				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.43	0.000	0.00	0.0	0.0	0.000	A
B-A	0.00	0.00	94.23	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.00	0.00	139.56	0.000	0.00	0.0	0.0	0.000	A
C-A	1.21	1.21			1.21				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.09	0.000	0.00	0.0	0.0	0.000	A
B-A	1.44	1.44	58.51	0.025	1.41	0.0	0.0	15.758	C
C-AB	1.21	1.21	139.21	0.009	1.20	0.0	0.0	6.520	A
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	4.83	4.83			4.83				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.85	0.000	0.00	0.0	0.0	0.000	A
B-A	1.21	1.21	112.14	0.011	1.22	0.0	0.0	12.163	B
C-AB	1.21	1.21	138.73	0.009	1.21	0.0	0.0	6.543	A
C-A	0.00	0.00			0.00				
A-B	1.44	1.44			1.44				
A-C	2.65	2.65			2.65				

Opening Year + Adj + Dev, 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - L1214-10 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Tobergal Bridge	T-Junction	Two-way		5.24	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D10	Opening Year + Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D2+ D5 +D6

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - L1214-38 S		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - L1214-10 N		DIRECT	✓	100.000

Origin-Destination Data

07:00 - 07:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.47	1.02
	B - L5361	4.51	0.00	1.02
	C - L1214-10 N	3.06	0.00	0.00

07:15 - 07:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.43	1.02
	B - L5361	2.47	0.00	1.02
	C - L1214-10 N	1.02	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.43	1.02
	B - L5361	3.51	0.00	1.02
	C - L1214-10 N	1.04	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.43	4.08
	B - L5361	2.47	0.00	1.02
	C - L1214-10 N	0.00	1.02	0.00

08:00 - 08:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.51	0.00
	B - L5361	1.66	0.00	0.00
	C - L1214-10 N	1.02	1.02	0.00

08:15 - 08:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.59	4.08
	B - L5361	1.66	0.00	1.02
	C - L1214-10 N	1.04	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.51	0.00
	B - L5361	1.66	0.00	1.02
	C - L1214-10 N	3.08	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.53	2.04
	B - L5361	2.68	0.00	3.08
	C - L1214-10 N	3.06	1.02	0.00

09:00 - 09:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.73	3.06
	B - L5361	2.03	0.00	0.00
	C - L1214-10 N	1.04	2.06	0.00

09:15 - 09:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.71	1.02
	B - L5361	4.07	0.00	0.00
	C - L1214-10 N	2.04	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.71	5.09
	B - L5361	3.07	0.00	1.02
	C - L1214-10 N	2.04	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.71	2.04
	B - L5361	2.03	0.00	0.00
	C - L1214-10 N	2.06	2.04	0.00

10:00 - 10:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.45	0.00
	B - L5361	2.30	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.40	3.06
	B - L5361	1.28	0.00	0.00
	C - L1214-10 N	3.06	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.40	3.06
	B - L5361	2.32	0.00	0.00
	C - L1214-10 N	2.04	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.45	2.04
	B - L5361	1.28	0.00	0.00
	C - L1214-10 N	3.06	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	0.00
	B - L5361	1.66	0.00	0.00
	C - L1214-10 N	4.13	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	1.02
	B - L5361	2.68	0.00	0.00
	C - L1214-10 N	2.09	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	4.09
	B - L5361	2.70	0.00	0.00
	C - L1214-10 N	3.11	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.29	1.02
	B - L5361	1.66	0.00	0.00
	C - L1214-10 N	3.11	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	2.04
	B - L5361	0.99	0.00	0.00
	C - L1214-10 N	2.06	1.02	0.00

12:15 - 12:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	4.09
	B - L5361	2.03	0.00	2.04
	C - L1214-10 N	4.08	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.29	3.06
	B - L5361	0.99	0.00	0.00
	C - L1214-10 N	1.02	1.02	0.00

12:45 - 13:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	3.08
	B - L5361	2.01	0.00	0.00
	C - L1214-10 N	3.06	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	0.00
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	5.11	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	2.04
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	0.00
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	1.02	1.02	0.00

13:45 - 14:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	5.09
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.87	0.00
	B - L5361	1.80	0.00	0.00
	C - L1214-10 N	4.09	1.02	0.00

14:15 - 14:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.85	2.04
	B - L5361	2.84	0.00	1.04
	C - L1214-10 N	2.04	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.93	2.04
	B - L5361	1.80	0.00	1.02
	C - L1214-10 N	3.08	1.02	0.00

14:45 - 15:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.85	1.04
	B - L5361	1.80	0.00	0.00
	C - L1214-10 N	1.04	2.04	0.00

15:00 - 15:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.26	1.02
	B - L5361	2.48	0.00	1.02
	C - L1214-10 N	1.02	2.04	0.00

15:15 - 15:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	4.31	5.11
	B - L5361	2.48	0.00	0.00
	C - L1214-10 N	1.02	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.22	1.02
	B - L5361	3.50	0.00	1.02
	C - L1214-10 N	2.04	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.24	2.06
	B - L5361	2.48	0.00	0.00
	C - L1214-10 N	0.00	1.02	0.00

16:00 - 16:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.54	2.12
	B - L5361	1.12	0.00	0.00
	C - L1214-10 N	4.09	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.46	3.14
	B - L5361	2.16	0.00	0.00
	C - L1214-10 N	3.08	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.48	3.14
	B - L5361	2.16	0.00	0.00
	C - L1214-10 N	1.04	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.52	5.22
	B - L5361	1.12	0.00	0.00
	C - L1214-10 N	2.04	1.02	0.00

17:00 - 17:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.40	3.08
	B - L5361	2.47	0.00	1.02
	C - L1214-10 N	2.04	1.04	0.00

17:15 - 17:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.40	4.08
	B - L5361	0.39	0.00	0.00
	C - L1214-10 N	3.06	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.38	5.09
	B - L5361	0.39	0.00	0.00
	C - L1214-10 N	3.06	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.40	4.08
	B - L5361	1.43	0.00	1.02
	C - L1214-10 N	1.02	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.45	0.00
	B - L5361	0.81	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.39	2.04
	B - L5361	0.81	0.00	0.00
	C - L1214-10 N	1.02	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.39	4.08
	B - L5361	1.85	0.00	0.00
	C - L1214-10 N	0.00	1.02	0.00

18:45 - 19:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.43	2.06
	B - L5361	1.83	0.00	0.00
	C - L1214-10 N	0.00	1.02	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	54	0	0
	C - L1214-10 N	0	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	98	0	0
	C - L1214-10 N	93	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	96	0
	B - L5361	100	0	0
	C - L1214-10 N	93	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	30	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	59	0
	B - L5361	61	0	30
	C - L1214-10 N	0	0	0

09:00 - 09:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	62	0
	B - L5361	100	0	0
	C - L1214-10 N	93	46	0

09:15 - 09:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	49	0	0
	C - L1214-10 N	0	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	98	0	0
	C - L1214-10 N	0	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	46	0	0

10:00 - 10:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	68	0
	B - L5361	55	0	0
	C - L1214-10 N	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	68	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	11	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	67	0	0
	C - L1214-10 N	24	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	22
	B - L5361	100	0	0
	C - L1214-10 N	16	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	100	0	0
	C - L1214-10 N	16	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	46	0	0

12:15 - 12:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	22
	B - L5361	96	0	0
	C - L1214-10 N	0	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

12:45 - 13:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	30
	B - L5361	48	0	0
	C - L1214-10 N	0	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	17	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

13:45 - 14:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	64	0
	B - L5361	100	0	0
	C - L1214-10 N	22	0	0

14:15 - 14:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	97	0	93
	C - L1214-10 N	0	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	96	0
	B - L5361	100	0	0
	C - L1214-10 N	30	0	0

14:45 - 15:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	93
	B - L5361	100	0	0
	C - L1214-10 N	93	0	0

15:00 - 15:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

15:15 - 15:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	72	17
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	68	0	0
	C - L1214-10 N	0	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	54	46
	B - L5361	97	0	0
	C - L1214-10 N	0	0	0

16:00 - 16:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	31
	B - L5361	100	0	0
	C - L1214-10 N	22	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	21
	B - L5361	97	0	0
	C - L1214-10 N	30	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	71	21
	B - L5361	97	0	0
	C - L1214-10 N	93	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	78	49
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	30
	B - L5361	94	0	0
	C - L1214-10 N	0	93	0

17:15 - 17:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	56	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	97	0
	B - L5361	95	0	0
	C - L1214-10 N	0	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	55	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	96	0	0
	C - L1214-10 N	0	0	0

18:45 - 19:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	95	46
	B - L5361	43	0	0
	C - L1214-10 N	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.02	7.23	0.0	A	0.38	18.38
B-A	0.06	16.13	0.1	C	2.00	95.95
C-AB	0.02	11.92	0.0	B	0.45	21.67
C-A					1.92	91.92
A-B					2.05	98.26
A-C					2.30	110.57

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	183.56	0.006	1.01	0.0	0.0	4.930	A
B-A	4.51	4.51	76.27	0.059	4.45	0.0	0.1	12.521	B
C-AB	0.00	0.00	142.15	0.000	0.00	0.0	0.0	0.000	A
C-A	3.06	3.06			3.06				
A-B	2.47	2.47			2.47				
A-C	1.02	1.02			1.02				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	184.57	0.006	1.02	0.0	0.0	4.902	A
B-A	2.47	2.47	59.28	0.042	2.49	0.1	0.0	13.488	B
C-AB	0.00	0.00	142.61	0.000	0.00	0.0	0.0	0.000	A
C-A	1.02	1.02			1.02				
A-B	1.43	1.43			1.43				
A-C	1.02	1.02			1.02				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	183.76	0.006	1.02	0.0	0.0	4.924	A
B-A	3.51	3.51	59.51	0.059	3.48	0.0	0.1	16.133	C
C-AB	0.00	0.00	115.77	0.000	0.00	0.0	0.0	0.000	A
C-A	1.04	1.04			1.04				
A-B	1.43	1.43			1.43				
A-C	1.02	1.02			1.02				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	183.65	0.006	1.02	0.0	0.0	4.927	A
B-A	2.47	2.47	58.53	0.042	2.49	0.1	0.0	15.965	C
C-AB	1.02	1.02	141.91	0.007	1.01	0.0	0.0	6.386	A
C-A	0.00	0.00			0.00				
A-B	1.43	1.43			1.43				
A-C	4.08	4.08			4.08				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.51	0.000	0.01	0.0	0.0	0.000	A
B-A	1.66	1.66	58.88	0.028	1.67	0.0	0.0	15.736	C
C-AB	1.03	1.03	143.50	0.007	1.03	0.0	0.0	6.316	A
C-A	1.01	1.01			1.01				
A-B	1.51	1.51			1.51				
A-C	0.00	0.00			0.00				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	183.84	0.006	1.01	0.0	0.0	4.922	A
B-A	1.66	1.66	58.35	0.028	1.66	0.0	0.0	15.877	C
C-AB	0.00	0.00	140.97	0.000	0.01	0.0	0.0	0.000	A
C-A	1.04	1.04			1.04				
A-B	3.59	3.59			3.59				
A-C	4.08	4.08			4.08				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	185.52	0.005	1.02	0.0	0.0	4.877	A
B-A	1.66	1.66	58.84	0.028	1.66	0.0	0.0	15.740	C
C-AB	0.00	0.00	119.90	0.000	0.00	0.0	0.0	0.000	A
C-A	3.08	3.08			3.08				
A-B	1.51	1.51			1.51				
A-C	0.00	0.00			0.00				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	3.08	3.08	141.83	0.022	3.06	0.0	0.0	6.107	A
B-A	2.68	2.68	72.34	0.037	2.66	0.0	0.0	14.116	B
C-AB	1.04	1.04	144.21	0.007	1.03	0.0	0.0	6.285	A
C-A	3.03	3.03			3.03				
A-B	2.53	2.53			2.53				
A-C	2.04	2.04			2.04				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	141.57	0.000	0.02	0.0	0.0	0.000	A
B-A	2.03	2.03	58.33	0.035	2.04	0.0	0.0	14.229	B
C-AB	2.08	2.08	97.92	0.021	2.07	0.0	0.0	8.386	A
C-A	1.02	1.02			1.02				
A-B	2.73	2.73			2.73				
A-C	3.06	3.06			3.06				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	171.22	0.000	0.00	0.0	0.0	0.000	A
B-A	4.07	4.07	78.77	0.052	4.04	0.0	0.1	13.454	B
C-AB	0.00	0.00	98.93	0.000	0.02	0.0	0.0	9.158	A
C-A	2.04	2.04			2.04				
A-B	1.71	1.71			1.71				
A-C	1.02	1.02			1.02				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	182.82	0.006	1.01	0.0	0.0	6.075	A
B-A	3.07	3.07	59.40	0.052	3.08	0.1	0.0	13.709	B
C-AB	0.00	0.00	141.56	0.000	0.00	0.0	0.0	0.000	A
C-A	2.04	2.04			2.04				
A-B	1.71	1.71			1.71				
A-C	5.09	5.09			5.09				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.55	0.000	0.01	0.0	0.0	0.000	A
B-A	2.03	2.03	58.36	0.035	2.04	0.0	0.0	15.868	C
C-AB	2.07	2.07	143.36	0.014	2.05	0.0	0.0	6.368	A
C-A	2.03	2.03			2.03				
A-B	1.71	1.71			1.71				
A-C	2.04	2.04			2.04				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.10	0.000	0.00	0.0	0.0	0.000	A
B-A	2.30	2.30	75.81	0.030	2.30	0.0	0.0	13.908	B
C-AB	0.00	0.00	141.24	0.000	0.02	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	3.45	3.45			3.45				
A-C	0.00	0.00			0.00				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.94	0.000	0.00	0.0	0.0	0.000	A
B-A	1.28	1.28	58.94	0.022	1.30	0.0	0.0	13.401	B
C-AB	0.00	0.00	134.45	0.000	0.00	0.0	0.0	0.000	A
C-A	3.06	3.06			3.06				
A-B	1.40	1.40			1.40				
A-C	3.06	3.06			3.06				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.16	0.000	0.00	0.0	0.0	0.000	A
B-A	2.32	2.32	59.61	0.039	2.30	0.0	0.0	15.793	C
C-AB	0.00	0.00	138.20	0.000	0.00	0.0	0.0	0.000	A
C-A	2.04	2.04			2.04				
A-B	1.40	1.40			1.40				
A-C	3.06	3.06			3.06				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.88	0.000	0.00	0.0	0.0	0.000	A
B-A	1.28	1.28	58.59	0.022	1.30	0.0	0.0	15.555	C
C-AB	0.00	0.00	139.71	0.000	0.00	0.0	0.0	0.000	A
C-A	3.06	3.06			3.06				
A-B	3.45	3.45			3.45				
A-C	2.04	2.04			2.04				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.59	0.000	0.00	0.0	0.0	0.000	A
B-A	1.66	1.66	58.82	0.028	1.65	0.0	0.0	15.741	C
C-AB	0.00	0.00	138.06	0.000	0.00	0.0	0.0	0.000	A
C-A	4.13	4.13			4.13				
A-B	1.25	1.25			1.25				
A-C	0.00	0.00			0.00				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.82	0.000	0.00	0.0	0.0	0.000	A
B-A	2.68	2.68	70.20	0.038	2.66	0.0	0.0	14.329	B
C-AB	0.00	0.00	132.43	0.000	0.00	0.0	0.0	0.000	A
C-A	2.09	2.09			2.09				
A-B	1.25	1.25			1.25				
A-C	1.02	1.02			1.02				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.27	0.000	0.00	0.0	0.0	0.000	A
B-A	2.70	2.70	58.48	0.046	2.69	0.0	0.0	14.798	B
C-AB	0.00	0.00	131.59	0.000	0.00	0.0	0.0	0.000	A
C-A	3.11	3.11			3.11				
A-B	1.25	1.25			1.25				
A-C	4.09	4.09			4.09				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.04	0.000	0.00	0.0	0.0	0.000	A
B-A	1.66	1.66	58.69	0.028	1.67	0.0	0.0	15.789	C
C-AB	0.00	0.00	132.00	0.000	0.00	0.0	0.0	0.000	A
C-A	3.11	3.11			3.11				
A-B	2.29	2.29			2.29				
A-C	1.02	1.02			1.02				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.51	0.000	0.00	0.0	0.0	0.000	A
B-A	0.99	0.99	58.54	0.017	1.00	0.0	0.0	15.645	C
C-AB	1.03	1.03	143.57	0.007	1.03	0.0	0.0	6.313	A
C-A	2.04	2.04			2.04				
A-B	1.25	1.25			1.25				
A-C	2.04	2.04			2.04				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.04	2.04	183.84	0.011	2.03	0.0	0.0	4.950	A
B-A	2.03	2.03	59.39	0.034	2.01	0.0	0.0	15.778	C
C-AB	0.00	0.00	140.86	0.000	0.01	0.0	0.0	0.000	A
C-A	4.08	4.08			4.08				
A-B	1.25	1.25			1.25				
A-C	4.09	4.09			4.09				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.97	0.000	0.01	0.0	0.0	0.000	A
B-A	0.99	0.99	58.52	0.017	1.01	0.0	0.0	15.465	C
C-AB	1.03	1.03	142.47	0.007	1.02	0.0	0.0	6.383	A
C-A	1.01	1.01			1.01				
A-B	2.29	2.29			2.29				
A-C	3.06	3.06			3.06				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.54	0.000	0.00	0.0	0.0	0.000	A
B-A	2.01	2.01	78.59	0.026	2.00	0.0	0.0	13.098	B
C-AB	0.00	0.00	142.01	0.000	0.01	0.0	0.0	0.000	A
C-A	3.06	3.06			3.06				
A-B	1.25	1.25			1.25				
A-C	3.08	3.08			3.08				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.50	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.95	0.028	1.63	0.0	0.0	13.471	B
C-AB	0.00	0.00	136.77	0.000	0.00	0.0	0.0	0.000	A
C-A	5.11	5.11			5.11				
A-B	1.74	1.74			1.74				
A-C	0.00	0.00			0.00				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.90	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.87	0.028	1.62	0.0	0.0	15.719	C
C-AB	0.00	0.00	139.22	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	1.74	1.74			1.74				
A-C	2.04	2.04			2.04				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.50	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.87	0.028	1.62	0.0	0.0	15.722	C
C-AB	1.03	1.03	143.40	0.007	1.02	0.0	0.0	6.320	A
C-A	1.01	1.01			1.01				
A-B	1.74	1.74			1.74				
A-C	0.00	0.00			0.00				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.99	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.53	0.028	1.62	0.0	0.0	15.815	C
C-AB	0.00	0.00	141.54	0.000	0.01	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	1.74	1.74			1.74				
A-C	5.09	5.09			5.09				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.21	0.000	0.00	0.0	0.0	0.000	A
B-A	1.80	1.80	58.53	0.031	1.80	0.0	0.0	15.863	C
C-AB	1.05	1.05	144.93	0.007	1.04	0.0	0.0	6.234	A
C-A	4.06	4.06			4.06				
A-B	2.87	2.87			2.87				
A-C	0.00	0.00			0.00				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.04	1.04	95.41	0.011	1.03	0.0	0.0	6.472	A
B-A	2.84	2.84	59.50	0.048	2.82	0.0	0.0	15.960	C
C-AB	0.00	0.00	141.30	0.000	0.01	0.0	0.0	0.000	A
C-A	2.04	2.04			2.04				
A-B	1.85	1.85			1.85				
A-C	2.04	2.04			2.04				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	182.98	0.006	1.02	0.0	0.0	7.229	A
B-A	1.80	1.80	58.26	0.031	1.82	0.0	0.0	15.822	C
C-AB	1.04	1.04	143.10	0.007	1.03	0.0	0.0	6.334	A
C-A	3.05	3.05			3.05				
A-B	3.93	3.93			3.93				
A-C	2.04	2.04			2.04				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.72	0.000	0.01	0.0	0.0	0.000	A
B-A	1.80	1.80	58.40	0.031	1.80	0.0	0.0	15.903	C
C-AB	2.05	2.05	142.60	0.014	2.05	0.0	0.0	6.402	A
C-A	1.02	1.02			1.02				
A-B	1.85	1.85			1.85				
A-C	1.04	1.04			1.04				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	184.41	0.006	1.01	0.0	0.0	4.907	A
B-A	2.48	2.48	59.44	0.042	2.47	0.0	0.0	15.897	C
C-AB	2.05	2.05	142.94	0.014	2.05	0.0	0.0	6.408	A
C-A	1.00	1.00			1.00				
A-B	2.26	2.26			2.26				
A-C	1.02	1.02			1.02				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	182.58	0.000	0.01	0.0	0.0	0.000	A
B-A	2.48	2.48	59.08	0.042	2.48	0.0	0.0	15.902	C
C-AB	0.00	0.00	140.44	0.000	0.01	0.0	0.0	0.000	A
C-A	1.02	1.02			1.02				
A-B	4.31	4.31			4.31				
A-C	5.11	5.11			5.11				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	184.24	0.006	1.01	0.0	0.0	4.911	A
B-A	3.50	3.50	69.87	0.050	3.49	0.0	0.1	14.537	B
C-AB	0.00	0.00	142.71	0.000	0.00	0.0	0.0	0.000	A
C-A	2.04	2.04			2.04				
A-B	1.22	1.22			1.22				
A-C	1.02	1.02			1.02				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.93	0.000	0.01	0.0	0.0	0.000	A
B-A	2.48	2.48	59.70	0.042	2.50	0.1	0.0	14.387	B
C-AB	1.02	1.02	142.03	0.007	1.01	0.0	0.0	6.381	A
C-A	0.00	0.00			0.00				
A-B	2.24	2.24			2.24				
A-C	2.06	2.06			2.06				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.64	0.000	0.00	0.0	0.0	0.000	A
B-A	1.12	1.12	58.31	0.019	1.14	0.0	0.0	15.588	C
C-AB	0.00	0.00	141.25	0.000	0.01	0.0	0.0	0.000	A
C-A	4.09	4.09			4.09				
A-B	3.54	3.54			3.54				
A-C	2.12	2.12			2.12				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.05	0.000	0.00	0.0	0.0	0.000	A
B-A	2.16	2.16	59.45	0.036	2.14	0.0	0.0	15.796	C
C-AB	0.00	0.00	128.73	0.000	0.00	0.0	0.0	0.000	A
C-A	3.08	3.08			3.08				
A-B	1.46	1.46			1.46				
A-C	3.14	3.14			3.14				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.88	0.000	0.00	0.0	0.0	0.000	A
B-A	2.16	2.16	59.54	0.036	2.16	0.0	0.0	15.683	C
C-AB	0.00	0.00	110.40	0.000	0.00	0.0	0.0	0.000	A
C-A	1.04	1.04			1.04				
A-B	2.48	2.48			2.48				
A-C	3.14	3.14			3.14				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.25	0.000	0.00	0.0	0.0	0.000	A
B-A	1.12	1.12	57.84	0.019	1.14	0.0	0.0	15.700	C
C-AB	1.03	1.03	141.70	0.007	1.03	0.0	0.0	6.397	A
C-A	2.02	2.02			2.02				
A-B	3.52	3.52			3.52				
A-C	5.22	5.22			5.22				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	183.54	0.006	1.01	0.0	0.0	4.930	A
B-A	2.47	2.47	59.95	0.041	2.44	0.0	0.0	15.793	C
C-AB	1.07	1.07	75.39	0.014	1.06	0.0	0.0	9.283	A
C-A	2.01	2.01			2.01				
A-B	2.40	2.40			2.40				
A-C	3.08	3.08			3.08				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.11	0.000	0.01	0.0	0.0	0.000	A
B-A	0.39	0.39	58.55	0.007	0.43	0.0	0.0	15.126	C
C-AB	0.00	0.00	76.90	0.000	0.01	0.0	0.0	11.922	B
C-A	3.06	3.06			3.06				
A-B	2.40	2.40			2.40				
A-C	4.08	4.08			4.08				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.95	0.000	0.00	0.0	0.0	0.000	A
B-A	0.39	0.39	58.31	0.007	0.39	0.0	0.0	15.539	C
C-AB	0.00	0.00	141.49	0.000	0.00	0.0	0.0	0.000	A
C-A	3.06	3.06			3.06				
A-B	2.38	2.38			2.38				
A-C	5.09	5.09			5.09				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.02	1.02	184.35	0.006	1.01	0.0	0.0	4.908	A
B-A	1.43	1.43	60.10	0.024	1.41	0.0	0.0	15.419	C
C-AB	0.00	0.00	133.74	0.000	0.00	0.0	0.0	0.000	A
C-A	1.02	1.02			1.02				
A-B	2.40	2.40			2.40				
A-C	4.08	4.08			4.08				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.11	0.000	0.01	0.0	0.0	0.000	A
B-A	0.81	0.81	59.13	0.014	0.82	0.0	0.0	15.184	C
C-AB	0.00	0.00	138.61	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	2.45	2.45			2.45				
A-C	0.00	0.00			0.00				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.87	0.000	0.00	0.0	0.0	0.000	A
B-A	0.81	0.81	58.92	0.014	0.81	0.0	0.0	15.488	C
C-AB	0.00	0.00	140.81	0.000	0.00	0.0	0.0	0.000	A
C-A	1.02	1.02			1.02				
A-B	0.39	0.39			0.39				
A-C	2.04	2.04			2.04				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.47	0.000	0.00	0.0	0.0	0.000	A
B-A	1.85	1.85	59.81	0.031	1.83	0.0	0.0	15.617	C
C-AB	1.02	1.02	142.39	0.007	1.01	0.0	0.0	6.365	A
C-A	0.00	0.00			0.00				
A-B	0.39	0.39			0.39				
A-C	4.08	4.08			4.08				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.94	0.000	0.00	0.0	0.0	0.000	A
B-A	1.83	1.83	81.30	0.022	1.84	0.0	0.0	13.387	B
C-AB	1.02	1.02	142.18	0.007	1.02	0.0	0.0	6.375	A
C-A	0.00	0.00			0.00				
A-B	1.43	1.43			1.43				
A-C	2.06	2.06			2.06				

+5 + Adj +Dev, 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - L1214-10 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Tobergal Bridge	T-Junction	Two-way		5.19	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D11	+5 + Adj +Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D3+D5 + D6

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - L1214-38 S		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - L1214-10 N		DIRECT	✓	100.000

Origin-Destination Data

07:00 - 07:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.65	1.11
	B - L5361	4.69	0.00	1.11
	C - L1214-10 N	3.32	0.00	0.00

07:15 - 07:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.43	1.11
	B - L5361	2.47	0.00	1.11
	C - L1214-10 N	1.11	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.43	1.11
	B - L5361	3.69	0.00	1.11
	C - L1214-10 N	1.22	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.43	4.43
	B - L5361	2.47	0.00	1.11
	C - L1214-10 N	0.00	1.11	0.00

08:00 - 08:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.51	0.00
	B - L5361	1.66	0.00	0.00
	C - L1214-10 N	1.11	1.11	0.00

08:15 - 08:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.96	4.43
	B - L5361	1.66	0.00	1.11
	C - L1214-10 N	1.22	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.51	0.00
	B - L5361	1.66	0.00	1.11
	C - L1214-10 N	3.44	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.62	2.22
	B - L5361	2.77	0.00	3.44
	C - L1214-10 N	3.32	1.11	0.00

09:00 - 09:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.81	3.32
	B - L5361	2.03	0.00	0.00
	C - L1214-10 N	1.22	2.33	0.00

09:15 - 09:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.71	1.11
	B - L5361	4.25	0.00	0.00
	C - L1214-10 N	2.22	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.71	5.54
	B - L5361	3.25	0.00	1.11
	C - L1214-10 N	2.22	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.71	2.22
	B - L5361	2.03	0.00	0.00
	C - L1214-10 N	2.33	2.22	0.00

10:00 - 10:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.73	0.00
	B - L5361	2.39	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.40	3.32
	B - L5361	1.28	0.00	0.00
	C - L1214-10 N	3.32	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.40	3.32
	B - L5361	2.51	0.00	0.00
	C - L1214-10 N	2.22	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.73	2.22
	B - L5361	1.28	0.00	0.00
	C - L1214-10 N	3.32	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	0.00
	B - L5361	1.66	0.00	0.00
	C - L1214-10 N	4.40	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	1.11
	B - L5361	2.77	0.00	0.00
	C - L1214-10 N	2.18	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	4.55
	B - L5361	2.88	0.00	0.00
	C - L1214-10 N	3.29	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.47	1.11
	B - L5361	1.66	0.00	0.00
	C - L1214-10 N	3.29	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	2.22
	B - L5361	0.99	0.00	0.00
	C - L1214-10 N	2.33	1.11	0.00

12:15 - 12:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	4.55
	B - L5361	2.21	0.00	2.22
	C - L1214-10 N	4.43	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.47	3.32
	B - L5361	0.99	0.00	0.00
	C - L1214-10 N	1.11	1.11	0.00

12:45 - 13:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	3.44
	B - L5361	2.10	0.00	0.00
	C - L1214-10 N	3.32	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	0.00
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	5.65	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	2.22
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	0.00
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	1.11	1.11	0.00

13:45 - 14:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	5.54
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.96	0.00
	B - L5361	1.80	0.00	0.00
	C - L1214-10 N	4.55	1.11	0.00

14:15 - 14:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.85	2.22
	B - L5361	3.03	0.00	1.22
	C - L1214-10 N	2.22	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	4.30	2.22
	B - L5361	1.80	0.00	1.11
	C - L1214-10 N	3.44	1.11	0.00

14:45 - 15:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.85	1.22
	B - L5361	1.80	0.00	0.00
	C - L1214-10 N	1.22	2.22	0.00

15:00 - 15:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.44	1.11
	B - L5361	2.67	0.00	1.11
	C - L1214-10 N	1.11	2.22	0.00

15:15 - 15:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	4.77	5.65
	B - L5361	2.67	0.00	0.00
	C - L1214-10 N	1.11	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.22	1.11
	B - L5361	3.78	0.00	1.11
	C - L1214-10 N	2.22	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.33	2.33
	B - L5361	2.67	0.00	0.00
	C - L1214-10 N	0.00	1.11	0.00

16:00 - 16:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.91	2.21
	B - L5361	1.12	0.00	0.00
	C - L1214-10 N	4.55	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.46	3.32
	B - L5361	2.34	0.00	0.00
	C - L1214-10 N	3.44	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.57	3.32
	B - L5361	2.34	0.00	0.00
	C - L1214-10 N	1.22	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.79	5.77
	B - L5361	1.12	0.00	0.00
	C - L1214-10 N	2.22	1.11	0.00

17:00 - 17:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.59	3.44
	B - L5361	2.84	0.00	1.11
	C - L1214-10 N	2.22	1.22	0.00

17:15 - 17:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.59	4.43
	B - L5361	0.39	0.00	0.00
	C - L1214-10 N	3.32	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.47	5.54
	B - L5361	0.39	0.00	0.00
	C - L1214-10 N	3.32	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.59	4.43
	B - L5361	1.61	0.00	1.11
	C - L1214-10 N	1.11	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.72	0.00
	B - L5361	0.81	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.39	2.22
	B - L5361	0.81	0.00	0.00
	C - L1214-10 N	1.11	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.39	4.43
	B - L5361	2.04	0.00	0.00
	C - L1214-10 N	0.00	1.11	0.00

18:45 - 19:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.61	2.33
	B - L5361	1.92	0.00	0.00
	C - L1214-10 N	0.00	1.11	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	99	0
	B - L5361	52	0	0
	C - L1214-10 N	0	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	99	0	0
	C - L1214-10 N	97	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

08:00 - 08:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

08:15 - 08:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	98	0
	B - L5361	100	0	0
	C - L1214-10 N	97	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	34	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	57	0
	B - L5361	60	0	34
	C - L1214-10 N	0	0	0

09:00 - 09:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	60	0
	B - L5361	100	0	0
	C - L1214-10 N	97	50	0

09:15 - 09:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	47	0	0
	C - L1214-10 N	0	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	99	0	0
	C - L1214-10 N	0	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	50	0	0

10:00 - 10:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	69	0
	B - L5361	53	0	0
	C - L1214-10 N	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	98	0	0
	C - L1214-10 N	0	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	69	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	11	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	65	0	0
	C - L1214-10 N	23	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	25
	B - L5361	100	0	0
	C - L1214-10 N	15	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	98	0
	B - L5361	100	0	0
	C - L1214-10 N	15	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	50	0	0

12:15 - 12:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	25
	B - L5361	98	0	0
	C - L1214-10 N	0	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	98	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

12:45 - 13:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	34
	B - L5361	47	0	0
	C - L1214-10 N	0	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	20	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

13:45 - 14:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	62	0
	B - L5361	100	0	0
	C - L1214-10 N	25	0	0

14:15 - 14:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	99	0	97
	C - L1214-10 N	0	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	98	0
	B - L5361	100	0	0
	C - L1214-10 N	34	0	0

14:45 - 15:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	97
	B - L5361	100	0	0
	C - L1214-10 N	97	0	0

15:00 - 15:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	98	0
	B - L5361	99	0	0
	C - L1214-10 N	0	0	0

15:15 - 15:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	75	20
	B - L5361	99	0	0
	C - L1214-10 N	0	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	69	0	0
	C - L1214-10 N	0	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	52	50
	B - L5361	99	0	0
	C - L1214-10 N	0	0	0

16:00 - 16:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	30
	B - L5361	100	0	0
	C - L1214-10 N	25	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	20
	B - L5361	98	0	0
	C - L1214-10 N	34	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	69	20
	B - L5361	98	0	0
	C - L1214-10 N	97	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	78	53
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

17:00 - 17:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	99	34
	B - L5361	97	0	0
	C - L1214-10 N	0	97	0

17:15 - 17:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	99	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	55	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	99	0
	B - L5361	98	0	0
	C - L1214-10 N	0	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	58	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	98	0	0
	C - L1214-10 N	0	0	0

18:45 - 19:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	98	50
	B - L5361	42	0	0
	C - L1214-10 N	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.03	7.63	0.0	A	0.42	20.17
B-A	0.06	16.25	0.1	C	2.08	99.79
C-AB	0.02	12.16	0.0	B	0.50	23.78
C-A					2.10	100.75
A-B					2.14	102.93
A-C					2.52	120.77

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	183.40	0.006	1.10	0.0	0.0	4.936	A
B-A	4.69	4.69	77.03	0.061	4.62	0.0	0.1	12.419	B
C-AB	0.00	0.00	142.04	0.000	0.00	0.0	0.0	0.000	A
C-A	3.32	3.32			3.32				
A-B	2.65	2.65			2.65				
A-C	1.11	1.11			1.11				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	184.55	0.006	1.11	0.0	0.0	4.907	A
B-A	2.47	2.47	59.29	0.042	2.50	0.1	0.0	13.370	B
C-AB	0.00	0.00	142.59	0.000	0.00	0.0	0.0	0.000	A
C-A	1.11	1.11			1.11				
A-B	1.43	1.43			1.43				
A-C	1.11	1.11			1.11				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	183.57	0.006	1.11	0.0	0.0	4.932	A
B-A	3.69	3.69	59.14	0.062	3.66	0.0	0.1	16.250	C
C-AB	0.00	0.00	114.79	0.000	0.00	0.0	0.0	0.000	A
C-A	1.22	1.22			1.22				
A-B	1.43	1.43			1.43				
A-C	1.11	1.11			1.11				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	183.54	0.006	1.11	0.0	0.0	4.932	A
B-A	2.47	2.47	58.46	0.042	2.49	0.1	0.0	16.036	C
C-AB	1.11	1.11	141.83	0.008	1.10	0.0	0.0	6.394	A
C-A	0.00	0.00			0.00				
A-B	1.43	1.43			1.43				
A-C	4.43	4.43			4.43				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.51	0.000	0.01	0.0	0.0	0.000	A
B-A	1.66	1.66	58.86	0.028	1.67	0.0	0.0	15.740	C
C-AB	1.12	1.12	143.56	0.008	1.12	0.0	0.0	6.317	A
C-A	1.10	1.10			1.10				
A-B	1.51	1.51			1.51				
A-C	0.00	0.00			0.00				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	183.64	0.006	1.10	0.0	0.0	4.930	A
B-A	1.66	1.66	58.24	0.028	1.66	0.0	0.0	15.904	C
C-AB	0.00	0.00	140.70	0.000	0.01	0.0	0.0	0.000	A
C-A	1.22	1.22			1.22				
A-B	3.96	3.96			3.96				
A-C	4.43	4.43			4.43				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	185.52	0.006	1.11	0.0	0.0	4.879	A
B-A	1.66	1.66	58.80	0.028	1.66	0.0	0.0	15.752	C
C-AB	0.00	0.00	118.43	0.000	0.00	0.0	0.0	0.000	A
C-A	3.44	3.44			3.44				
A-B	1.51	1.51			1.51				
A-C	0.00	0.00			0.00				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	3.44	3.44	114.00	0.030	3.42	0.0	0.0	7.625	A
B-A	2.77	2.77	88.33	0.031	2.76	0.0	0.0	11.519	B
C-AB	1.13	1.13	144.33	0.008	1.13	0.0	0.0	6.284	A
C-A	3.30	3.30			3.30				
A-B	2.62	2.62			2.62				
A-C	2.22	2.22			2.22				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	137.46	0.000	0.03	0.0	0.0	0.000	A
B-A	2.03	2.03	58.16	0.035	2.03	0.0	0.0	14.159	B
C-AB	2.36	2.36	95.05	0.025	2.35	0.0	0.0	8.629	A
C-A	1.19	1.19			1.19				
A-B	2.81	2.81			2.81				
A-C	3.32	3.32			3.32				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	169.61	0.000	0.00	0.0	0.0	0.000	A
B-A	4.25	4.25	79.60	0.053	4.22	0.0	0.1	13.360	B
C-AB	0.00	0.00	96.08	0.000	0.02	0.0	0.0	9.444	A
C-A	2.21	2.21			2.21				
A-B	1.71	1.71			1.71				
A-C	1.11	1.11			1.11				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	182.52	0.006	1.10	0.0	0.0	6.241	A
B-A	3.25	3.25	58.97	0.055	3.27	0.1	0.1	13.748	B
C-AB	0.00	0.00	141.46	0.000	0.00	0.0	0.0	0.000	A
C-A	2.22	2.22			2.22				
A-B	1.71	1.71			1.71				
A-C	5.54	5.54			5.54				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.49	0.000	0.01	0.0	0.0	0.000	A
B-A	2.03	2.03	58.27	0.035	2.05	0.1	0.0	15.955	C
C-AB	2.25	2.25	143.43	0.016	2.24	0.0	0.0	6.373	A
C-A	2.29	2.29			2.29				
A-B	1.71	1.71			1.71				
A-C	2.22	2.22			2.22				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.00	0.000	0.00	0.0	0.0	0.000	A
B-A	2.39	2.39	76.59	0.031	2.39	0.0	0.0	13.822	B
C-AB	0.00	0.00	140.91	0.000	0.02	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	3.73	3.73			3.73				
A-C	0.00	0.00			0.00				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.86	0.000	0.00	0.0	0.0	0.000	A
B-A	1.28	1.28	58.91	0.022	1.30	0.0	0.0	13.296	B
C-AB	0.00	0.00	133.68	0.000	0.00	0.0	0.0	0.000	A
C-A	3.32	3.32			3.32				
A-B	1.40	1.40			1.40				
A-C	3.32	3.32			3.32				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.92	0.000	0.00	0.0	0.0	0.000	A
B-A	2.51	2.51	59.05	0.042	2.48	0.0	0.0	15.945	C
C-AB	0.00	0.00	137.76	0.000	0.00	0.0	0.0	0.000	A
C-A	2.22	2.22			2.22				
A-B	1.40	1.40			1.40				
A-C	3.32	3.32			3.32				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.77	0.000	0.00	0.0	0.0	0.000	A
B-A	1.28	1.28	58.51	0.022	1.30	0.0	0.0	15.661	C
C-AB	0.00	0.00	139.36	0.000	0.00	0.0	0.0	0.000	A
C-A	3.32	3.32			3.32				
A-B	3.73	3.73			3.73				
A-C	2.22	2.22			2.22				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.59	0.000	0.00	0.0	0.0	0.000	A
B-A	1.66	1.66	58.80	0.028	1.65	0.0	0.0	15.746	C
C-AB	0.00	0.00	137.98	0.000	0.00	0.0	0.0	0.000	A
C-A	4.40	4.40			4.40				
A-B	1.25	1.25			1.25				
A-C	0.00	0.00			0.00				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.76	0.000	0.00	0.0	0.0	0.000	A
B-A	2.77	2.77	70.95	0.039	2.75	0.0	0.0	14.237	B
C-AB	0.00	0.00	132.54	0.000	0.00	0.0	0.0	0.000	A
C-A	2.18	2.18			2.18				
A-B	1.25	1.25			1.25				
A-C	1.11	1.11			1.11				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	182.92	0.000	0.00	0.0	0.0	0.000	A
B-A	2.88	2.88	58.39	0.049	2.88	0.0	0.0	14.815	B
C-AB	0.00	0.00	131.59	0.000	0.00	0.0	0.0	0.000	A
C-A	3.29	3.29			3.29				
A-B	1.25	1.25			1.25				
A-C	4.55	4.55			4.55				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.96	0.000	0.00	0.0	0.0	0.000	A
B-A	1.66	1.66	58.65	0.028	1.67	0.0	0.0	15.803	C
C-AB	0.00	0.00	132.06	0.000	0.00	0.0	0.0	0.000	A
C-A	3.29	3.29			3.29				
A-B	2.47	2.47			2.47				
A-C	1.11	1.11			1.11				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.45	0.000	0.00	0.0	0.0	0.000	A
B-A	0.99	0.99	58.47	0.017	1.00	0.0	0.0	15.664	C
C-AB	1.13	1.13	143.64	0.008	1.12	0.0	0.0	6.314	A
C-A	2.31	2.31			2.31				
A-B	1.25	1.25			1.25				
A-C	2.22	2.22			2.22				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.22	2.22	183.46	0.012	2.20	0.0	0.0	4.965	A
B-A	2.21	2.21	58.70	0.038	2.19	0.0	0.0	15.965	C
C-AB	0.00	0.00	140.48	0.000	0.01	0.0	0.0	0.000	A
C-A	4.43	4.43			4.43				
A-B	1.25	1.25			1.25				
A-C	4.55	4.55			4.55				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.84	0.000	0.01	0.0	0.0	0.000	A
B-A	0.99	0.99	58.43	0.017	1.01	0.0	0.0	15.588	C
C-AB	1.12	1.12	142.38	0.008	1.11	0.0	0.0	6.396	A
C-A	1.10	1.10			1.10				
A-B	2.47	2.47			2.47				
A-C	3.32	3.32			3.32				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.32	0.000	0.00	0.0	0.0	0.000	A
B-A	2.10	2.10	79.33	0.026	2.09	0.0	0.0	13.005	B
C-AB	0.00	0.00	141.88	0.000	0.01	0.0	0.0	0.000	A
C-A	3.32	3.32			3.32				
A-B	1.25	1.25			1.25				
A-C	3.44	3.44			3.44				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.50	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.91	0.028	1.63	0.0	0.0	13.368	B
C-AB	0.00	0.00	135.82	0.000	0.00	0.0	0.0	0.000	A
C-A	5.65	5.65			5.65				
A-B	1.74	1.74			1.74				
A-C	0.00	0.00			0.00				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.85	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.85	0.028	1.62	0.0	0.0	15.724	C
C-AB	0.00	0.00	138.68	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	1.74	1.74			1.74				
A-C	2.22	2.22			2.22				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.50	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.85	0.028	1.62	0.0	0.0	15.728	C
C-AB	1.12	1.12	143.46	0.008	1.11	0.0	0.0	6.322	A
C-A	1.10	1.10			1.10				
A-B	1.74	1.74			1.74				
A-C	0.00	0.00			0.00				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.86	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.48	0.028	1.62	0.0	0.0	15.829	C
C-AB	0.00	0.00	141.44	0.000	0.01	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	1.74	1.74			1.74				
A-C	5.54	5.54			5.54				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.19	0.000	0.00	0.0	0.0	0.000	A
B-A	1.80	1.80	58.46	0.031	1.80	0.0	0.0	15.882	C
C-AB	1.14	1.14	145.14	0.008	1.14	0.0	0.0	6.224	A
C-A	4.51	4.51			4.51				
A-B	2.96	2.96			2.96				
A-C	0.00	0.00			0.00				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	93.30	0.013	1.21	0.0	0.0	6.646	A
B-A	3.03	3.03	59.06	0.051	3.00	0.0	0.1	16.083	C
C-AB	0.00	0.00	141.02	0.000	0.01	0.0	0.0	0.000	A
C-A	2.22	2.22			2.22				
A-B	1.85	1.85			1.85				
A-C	2.22	2.22			2.22				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	182.63	0.006	1.11	0.0	0.0	7.440	A
B-A	1.80	1.80	58.14	0.031	1.82	0.1	0.0	15.923	C
C-AB	1.13	1.13	143.05	0.008	1.13	0.0	0.0	6.340	A
C-A	3.41	3.41			3.41				
A-B	4.30	4.30			4.30				
A-C	2.22	2.22			2.22				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.60	0.000	0.01	0.0	0.0	0.000	A
B-A	1.80	1.80	58.30	0.031	1.80	0.0	0.0	15.930	C
C-AB	2.23	2.23	142.56	0.016	2.23	0.0	0.0	6.412	A
C-A	1.20	1.20			1.20				
A-B	1.85	1.85			1.85				
A-C	1.22	1.22			1.22				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	184.17	0.006	1.10	0.0	0.0	4.915	A
B-A	2.67	2.67	58.90	0.045	2.65	0.0	0.0	16.044	C
C-AB	2.23	2.23	142.89	0.016	2.23	0.0	0.0	6.427	A
C-A	1.09	1.09			1.09				
A-B	2.44	2.44			2.44				
A-C	1.11	1.11			1.11				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	182.07	0.000	0.01	0.0	0.0	0.000	A
B-A	2.67	2.67	58.47	0.046	2.67	0.0	0.0	16.128	C
C-AB	0.00	0.00	140.81	0.000	0.02	0.0	0.0	6.392	A
C-A	1.11	1.11			1.11				
A-B	4.77	4.77			4.77				
A-C	5.65	5.65			5.65				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	184.00	0.006	1.10	0.0	0.0	4.920	A
B-A	3.78	3.78	69.35	0.054	3.76	0.0	0.1	14.723	B
C-AB	0.00	0.00	142.69	0.000	0.00	0.0	0.0	0.000	A
C-A	2.22	2.22			2.22				
A-B	1.22	1.22			1.22				
A-C	1.11	1.11			1.11				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.60	0.000	0.01	0.0	0.0	0.000	A
B-A	2.67	2.67	59.15	0.045	2.69	0.1	0.0	14.564	B
C-AB	1.11	1.11	141.89	0.008	1.10	0.0	0.0	6.392	A
C-A	0.00	0.00			0.00				
A-B	2.33	2.33			2.33				
A-C	2.33	2.33			2.33				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.52	0.000	0.00	0.0	0.0	0.000	A
B-A	1.12	1.12	58.20	0.019	1.15	0.0	0.0	15.702	C
C-AB	0.00	0.00	141.06	0.000	0.01	0.0	0.0	0.000	A
C-A	4.55	4.55			4.55				
A-B	3.91	3.91			3.91				
A-C	2.21	2.21			2.21				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.83	0.000	0.00	0.0	0.0	0.000	A
B-A	2.34	2.34	58.84	0.040	2.32	0.0	0.0	15.963	C
C-AB	0.00	0.00	127.11	0.000	0.00	0.0	0.0	0.000	A
C-A	3.44	3.44			3.44				
A-B	1.46	1.46			1.46				
A-C	3.32	3.32			3.32				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.65	0.000	0.00	0.0	0.0	0.000	A
B-A	2.34	2.34	58.93	0.040	2.34	0.0	0.0	15.903	C
C-AB	0.00	0.00	108.89	0.000	0.00	0.0	0.0	0.000	A
C-A	1.22	1.22			1.22				
A-B	2.57	2.57			2.57				
A-C	3.32	3.32			3.32				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	182.89	0.000	0.00	0.0	0.0	0.000	A
B-A	1.12	1.12	57.66	0.019	1.14	0.0	0.0	15.845	C
C-AB	1.13	1.13	141.48	0.008	1.12	0.0	0.0	6.411	A
C-A	2.20	2.20			2.20				
A-B	3.79	3.79			3.79				
A-C	5.77	5.77			5.77				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	182.98	0.006	1.10	0.0	0.0	4.948	A
B-A	2.84	2.84	58.77	0.048	2.81	0.0	0.0	16.139	C
C-AB	1.26	1.26	73.87	0.017	1.26	0.0	0.0	9.556	A
C-A	2.18	2.18			2.18				
A-B	2.59	2.59			2.59				
A-C	3.44	3.44			3.44				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.95	0.000	0.01	0.0	0.0	0.000	A
B-A	0.39	0.39	58.39	0.007	0.43	0.0	0.0	15.379	C
C-AB	0.00	0.00	75.61	0.000	0.01	0.0	0.0	12.157	B
C-A	3.32	3.32			3.32				
A-B	2.59	2.59			2.59				
A-C	4.43	4.43			4.43				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.81	0.000	0.00	0.0	0.0	0.000	A
B-A	0.39	0.39	58.23	0.007	0.39	0.0	0.0	15.558	C
C-AB	0.00	0.00	141.36	0.000	0.00	0.0	0.0	0.000	A
C-A	3.32	3.32			3.32				
A-B	2.47	2.47			2.47				
A-C	5.54	5.54			5.54				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.11	1.11	184.03	0.006	1.10	0.0	0.0	4.919	A
B-A	1.61	1.61	59.16	0.027	1.59	0.0	0.0	15.665	C
C-AB	0.00	0.00	133.25	0.000	0.00	0.0	0.0	0.000	A
C-A	1.11	1.11			1.11				
A-B	2.59	2.59			2.59				
A-C	4.43	4.43			4.43				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	186.05	0.000	0.01	0.0	0.0	0.000	A
B-A	0.81	0.81	59.09	0.014	0.83	0.0	0.0	15.334	C
C-AB	0.00	0.00	138.33	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	2.72	2.72			2.72				
A-C	0.00	0.00			0.00				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.82	0.000	0.00	0.0	0.0	0.000	A
B-A	0.81	0.81	58.89	0.014	0.81	0.0	0.0	15.496	C
C-AB	0.00	0.00	140.68	0.000	0.00	0.0	0.0	0.000	A
C-A	1.11	1.11			1.11				
A-B	0.39	0.39			0.39				
A-C	2.22	2.22			2.22				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.20	0.000	0.00	0.0	0.0	0.000	A
B-A	2.04	2.04	59.10	0.034	2.01	0.0	0.0	15.802	C
C-AB	1.11	1.11	142.31	0.008	1.10	0.0	0.0	6.373	A
C-A	0.00	0.00			0.00				
A-B	0.39	0.39			0.39				
A-C	4.43	4.43			4.43				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.70	0.000	0.00	0.0	0.0	0.000	A
B-A	1.92	1.92	81.97	0.023	1.93	0.0	0.0	13.509	B
C-AB	1.11	1.11	141.97	0.008	1.11	0.0	0.0	6.388	A
C-A	0.00	0.00			0.00				
A-B	1.61	1.61			1.61				
A-C	2.33	2.33			2.33				

+15 + Adj +Dev , 12 hrs

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Minor arm flare	B - L5361 - Minor arm geometry	Is flare very short? Estimated flare length is zero but has been increased to 1 because a zero flare length is not allowed.
Warning	Major arm width	C - L1214-10 N - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Tobergal Bridge	T-Junction	Two-way		5.13	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D12	+15 + Adj +Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D4+D5 + D6

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - L1214-38 S		DIRECT	✓	100.000
B - L5361		DIRECT	✓	100.000
C - L1214-10 N		DIRECT	✓	100.000

Origin-Destination Data

07:00 - 07:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.87	1.21
	B - L5361	4.88	0.00	1.21
	C - L1214-10 N	3.62	0.00	0.00

07:15 - 07:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.43	1.21
	B - L5361	2.47	0.00	1.21
	C - L1214-10 N	1.21	0.00	0.00

07:30 - 07:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.43	1.21
	B - L5361	3.91	0.00	1.21
	C - L1214-10 N	1.44	0.00	0.00

07:45 - 08:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.43	4.83
	B - L5361	2.47	0.00	1.21
	C - L1214-10 N	0.00	1.21	0.00

08:00 - 08:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.51	0.00
	B - L5361	1.66	0.00	0.00
	C - L1214-10 N	1.21	1.21	0.00

08:15 - 08:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	4.39	4.83
	B - L5361	1.66	0.00	1.21
	C - L1214-10 N	1.44	0.00	0.00

08:30 - 08:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.51	0.00
	B - L5361	1.66	0.00	1.21
	C - L1214-10 N	3.85	0.00	0.00

08:45 - 09:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.72	2.41
	B - L5361	2.86	0.00	3.85
	C - L1214-10 N	3.62	1.21	0.00

09:00 - 09:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.91	3.62
	B - L5361	2.03	0.00	0.00
	C - L1214-10 N	1.44	2.65	0.00

09:15 - 09:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.71	1.21
	B - L5361	4.44	0.00	0.00
	C - L1214-10 N	2.41	0.00	0.00

09:30 - 09:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.71	6.03
	B - L5361	3.47	0.00	1.21
	C - L1214-10 N	2.41	0.00	0.00

09:45 - 10:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.71	2.41
	B - L5361	2.03	0.00	0.00
	C - L1214-10 N	2.65	2.41	0.00

10:00 - 10:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	4.04	0.00
	B - L5361	2.49	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

10:15 - 10:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.40	3.62
	B - L5361	1.28	0.00	0.00
	C - L1214-10 N	3.62	0.00	0.00

10:30 - 10:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.40	3.62
	B - L5361	2.72	0.00	0.00
	C - L1214-10 N	2.41	0.00	0.00

10:45 - 11:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	4.04	2.41
	B - L5361	1.28	0.00	0.00
	C - L1214-10 N	3.62	0.00	0.00

11:00 - 11:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	0.00
	B - L5361	1.66	0.00	0.00
	C - L1214-10 N	4.69	0.00	0.00

11:15 - 11:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	1.21
	B - L5361	2.86	0.00	0.00
	C - L1214-10 N	2.28	0.00	0.00

11:30 - 11:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	5.06
	B - L5361	3.10	0.00	0.00
	C - L1214-10 N	3.49	0.00	0.00

11:45 - 12:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.69	1.21
	B - L5361	1.66	0.00	0.00
	C - L1214-10 N	3.49	0.00	0.00

12:00 - 12:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	2.41
	B - L5361	0.99	0.00	0.00
	C - L1214-10 N	2.65	1.21	0.00

12:15 - 12:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	5.06
	B - L5361	2.43	0.00	2.41
	C - L1214-10 N	4.83	0.00	0.00

12:30 - 12:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.69	3.62
	B - L5361	0.99	0.00	0.00
	C - L1214-10 N	1.21	1.21	0.00

12:45 - 13:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.25	3.85
	B - L5361	2.20	0.00	0.00
	C - L1214-10 N	3.62	0.00	0.00

13:00 - 13:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	0.00
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	6.27	0.00	0.00

13:15 - 13:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	2.41
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

13:30 - 13:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	0.00
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	1.21	1.21	0.00

13:45 - 14:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.74	6.03
	B - L5361	1.63	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

14:00 - 14:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.06	0.00
	B - L5361	1.80	0.00	0.00
	C - L1214-10 N	5.06	1.21	0.00

14:15 - 14:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.85	2.41
	B - L5361	3.24	0.00	1.44
	C - L1214-10 N	2.41	0.00	0.00

14:30 - 14:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	4.73	2.41
	B - L5361	1.80	0.00	1.21
	C - L1214-10 N	3.85	1.21	0.00

14:45 - 15:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.85	1.44
	B - L5361	1.80	0.00	0.00
	C - L1214-10 N	1.44	2.41	0.00

15:00 - 15:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.66	1.21
	B - L5361	2.88	0.00	1.21
	C - L1214-10 N	1.21	2.41	0.00

15:15 - 15:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	5.30	6.27
	B - L5361	2.88	0.00	0.00
	C - L1214-10 N	1.21	0.00	0.00

15:30 - 15:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.22	1.21
	B - L5361	4.09	0.00	1.21
	C - L1214-10 N	2.41	0.00	0.00

15:45 - 16:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.43	2.65
	B - L5361	2.88	0.00	0.00
	C - L1214-10 N	0.00	1.21	0.00

16:00 - 16:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	4.34	2.31
	B - L5361	1.12	0.00	0.00
	C - L1214-10 N	5.06	0.00	0.00

16:15 - 16:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.46	3.52
	B - L5361	2.56	0.00	0.00
	C - L1214-10 N	3.85	0.00	0.00

16:30 - 16:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.67	3.52
	B - L5361	2.56	0.00	0.00
	C - L1214-10 N	1.44	0.00	0.00

16:45 - 17:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	4.11	6.40
	B - L5361	1.12	0.00	0.00
	C - L1214-10 N	2.41	1.21	0.00

17:00 - 17:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.80	3.85
	B - L5361	3.27	0.00	1.21
	C - L1214-10 N	2.41	1.44	0.00

17:15 - 17:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.80	4.83
	B - L5361	0.39	0.00	0.00
	C - L1214-10 N	3.62	0.00	0.00

17:30 - 17:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.57	6.03
	B - L5361	0.39	0.00	0.00
	C - L1214-10 N	3.62	0.00	0.00

17:45 - 18:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	2.80	4.83
	B - L5361	1.83	0.00	1.21
	C - L1214-10 N	1.21	0.00	0.00

18:00 - 18:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	3.04	0.00
	B - L5361	0.81	0.00	0.00
	C - L1214-10 N	0.00	0.00	0.00

18:15 - 18:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.39	2.41
	B - L5361	0.81	0.00	0.00
	C - L1214-10 N	1.21	0.00	0.00

18:30 - 18:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	0.39	4.83
	B - L5361	2.25	0.00	0.00
	C - L1214-10 N	0.00	1.21	0.00

18:45 - 19:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0.00	1.83	2.65
	B - L5361	2.02	0.00	0.00
	C - L1214-10 N	0.00	1.21	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	52	0	2
	C - L1214-10 N	2	0	0

07:15 - 07:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	2
	C - L1214-10 N	2	0	0

07:30 - 07:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	2
	C - L1214-10 N	100	0	0

07:45 - 08:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	2
	C - L1214-10 N	0	2	0

08:00 - 08:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	2	2	0

08:15 - 08:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	2
	C - L1214-10 N	100	0	0

08:30 - 08:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	2
	C - L1214-10 N	42	0	0

08:45 - 09:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	57	2
	B - L5361	59	0	42
	C - L1214-10 N	2	2	0

09:00 - 09:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	60	2
	B - L5361	100	0	0
	C - L1214-10 N	100	60	0

09:15 - 09:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	47	0	0
	C - L1214-10 N	2	0	0

09:30 - 09:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	2
	C - L1214-10 N	2	0	0

09:45 - 10:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	0
	C - L1214-10 N	60	2	0

10:00 - 10:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	74	0
	B - L5361	53	0	0
	C - L1214-10 N	0	0	0

10:15 - 10:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	0
	C - L1214-10 N	2	0	0

10:30 - 10:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	0
	C - L1214-10 N	2	0	0

10:45 - 11:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	74	2
	B - L5361	100	0	0
	C - L1214-10 N	2	0	0

11:00 - 11:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	13	0	0

11:15 - 11:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	64	0	0
	C - L1214-10 N	24	0	0

11:30 - 11:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	33
	B - L5361	100	0	0
	C - L1214-10 N	16	0	0

11:45 - 12:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	0
	C - L1214-10 N	16	0	0

12:00 - 12:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	0
	C - L1214-10 N	60	2	0

12:15 - 12:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	33
	B - L5361	100	0	2
	C - L1214-10 N	2	0	0

12:30 - 12:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	0
	C - L1214-10 N	2	2	0

12:45 - 13:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	42
	B - L5361	46	0	0
	C - L1214-10 N	2	0	0

13:00 - 13:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	27	0	0

13:15 - 13:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

13:30 - 13:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	0
	B - L5361	100	0	0
	C - L1214-10 N	2	2	0

13:45 - 14:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

14:00 - 14:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	61	0
	B - L5361	100	0	0
	C - L1214-10 N	33	2	0

14:15 - 14:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	100
	C - L1214-10 N	2	0	0

14:30 - 14:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	2
	C - L1214-10 N	42	2	0

14:45 - 15:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	100
	B - L5361	100	0	0
	C - L1214-10 N	100	2	0

15:00 - 15:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	2
	C - L1214-10 N	2	2	0

15:15 - 15:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	83	27
	B - L5361	100	0	0
	C - L1214-10 N	2	0	0

15:30 - 15:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	74	0	2
	C - L1214-10 N	2	0	0

15:45 - 16:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	51	60
	B - L5361	100	0	0
	C - L1214-10 N	0	2	0

16:00 - 16:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	31
	B - L5361	100	0	0
	C - L1214-10 N	33	0	0

16:15 - 16:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	21
	B - L5361	100	0	0
	C - L1214-10 N	42	0	0

16:30 - 16:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	68	21
	B - L5361	100	0	0
	C - L1214-10 N	100	0	0

16:45 - 17:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	82	61
	B - L5361	100	0	0
	C - L1214-10 N	2	2	0

17:00 - 17:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	42
	B - L5361	100	0	2
	C - L1214-10 N	2	100	0

17:15 - 17:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	0
	C - L1214-10 N	2	0	0

17:30 - 17:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	54	2
	B - L5361	100	0	0
	C - L1214-10 N	2	0	0

17:45 - 18:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	2
	C - L1214-10 N	2	0	0

18:00 - 18:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	65	0
	B - L5361	100	0	0
	C - L1214-10 N	0	0	0

18:15 - 18:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	0
	C - L1214-10 N	2	0	0

18:30 - 18:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	2
	B - L5361	100	0	0
	C - L1214-10 N	0	2	0

18:45 - 19:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - L5361	C - L1214-10 N
From	A - L1214-38 S	0	100	60
	B - L5361	42	0	0
	C - L1214-10 N	0	2	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.04	8.10	0.0	A	0.46	22.19
B-A	0.07	16.49	0.1	C	2.17	104.24
C-AB	0.03	12.33	0.0	B	0.55	26.18
C-A					2.31	110.72
A-B					2.26	108.34
A-C					2.76	132.25

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	179.13	0.007	1.20	0.0	0.0	5.057	A
B-A	4.88	4.88	77.26	0.063	4.82	0.0	0.1	12.411	B
C-AB	0.00	0.00	140.32	0.000	0.00	0.0	0.0	0.000	A
C-A	3.62	3.62			3.62				
A-B	2.87	2.87			2.87				
A-C	1.21	1.21			1.21				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	180.42	0.007	1.21	0.0	0.0	5.023	A
B-A	2.47	2.47	59.28	0.042	2.50	0.1	0.0	13.310	B
C-AB	0.00	0.00	140.96	0.000	0.00	0.0	0.0	0.000	A
C-A	1.21	1.21			1.21				
A-B	1.43	1.43			1.43				
A-C	1.21	1.21			1.21				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	179.27	0.007	1.21	0.0	0.0	5.053	A
B-A	3.91	3.91	58.79	0.066	3.88	0.0	0.1	16.380	C
C-AB	0.00	0.00	113.53	0.000	0.00	0.0	0.0	0.000	A
C-A	1.44	1.44			1.44				
A-B	1.43	1.43			1.43				
A-C	1.21	1.21			1.21				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	179.32	0.007	1.21	0.0	0.0	5.054	A
B-A	2.47	2.47	58.38	0.042	2.49	0.1	0.0	16.111	C
C-AB	1.21	1.21	138.58	0.009	1.20	0.0	0.0	6.550	A
C-A	0.00	0.00			0.00				
A-B	1.43	1.43			1.43				
A-C	4.83	4.83			4.83				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	181.39	0.000	0.01	0.0	0.0	0.000	A
B-A	1.66	1.66	58.84	0.028	1.67	0.0	0.0	15.750	C
C-AB	1.22	1.22	140.46	0.009	1.22	0.0	0.0	6.462	A
C-A	1.20	1.20			1.20				
A-B	1.51	1.51			1.51				
A-C	0.00	0.00			0.00				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	179.31	0.007	1.20	0.0	0.0	5.052	A
B-A	1.66	1.66	58.11	0.029	1.66	0.0	0.0	15.943	C
C-AB	0.00	0.00	137.26	0.000	0.01	0.0	0.0	0.000	A
C-A	1.44	1.44			1.44				
A-B	4.39	4.39			4.39				
A-C	4.83	4.83			4.83				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	181.40	0.007	1.21	0.0	0.0	4.995	A
B-A	1.66	1.66	58.74	0.028	1.66	0.0	0.0	15.767	C
C-AB	0.00	0.00	115.55	0.000	0.00	0.0	0.0	0.000	A
C-A	3.85	3.85			3.85				
A-B	1.51	1.51			1.51				
A-C	0.00	0.00			0.00				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	3.85	3.85	107.34	0.036	3.82	0.0	0.0	8.095	A
B-A	2.86	2.86	88.63	0.032	2.86	0.0	0.0	11.495	B
C-AB	1.24	1.24	141.29	0.009	1.23	0.0	0.0	6.425	A
C-A	3.59	3.59			3.59				
A-B	2.72	2.72			2.72				
A-C	2.41	2.41			2.41				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	129.42	0.000	0.03	0.0	0.0	0.000	A
B-A	2.03	2.03	57.97	0.035	2.03	0.0	0.0	14.146	B
C-AB	2.69	2.69	89.34	0.030	2.67	0.0	0.0	9.169	A
C-A	1.40	1.40			1.40				
A-B	2.91	2.91			2.91				
A-C	3.62	3.62			3.62				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	166.33	0.000	0.00	0.0	0.0	0.000	A
B-A	4.44	4.44	79.81	0.056	4.41	0.0	0.1	13.335	B
C-AB	0.00	0.00	90.42	0.000	0.03	0.0	0.0	10.052	B
C-A	2.41	2.41			2.41				
A-B	1.71	1.71			1.71				
A-C	1.21	1.21			1.21				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	178.08	0.007	1.20	0.0	0.0	6.609	A
B-A	3.47	3.47	58.53	0.060	3.48	0.1	0.1	13.859	B
C-AB	0.00	0.00	138.18	0.000	0.00	0.0	0.0	0.000	A
C-A	2.41	2.41			2.41				
A-B	1.71	1.71			1.71				
A-C	6.03	6.03			6.03				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	180.32	0.000	0.01	0.0	0.0	0.000	A
B-A	2.03	2.03	58.14	0.035	2.05	0.1	0.0	16.052	C
C-AB	2.46	2.46	140.34	0.018	2.44	0.0	0.0	6.526	A
C-A	2.60	2.60			2.60				
A-B	1.71	1.71			1.71				
A-C	2.41	2.41			2.41				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.82	0.000	0.00	0.0	0.0	0.000	A
B-A	2.49	2.49	76.87	0.032	2.49	0.0	0.0	13.784	B
C-AB	0.00	0.00	137.28	0.000	0.02	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	4.04	4.04			4.04				
A-C	0.00	0.00			0.00				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.23	0.000	0.00	0.0	0.0	0.000	A
B-A	1.28	1.28	58.86	0.022	1.30	0.0	0.0	13.244	B
C-AB	0.00	0.00	131.03	0.000	0.00	0.0	0.0	0.000	A
C-A	3.62	3.62			3.62				
A-B	1.40	1.40			1.40				
A-C	3.62	3.62			3.62				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.36	0.000	0.00	0.0	0.0	0.000	A
B-A	2.72	2.72	58.54	0.047	2.69	0.0	0.0	16.106	C
C-AB	0.00	0.00	135.56	0.000	0.00	0.0	0.0	0.000	A
C-A	2.41	2.41			2.41				
A-B	1.40	1.40			1.40				
A-C	3.62	3.62			3.62				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.47	0.000	0.00	0.0	0.0	0.000	A
B-A	1.28	1.28	58.41	0.022	1.31	0.0	0.0	15.768	C
C-AB	0.00	0.00	137.29	0.000	0.00	0.0	0.0	0.000	A
C-A	3.62	3.62			3.62				
A-B	4.04	4.04			4.04				
A-C	2.41	2.41			2.41				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.52	0.000	0.00	0.0	0.0	0.000	A
B-A	1.66	1.66	58.77	0.028	1.65	0.0	0.0	15.753	C
C-AB	0.00	0.00	136.53	0.000	0.00	0.0	0.0	0.000	A
C-A	4.69	4.69			4.69				
A-B	1.25	1.25			1.25				
A-C	0.00	0.00			0.00				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.63	0.000	0.00	0.0	0.0	0.000	A
B-A	2.86	2.86	71.35	0.040	2.85	0.0	0.0	14.190	B
C-AB	0.00	0.00	131.66	0.000	0.00	0.0	0.0	0.000	A
C-A	2.28	2.28			2.28				
A-B	1.25	1.25			1.25				
A-C	1.21	1.21			1.21				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	182.43	0.000	0.00	0.0	0.0	0.000	A
B-A	3.10	3.10	58.26	0.053	3.09	0.0	0.1	14.888	B
C-AB	0.00	0.00	130.57	0.000	0.00	0.0	0.0	0.000	A
C-A	3.49	3.49			3.49				
A-B	1.25	1.25			1.25				
A-C	5.06	5.06			5.06				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.86	0.000	0.00	0.0	0.0	0.000	A
B-A	1.66	1.66	58.59	0.028	1.68	0.1	0.0	15.818	C
C-AB	0.00	0.00	131.14	0.000	0.00	0.0	0.0	0.000	A
C-A	3.49	3.49			3.49				
A-B	2.69	2.69			2.69				
A-C	1.21	1.21			1.21				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.37	0.000	0.00	0.0	0.0	0.000	A
B-A	0.99	0.99	58.37	0.017	1.00	0.0	0.0	15.690	C
C-AB	1.23	1.23	140.54	0.009	1.22	0.0	0.0	6.459	A
C-A	2.62	2.62			2.62				
A-B	1.25	1.25			1.25				
A-C	2.41	2.41			2.41				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.41	2.41	178.92	0.013	2.40	0.0	0.0	5.098	A
B-A	2.43	2.43	58.05	0.042	2.40	0.0	0.0	16.167	C
C-AB	0.00	0.00	136.80	0.000	0.01	0.0	0.0	0.000	A
C-A	4.83	4.83			4.83				
A-B	1.25	1.25			1.25				
A-C	5.06	5.06			5.06				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	180.57	0.000	0.01	0.0	0.0	0.000	A
B-A	0.99	0.99	58.32	0.017	1.02	0.0	0.0	15.713	C
C-AB	1.22	1.22	139.12	0.009	1.21	0.0	0.0	6.560	A
C-A	1.20	1.20			1.20				
A-B	2.69	2.69			2.69				
A-C	3.62	3.62			3.62				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	182.97	0.000	0.00	0.0	0.0	0.000	A
B-A	2.20	2.20	79.40	0.028	2.18	0.0	0.0	12.981	B
C-AB	0.00	0.00	138.54	0.000	0.01	0.0	0.0	0.000	A
C-A	3.62	3.62			3.62				
A-B	1.25	1.25			1.25				
A-C	3.85	3.85			3.85				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.97	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.84	0.028	1.63	0.0	0.0	13.319	B
C-AB	0.00	0.00	132.70	0.000	0.00	0.0	0.0	0.000	A
C-A	6.27	6.27			6.27				
A-B	1.74	1.74			1.74				
A-C	0.00	0.00			0.00				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.51	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.82	0.028	1.62	0.0	0.0	15.732	C
C-AB	0.00	0.00	136.98	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	1.74	1.74			1.74				
A-C	2.41	2.41			2.41				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.37	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.82	0.028	1.62	0.0	0.0	15.736	C
C-AB	1.22	1.22	140.36	0.009	1.21	0.0	0.0	6.467	A
C-A	1.20	1.20			1.20				
A-B	1.74	1.74			1.74				
A-C	0.00	0.00			0.00				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.61	0.000	0.00	0.0	0.0	0.000	A
B-A	1.63	1.63	58.41	0.028	1.62	0.0	0.0	15.848	C
C-AB	0.00	0.00	138.17	0.000	0.01	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	1.74	1.74			1.74				
A-C	6.03	6.03			6.03				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	185.14	0.000	0.00	0.0	0.0	0.000	A
B-A	1.80	1.80	58.37	0.031	1.80	0.0	0.0	15.909	C
C-AB	1.25	1.25	142.20	0.009	1.24	0.0	0.0	6.351	A
C-A	5.01	5.01			5.01				
A-B	3.06	3.06			3.06				
A-C	0.00	0.00			0.00				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.44	1.44	91.69	0.016	1.43	0.0	0.0	6.884	A
B-A	3.24	3.24	58.64	0.055	3.22	0.0	0.1	16.232	C
C-AB	0.00	0.00	137.49	0.000	0.01	0.0	0.0	0.000	A
C-A	2.41	2.41			2.41				
A-B	1.85	1.85			1.85				
A-C	2.41	2.41			2.41				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	178.25	0.007	1.21	0.0	0.0	7.686	A
B-A	1.80	1.80	57.98	0.031	1.83	0.1	0.0	16.034	C
C-AB	1.24	1.24	139.84	0.009	1.23	0.0	0.0	6.492	A
C-A	3.82	3.82			3.82				
A-B	4.73	4.73			4.73				
A-C	2.41	2.41			2.41				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	180.37	0.000	0.01	0.0	0.0	0.000	A
B-A	1.80	1.80	58.17	0.031	1.80	0.0	0.0	15.966	C
C-AB	2.44	2.44	139.39	0.018	2.43	0.0	0.0	6.572	A
C-A	1.41	1.41			1.41				
A-B	1.85	1.85			1.85				
A-C	1.44	1.44			1.44				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	179.80	0.007	1.20	0.0	0.0	5.038	A
B-A	2.88	2.88	58.40	0.049	2.87	0.0	0.1	16.202	C
C-AB	2.43	2.43	139.67	0.017	2.44	0.0	0.0	6.592	A
C-A	1.19	1.19			1.19				
A-B	2.66	2.66			2.66				
A-C	1.21	1.21			1.21				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	177.35	0.000	0.01	0.0	0.0	0.000	A
B-A	2.88	2.88	57.85	0.050	2.88	0.1	0.1	16.373	C
C-AB	0.00	0.00	137.23	0.000	0.02	0.0	0.0	6.561	A
C-A	1.21	1.21			1.21				
A-B	5.30	5.30			5.30				
A-C	6.27	6.27			6.27				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	179.58	0.007	1.20	0.0	0.0	5.044	A
B-A	4.09	4.09	67.38	0.061	4.08	0.1	0.1	15.109	C
C-AB	0.00	0.00	139.49	0.000	0.00	0.0	0.0	0.000	A
C-A	2.41	2.41			2.41				
A-B	1.22	1.22			1.22				
A-C	1.21	1.21			1.21				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	179.11	0.000	0.01	0.0	0.0	0.000	A
B-A	2.88	2.88	58.60	0.049	2.90	0.1	0.0	14.934	B
C-AB	1.21	1.21	138.55	0.009	1.20	0.0	0.0	6.552	A
C-A	0.00	0.00			0.00				
A-B	2.43	2.43			2.43				
A-C	2.65	2.65			2.65				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.33	0.000	0.00	0.0	0.0	0.000	A
B-A	1.12	1.12	58.06	0.019	1.15	0.0	0.0	15.821	C
C-AB	0.00	0.00	137.71	0.000	0.01	0.0	0.0	0.000	A
C-A	5.06	5.06			5.06				
A-B	4.34	4.34			4.34				
A-C	2.31	2.31			2.31				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.04	0.000	0.00	0.0	0.0	0.000	A
B-A	2.56	2.56	58.27	0.044	2.53	0.0	0.0	16.141	C
C-AB	0.00	0.00	123.33	0.000	0.00	0.0	0.0	0.000	A
C-A	3.85	3.85			3.85				
A-B	1.46	1.46			1.46				
A-C	3.52	3.52			3.52				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.10	0.000	0.00	0.0	0.0	0.000	A
B-A	2.56	2.56	58.38	0.044	2.56	0.0	0.0	16.123	C
C-AB	0.00	0.00	106.79	0.000	0.00	0.0	0.0	0.000	A
C-A	1.44	1.44			1.44				
A-B	2.67	2.67			2.67				
A-C	3.52	3.52			3.52				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	182.24	0.000	0.00	0.0	0.0	0.000	A
B-A	1.12	1.12	57.41	0.020	1.15	0.0	0.0	16.003	C
C-AB	1.23	1.23	138.03	0.009	1.22	0.0	0.0	6.578	A
C-A	2.39	2.39			2.39				
A-B	4.11	4.11			4.11				
A-C	6.40	6.40			6.40				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	178.23	0.007	1.20	0.0	0.0	5.083	A
B-A	3.27	3.27	57.76	0.057	3.23	0.0	0.1	16.492	C
C-AB	1.49	1.49	72.74	0.021	1.48	0.0	0.0	9.874	A
C-A	2.36	2.36			2.36				
A-B	2.80	2.80			2.80				
A-C	3.85	3.85			3.85				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	180.64	0.000	0.01	0.0	0.0	0.000	A
B-A	0.39	0.39	58.19	0.007	0.44	0.1	0.0	15.597	C
C-AB	0.00	0.00	74.70	0.000	0.02	0.0	0.0	12.331	B
C-A	3.62	3.62			3.62				
A-B	2.80	2.80			2.80				
A-C	4.83	4.83			4.83				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.57	0.000	0.00	0.0	0.0	0.000	A
B-A	0.39	0.39	58.13	0.007	0.39	0.0	0.0	15.586	C
C-AB	0.00	0.00	138.06	0.000	0.00	0.0	0.0	0.000	A
C-A	3.62	3.62			3.62				
A-B	2.57	2.57			2.57				
A-C	6.03	6.03			6.03				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.21	1.21	179.57	0.007	1.20	0.0	0.0	5.045	A
B-A	1.83	1.83	58.37	0.031	1.80	0.0	0.0	15.905	C
C-AB	0.00	0.00	131.39	0.000	0.00	0.0	0.0	0.000	A
C-A	1.21	1.21			1.21				
A-B	2.80	2.80			2.80				
A-C	4.83	4.83			4.83				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	181.84	0.000	0.01	0.0	0.0	0.000	A
B-A	0.81	0.81	59.03	0.014	0.83	0.0	0.0	15.469	C
C-AB	0.00	0.00	137.28	0.000	0.00	0.0	0.0	0.000	A
C-A	0.00	0.00			0.00				
A-B	3.04	3.04			3.04				
A-C	0.00	0.00			0.00				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.69	0.000	0.00	0.0	0.0	0.000	A
B-A	0.81	0.81	58.86	0.014	0.81	0.0	0.0	15.506	C
C-AB	0.00	0.00	139.39	0.000	0.00	0.0	0.0	0.000	A
C-A	1.21	1.21			1.21				
A-B	0.39	0.39			0.39				
A-C	2.41	2.41			2.41				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	183.35	0.000	0.00	0.0	0.0	0.000	A
B-A	2.25	2.25	58.47	0.039	2.23	0.0	0.0	15.993	C
C-AB	1.21	1.21	139.04	0.009	1.20	0.0	0.0	6.528	A
C-A	0.00	0.00			0.00				
A-B	0.39	0.39			0.39				
A-C	4.83	4.83			4.83				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.00	0.00	184.10	0.000	0.00	0.0	0.0	0.000	A
B-A	2.02	2.02	81.87	0.024	2.03	0.0	0.0	13.688	B
C-AB	1.21	1.21	138.56	0.009	1.21	0.0	0.0	6.551	A
C-A	0.00	0.00			0.00				
A-B	1.83	1.83			1.83				
A-C	2.65	2.65			2.65				

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.5.0.6896
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Filename: Site 07 Lagan Quarry Access.j9
Path: W:\2021\P21-019\2024\Modelling\Site 07 - Quarry Access
Report generation date: 29/07/2024 16:33:47

»Opening Year + Adj + Dev, 12 hrs
»+5 + Adj + Dev, 12 hrs
»+15 + Adj + Dev, 12 hrs

Summary of junction performance

	12 hrs			
	Queue (Veh)	**Delay (s)**	**RFC**	**LOS**
	Opening Year + Adj + Dev			
Stream B-C	0.0	10.50	0.03	B
Stream B-A	0.0	6.67	0.01	A
Stream C-AB	0.0	12.34	0.03	B
	+5 + Adj + Dev			
Stream B-C	0.0	10.51	0.03	B
Stream B-A	0.0	6.68	0.01	A
Stream C-AB	0.0	12.35	0.03	B
	+15 + Adj + Dev			
Stream B-C	0.0	10.52	0.03	B
Stream B-A	0.0	6.69	0.01	A
Stream C-AB	0.0	12.36	0.03	B

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

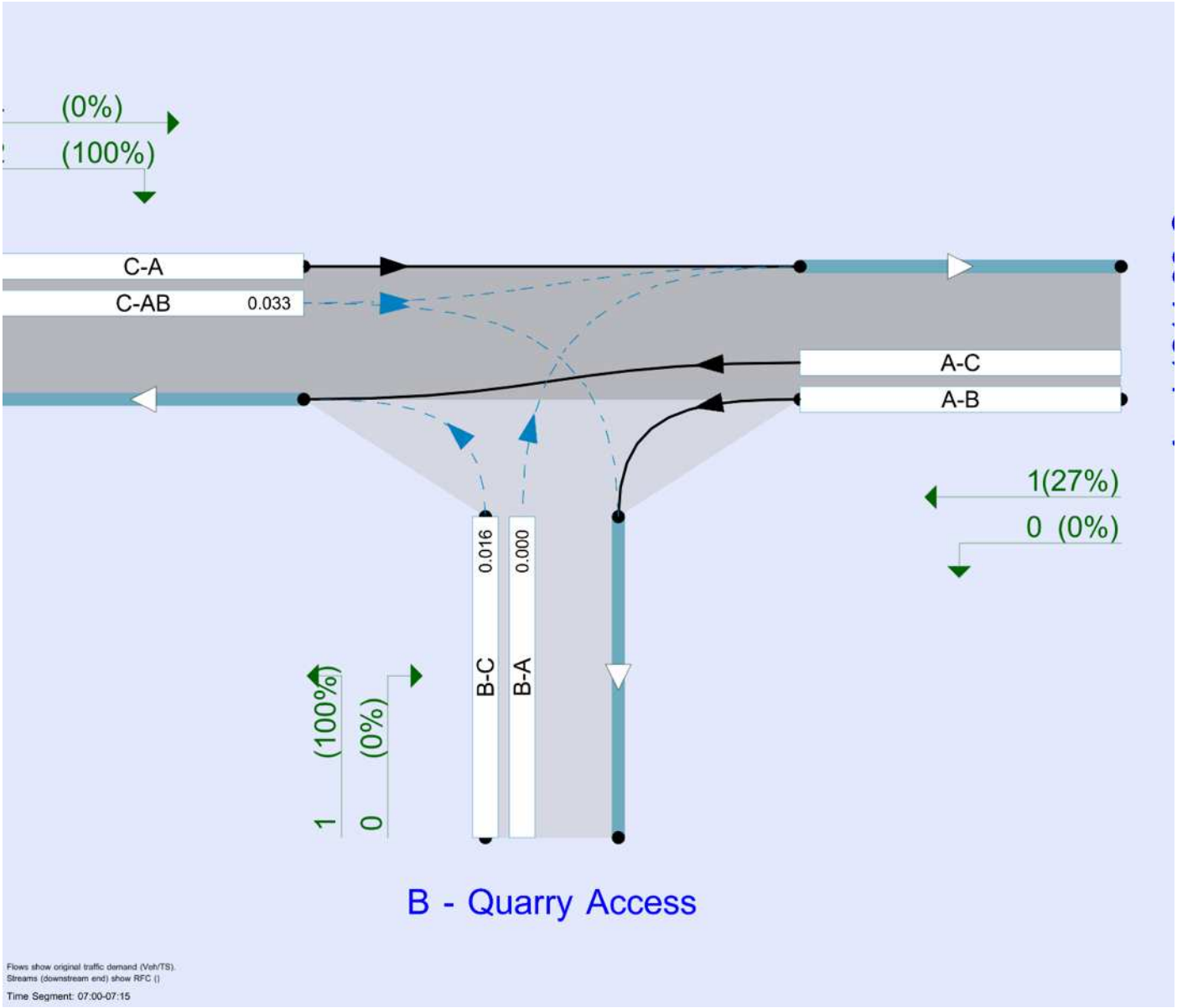
File summary

File Description

Title	Carrigcleena More
Location	Bweeng, Co.Cork
Site number	7
Date	29/07/2024
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	PMCE/papadakisa
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perTimeSegment	s	-Min	perMin



The junction diagram reflects the last run of Junctions.

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D1	Base	12 hrs	DIRECT	07:00	19:00	720	15			
D2	Opening Year	12 hrs	DIRECT	07:00	19:00	720	15			
D3	+5	12 hrs	DIRECT	07:00	19:00	720	15			
D4	+15	12 hrs	DIRECT	07:00	19:00	720	15			
D5	Adjacent Dev. Traffic	12 hrs	DIRECT	07:00	19:00	720	15			
D6	Development Tarffic	12 hrs	DIRECT	07:00	19:00	720	15			
D7	Opening Year + Adj	12 hrs	DIRECT	07:00	19:00	720	15		Simple	D2 + D5
D8	+5 + Adj	12 hrs	DIRECT	07:00	19:00	720	15		Simple	D3 + D5
D9	+15 + Adj	12 hrs	DIRECT	07:00	19:00	720	15		Simple	D4 + D5
D10	Opening Year + Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D2+ D5 + D6
D11	+5 + Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D3+ D5 + D6
D12	+15 + Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D4+ D5 + D6

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

Opening Year + Adj + Dev, 12 hrs

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Lagan Quarry Access	T-Junction	Two-way		6.39	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	L1214-38 S		Major
B	Quarry Access		Minor
C	L1214-38 N		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C - L1214-38 N	6.00			57.0	✓	0.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Width at give-way (m)	Width at 5m (m)	Width at 10m (m)	Width at 15m (m)	Width at 20m (m)	Estimate flare length	Flare length (PCU)	Visibility to left (m)	Visibility to right (m)
B - Quarry Access	One lane plus flare	10.00	6.80	3.20	2.20	2.20	✓	1.00	67	72

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (Veh/TS)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	139.161	0.101	0.256	0.161	0.366
1	B-C	176.026	0.108	0.273	-	-
1	C-B	151.743	0.235	0.235	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D10	Opening Year + Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D2+ D5 + D6

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - L1214-38 S		DIRECT	✓	100.000
B - Quarry Access		DIRECT	✓	100.000
C - L1214-38 N		DIRECT	✓	100.000

Origin-Destination Data

07:00 - 07:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	3.06	2.47	0.00

07:15 - 07:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	0.00	2.47	0.00

07:30 - 07:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	1.04	2.47	0.00

07:45 - 08:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	0.00	2.47	0.00

08:00 - 08:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	1.02	1.66	0.00

08:15 - 08:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.08
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	0.00	1.66	0.00

08:30 - 08:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	1.02	1.66	0.00

08:45 - 09:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	3.06	1.66	0.00

09:00 - 09:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	0.00	2.03	0.00

09:15 - 09:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	3.06	2.03	0.00

09:30 - 09:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.06
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	2.04	2.03	0.00

09:45 - 10:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	1.04	2.03	0.00

10:00 - 10:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	1.02	1.28	0.00

10:15 - 10:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.06
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	2.04	1.28	0.00

10:30 - 10:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	1.02	1.28	0.00

10:45 - 11:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.09
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	3.08	1.28	0.00

11:00 - 11:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	2.04	1.33	0.00

11:15 - 11:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	1.02	1.33	0.00

11:30 - 11:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	3.08
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	2.06	2.73	0.00

11:45 - 12:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	2.06
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	4.08	2.73	0.00

12:00 - 12:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	3.06
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	2.06	2.39	0.00

12:15 - 12:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	3.08
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	3.08	2.39	0.00

12:30 - 12:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.06
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	1.02	0.99	0.00

12:45 - 13:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.06
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	3.06	0.99	0.00

13:00 - 13:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	3.06	1.63	0.00

13:15 - 13:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	0.00	1.63	0.00

13:30 - 13:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	1.02	1.63	0.00

13:45 - 14:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	0.00	1.63	0.00

14:00 - 14:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	3.08	1.80	0.00

14:15 - 14:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	2.06	1.80	0.00

14:30 - 14:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.08
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	1.02	1.80	0.00

14:45 - 15:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	1.04	1.80	0.00

15:00 - 15:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.06
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	2.06	1.45	0.00

15:15 - 15:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	7.17
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	1.02	1.45	0.00

15:30 - 15:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	2.04	1.45	0.00

15:45 - 16:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.02
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	1.04	1.45	0.00

16:00 - 16:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.04
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	3.06	1.12	0.00

16:15 - 16:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	2.06	1.12	0.00

16:30 - 16:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.04
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	1.04	1.12	0.00

16:45 - 17:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.04
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	2.04	1.12	0.00

17:00 - 17:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.08
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	2.06	0.39	0.00

17:15 - 17:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	5.11
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	4.08	0.39	0.00

17:30 - 17:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.08
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	1.02	0.39	0.00

17:45 - 18:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.09
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	4.09	0.39	0.00

18:00 - 18:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.04
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	0.00	0.81	0.00

18:15 - 18:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.06
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	1.02	0.81	0.00

18:30 - 18:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.08
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	1.04	0.81	0.00

18:45 - 19:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.11
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	1.02	0.81	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

07:15 - 07:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

07:30 - 07:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

07:45 - 08:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

08:00 - 08:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

08:15 - 08:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

08:30 - 08:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

08:45 - 09:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:00 - 09:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:15 - 09:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:30 - 09:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:45 - 10:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

10:00 - 10:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	27	100	0

10:15 - 10:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

10:30 - 10:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	27	100	0

10:45 - 11:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

11:00 - 11:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

11:15 - 11:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

11:30 - 11:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	86	0

11:45 - 12:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	13
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	86	0

12:00 - 12:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	84	0

12:15 - 12:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	84	0

12:30 - 12:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

12:45 - 13:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

13:00 - 13:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

13:15 - 13:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

13:30 - 13:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	27	100	0

13:45 - 14:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	90
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

14:00 - 14:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

14:15 - 14:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

14:30 - 14:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	17
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

14:45 - 15:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

15:00 - 15:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	76	100	0

15:15 - 15:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

15:30 - 15:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

15:45 - 16:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	25	100	0

16:00 - 16:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	25
	B - Quarry Access	0	0	94
	C - L1214-38 N	18	100	0

16:15 - 16:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	94
	C - L1214-38 N	26	100	0

16:30 - 16:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	94
	C - L1214-38 N	100	100	0

16:45 - 17:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	94
	C - L1214-38 N	90	100	0

17:00 - 17:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	74
	B - Quarry Access	0	0	100
	C - L1214-38 N	26	100	0

17:15 - 17:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

17:30 - 17:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

17:45 - 18:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

18:00 - 18:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

18:15 - 18:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

18:30 - 18:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	25	100	0

18:45 - 19:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.03	10.50	0.0	B	1.48	70.85
B-A	0.01	6.67	0.0	A	0.15	7.15
C-AB	0.03	12.34	0.0	B	1.56	75.06
C-A					1.65	79.18
A-B					0.15	7.41
A-C					2.11	101.23

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.84	0.016	1.41	0.0	0.0	10.414	B
B-A	0.00	0.00	136.53	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.57	2.57	78.26	0.033	2.54	0.0	0.0	11.880	B
C-A	2.96	2.96			2.96				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.84	0.016	1.43	0.0	0.0	10.415	B
B-A	0.00	0.00	137.00	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.47	2.47	75.74	0.033	2.47	0.0	0.0	12.162	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.84	0.016	1.43	0.0	0.0	10.415	B
B-A	0.00	0.00	136.66	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.50	2.50	76.41	0.033	2.50	0.0	0.0	12.177	B
C-A	1.00	1.00			1.00				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.46	0.016	1.43	0.0	0.0	10.461	B
B-A	0.00	0.00	136.28	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.47	2.47	75.39	0.033	2.47	0.0	0.0	12.341	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	88.01	0.017	1.51	0.0	0.0	10.403	B
B-A	0.00	0.00	137.76	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.68	1.68	76.72	0.022	1.69	0.0	0.0	12.047	B
C-A	1.00	1.00			1.00				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	87.46	0.017	1.51	0.0	0.0	10.471	B
B-A	0.00	0.00	136.89	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.66	1.66	75.40	0.022	1.66	0.0	0.0	12.165	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	4.08	4.08			4.08				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	87.74	0.017	1.51	0.0	0.0	10.437	B
B-A	0.00	0.00	137.08	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.68	1.68	76.31	0.022	1.68	0.0	0.0	12.061	B
C-A	1.00	1.00			1.00				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	87.46	0.017	1.51	0.0	0.0	10.471	B
B-A	0.00	0.00	136.39	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.73	1.73	77.94	0.022	1.73	0.0	0.0	11.926	B
C-A	2.99	2.99			2.99				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.74	0.019	1.70	0.0	0.0	10.461	B
B-A	0.00	0.00	137.13	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.03	2.03	75.65	0.027	2.03	0.0	0.0	12.112	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.87	0.019	1.71	0.0	0.0	10.444	B
B-A	0.00	0.00	136.90	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.11	2.11	78.29	0.027	2.11	0.0	0.0	11.930	B
C-A	2.97	2.97			2.97				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.60	0.019	1.71	0.0	0.0	10.478	B
B-A	0.00	0.00	136.54	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.09	2.09	77.23	0.027	2.09	0.0	0.0	11.937	B
C-A	1.98	1.98			1.98				
A-B	0.00	0.00			0.00				
A-C	3.06	3.06			3.06				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.87	0.019	1.71	0.0	0.0	10.444	B
B-A	0.00	0.00	137.22	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.06	2.06	76.63	0.027	2.06	0.0	0.0	12.029	B
C-A	1.01	1.01			1.01				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.84	0.016	1.40	0.0	0.0	10.414	B
B-A	0.00	0.00	137.66	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.30	1.30	76.53	0.017	1.31	0.0	0.0	11.952	B
C-A	1.00	1.00			1.00				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.60	0.016	1.40	0.0	0.0	10.440	B
B-A	0.00	0.00	137.10	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.32	1.32	77.21	0.017	1.32	0.0	0.0	11.910	B
C-A	2.00	2.00			2.00				
A-B	0.00	0.00			0.00				
A-C	3.06	3.06			3.06				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.66	0.016	1.40	0.0	0.0	10.432	B
B-A	0.00	0.00	137.34	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.30	1.30	76.38	0.017	1.30	0.0	0.0	11.938	B
C-A	1.00	1.00			1.00				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.45	0.016	1.40	0.0	0.0	10.457	B
B-A	0.00	0.00	136.66	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.34	1.34	77.96	0.017	1.34	0.0	0.0	11.833	B
C-A	3.02	3.02			3.02				
A-B	0.00	0.00			0.00				
A-C	4.09	4.09			4.09				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	88.01	0.014	1.25	0.0	0.0	10.375	B
B-A	0.00	0.00	137.84	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.37	1.37	77.59	0.018	1.37	0.0	0.0	11.768	B
C-A	2.00	2.00			2.00				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.74	0.014	1.25	0.0	0.0	10.408	B
B-A	0.00	0.00	137.49	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.35	1.35	76.49	0.018	1.35	0.0	0.0	11.939	B
C-A	1.00	1.00			1.00				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.07	0.014	1.25	0.0	0.0	10.486	B
B-A	0.00	0.00	135.20	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.80	2.80	82.34	0.034	2.78	0.0	0.0	11.616	B
C-A	1.99	1.99			1.99				
A-B	1.85	1.85			1.85				
A-C	3.08	3.08			3.08				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.60	0.014	1.25	0.0	0.0	10.422	B
B-A	0.00	0.00	135.84	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.87	2.87	84.53	0.034	2.87	0.0	0.0	11.082	B
C-A	3.94	3.94			3.94				
A-B	1.85	1.85			1.85				
A-C	2.06	2.06			2.06				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.08	0.014	1.25	0.0	0.0	10.485	B
B-A	0.00	0.00	135.44	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.45	2.45	83.29	0.029	2.46	0.0	0.0	11.134	B
C-A	2.00	2.00			2.00				
A-B	1.85	1.85			1.85				
A-C	3.06	3.06			3.06				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.49	0.014	1.25	0.0	0.0	10.435	B
B-A	0.00	0.00	136.06	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.48	2.48	84.51	0.029	2.48	0.0	0.0	11.003	B
C-A	2.98	2.98			2.98				
A-B	1.85	1.85			1.85				
A-C	3.08	3.08			3.08				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.73	0.014	1.25	0.0	0.0	10.406	B
B-A	0.00	0.00	137.56	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.01	1.01	76.53	0.013	1.02	0.0	0.0	11.122	B
C-A	1.01	1.01			1.01				
A-B	0.00	0.00			0.00				
A-C	2.06	2.06			2.06				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.73	0.014	1.25	0.0	0.0	10.406	B
B-A	0.00	0.00	137.41	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.03	1.03	78.17	0.013	1.03	0.0	0.0	11.781	B
C-A	3.02	3.02			3.02				
A-B	0.00	0.00			0.00				
A-C	2.06	2.06			2.06				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	88.01	0.020	1.73	0.0	0.0	10.431	B
B-A	0.00	0.00	137.47	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.69	1.69	78.43	0.022	1.68	0.0	0.0	11.725	B
C-A	2.99	2.99			2.99				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	87.84	0.020	1.74	0.0	0.0	10.452	B
B-A	0.00	0.00	137.62	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.63	1.63	75.74	0.021	1.63	0.0	0.0	12.024	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	88.01	0.020	1.74	0.0	0.0	10.431	B
B-A	0.00	0.00	137.75	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.65	1.65	76.67	0.021	1.65	0.0	0.0	12.024	B
C-A	1.00	1.00			1.00				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	87.48	0.020	1.74	0.0	0.0	10.495	B
B-A	0.00	0.00	136.96	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.63	1.63	75.42	0.022	1.63	0.0	0.0	12.165	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.74	0.021	1.85	0.0	0.0	10.478	B
B-A	0.00	0.00	136.81	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.88	1.88	78.19	0.024	1.88	0.0	0.0	11.903	B
C-A	3.00	3.00			3.00				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.87	0.021	1.85	0.0	0.0	10.461	B
B-A	0.00	0.00	137.23	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.85	1.85	77.48	0.024	1.85	0.0	0.0	11.860	B
C-A	2.01	2.01			2.01				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.52	0.021	1.85	0.0	0.0	10.505	B
B-A	0.00	0.00	136.57	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.83	1.83	76.14	0.024	1.83	0.0	0.0	12.029	B
C-A	0.99	0.99			0.99				
A-B	0.00	0.00			0.00				
A-C	3.08	3.08			3.08				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.87	0.021	1.85	0.0	0.0	10.461	B
B-A	0.00	0.00	137.23	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.83	1.83	76.44	0.024	1.83	0.0	0.0	12.062	B
C-A	1.01	1.01			1.01				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	87.45	0.014	1.23	0.0	0.0	10.438	B
B-A	0.00	0.00	136.45	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.49	1.49	76.84	0.019	1.49	0.0	0.0	11.968	B
C-A	2.02	2.02			2.02				
A-B	0.00	0.00			0.00				
A-C	2.06	2.06			2.06				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	87.04	0.014	1.22	0.0	0.0	10.487	B
B-A	0.00	0.00	135.92	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.47	1.47	75.71	0.019	1.47	0.0	0.0	12.104	B
C-A	1.00	1.00			1.00				
A-B	0.00	0.00			0.00				
A-C	7.17	7.17			7.17				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	87.87	0.014	1.22	0.0	0.0	10.385	B
B-A	0.00	0.00	137.50	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.49	1.49	77.45	0.019	1.49	0.0	0.0	11.929	B
C-A	2.00	2.00			2.00				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	87.84	0.014	1.22	0.0	0.0	10.389	B
B-A	0.00	0.00	137.55	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.47	1.47	76.55	0.019	1.47	0.0	0.0	11.936	B
C-A	1.02	1.02			1.02				
A-B	0.00	0.00			0.00				
A-C	1.02	1.02			1.02				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	90.36	0.029	2.58	0.0	0.0	10.360	B
B-A	1.79	1.79	137.39	0.013	1.77	0.0	0.0	6.636	A
C-AB	1.17	1.17	78.18	0.015	1.17	0.0	0.0	11.760	B
C-A	3.01	3.01			3.01				
A-B	0.00	0.00			0.00				
A-C	1.04	1.04			1.04				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	90.19	0.029	2.60	0.0	0.0	10.274	B
B-A	1.79	1.79	137.23	0.013	1.79	0.0	0.0	6.644	A
C-AB	1.15	1.15	77.21	0.015	1.15	0.0	0.0	11.798	B
C-A	2.03	2.03			2.03				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	90.26	0.029	2.60	0.0	0.0	10.266	B
B-A	1.79	1.79	137.44	0.013	1.79	0.0	0.0	6.633	A
C-AB	1.14	1.14	76.33	0.015	1.14	0.0	0.0	11.911	B
C-A	1.02	1.02			1.02				
A-B	0.00	0.00			0.00				
A-C	1.04	1.04			1.04				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	89.98	0.029	2.60	0.0	0.0	10.299	B
B-A	1.79	1.79	136.64	0.013	1.79	0.0	0.0	6.673	A
C-AB	1.15	1.15	76.78	0.015	1.15	0.0	0.0	11.909	B
C-A	2.01	2.01			2.01				
A-B	0.00	0.00			0.00				
A-C	2.04	2.04			2.04				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.58	0.016	1.38	0.0	0.0	10.231	B
B-A	0.00	0.00	137.52	0.000	0.01	0.0	0.0	0.000	A
C-AB	0.40	0.40	77.07	0.005	0.41	0.0	0.0	11.816	B
C-A	2.05	2.05			2.05				
A-B	0.00	0.00			0.00				
A-C	2.08	2.08			2.08				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.32	0.016	1.36	0.0	0.0	10.470	B
B-A	0.00	0.00	136.90	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.41	0.41	78.67	0.005	0.41	0.0	0.0	11.590	B
C-A	4.05	4.05			4.05				
A-B	0.00	0.00			0.00				
A-C	5.11	5.11			5.11				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.46	0.016	1.36	0.0	0.0	10.453	B
B-A	0.00	0.00	137.50	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.40	0.40	76.10	0.005	0.40	0.0	0.0	11.734	B
C-A	1.01	1.01			1.01				
A-B	0.00	0.00			0.00				
A-C	4.08	4.08			4.08				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.45	0.016	1.36	0.0	0.0	10.453	B
B-A	0.00	0.00	137.16	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.41	0.41	78.80	0.005	0.41	0.0	0.0	11.631	B
C-A	4.07	4.07			4.07				
A-B	0.00	0.00			0.00				
A-C	4.09	4.09			4.09				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.87	0.004	0.40	0.0	0.0	10.291	B
B-A	0.00	0.00	138.30	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.81	0.81	75.76	0.011	0.81	0.0	0.0	11.901	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	1.04	1.04			1.04				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.60	0.004	0.39	0.0	0.0	10.319	B
B-A	0.00	0.00	137.45	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.82	0.82	76.19	0.011	0.82	0.0	0.0	11.941	B
C-A	1.01	1.01			1.01				
A-B	0.00	0.00			0.00				
A-C	3.06	3.06			3.06				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.46	0.004	0.39	0.0	0.0	10.336	B
B-A	0.00	0.00	137.30	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.82	0.82	76.21	0.011	0.82	0.0	0.0	11.968	B
C-A	1.03	1.03			1.03				
A-B	0.00	0.00			0.00				
A-C	4.08	4.08			4.08				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.45	0.004	0.39	0.0	0.0	10.336	B
B-A	0.00	0.00	137.17	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.82	0.82	76.07	0.011	0.82	0.0	0.0	11.929	B
C-A	1.01	1.01			1.01				
A-B	0.00	0.00			0.00				
A-C	4.11	4.11			4.11				

+5 + Adj + Dev, 12 hrs

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Lagan Quarry Access	T-Junction	Two-way		6.12	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D11	+5 + Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D3+ D5 + D6

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - L1214-38 S		DIRECT	✓	100.000
B - Quarry Access		DIRECT	✓	100.000
C - L1214-38 N		DIRECT	✓	100.000

Origin-Destination Data

07:00 - 07:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	3.32	2.47	0.00

07:15 - 07:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	0.00	2.47	0.00

07:30 - 07:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	1.22	2.47	0.00

07:45 - 08:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	0.00	2.47	0.00

08:00 - 08:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	1.11	1.66	0.00

08:15 - 08:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.43
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	0.00	1.66	0.00

08:30 - 08:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	1.11	1.66	0.00

08:45 - 09:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	3.32	1.66	0.00

09:00 - 09:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	0.00	2.03	0.00

09:15 - 09:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	3.32	2.03	0.00

09:30 - 09:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.32
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	2.22	2.03	0.00

09:45 - 10:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	1.22	2.03	0.00

10:00 - 10:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	1.11	1.28	0.00

10:15 - 10:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.32
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	2.22	1.28	0.00

10:30 - 10:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	1.11	1.28	0.00

10:45 - 11:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.55
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	3.44	1.28	0.00

11:00 - 11:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	2.22	1.33	0.00

11:15 - 11:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	1.11	1.33	0.00

11:30 - 11:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	3.44
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	2.33	2.73	0.00

11:45 - 12:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	2.33
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	4.43	2.73	0.00

12:00 - 12:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	3.32
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	2.33	2.39	0.00

12:15 - 12:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	3.44
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	3.44	2.39	0.00

12:30 - 12:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.33
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	1.11	0.99	0.00

12:45 - 13:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.33
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	3.32	0.99	0.00

13:00 - 13:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	3.32	1.63	0.00

13:15 - 13:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	0.00	1.63	0.00

13:30 - 13:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	1.11	1.63	0.00

13:45 - 14:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	0.00	1.63	0.00

14:00 - 14:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	3.44	1.80	0.00

14:15 - 14:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	2.33	1.80	0.00

14:30 - 14:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.44
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	1.11	1.80	0.00

14:45 - 15:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	1.22	1.80	0.00

15:00 - 15:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.33
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	2.33	1.45	0.00

15:15 - 15:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	7.98
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	1.11	1.45	0.00

15:30 - 15:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	2.22	1.45	0.00

15:45 - 16:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.11
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	1.22	1.45	0.00

16:00 - 16:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.22
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	3.32	1.12	0.00

16:15 - 16:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	2.33	1.12	0.00

16:30 - 16:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.22
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	1.22	1.12	0.00

16:45 - 17:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.22
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	2.22	1.12	0.00

17:00 - 17:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.45
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	2.33	0.39	0.00

17:15 - 17:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	5.65
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	4.43	0.39	0.00

17:30 - 17:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.43
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	1.11	0.39	0.00

17:45 - 18:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.55
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	4.55	0.39	0.00

18:00 - 18:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.22
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	0.00	0.81	0.00

18:15 - 18:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.32
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	1.11	0.81	0.00

18:30 - 18:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.43
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	1.22	0.81	0.00

18:45 - 19:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.66
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	1.11	0.81	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

07:15 - 07:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

07:30 - 07:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

07:45 - 08:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

08:00 - 08:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

08:15 - 08:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

08:30 - 08:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

08:45 - 09:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:00 - 09:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:15 - 09:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:30 - 09:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:45 - 10:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

10:00 - 10:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	27	100	0

10:15 - 10:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

10:30 - 10:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	27	100	0

10:45 - 11:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

11:00 - 11:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

11:15 - 11:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

11:30 - 11:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	86	0

11:45 - 12:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	17
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	86	0

12:00 - 12:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	84	0

12:15 - 12:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	84	0

12:30 - 12:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

12:45 - 13:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

13:00 - 13:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

13:15 - 13:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

13:30 - 13:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	27	100	0

13:45 - 14:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	90
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

14:00 - 14:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

14:15 - 14:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

14:30 - 14:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	20
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

14:45 - 15:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

15:00 - 15:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	78	100	0

15:15 - 15:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

15:30 - 15:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

15:45 - 16:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	15	100	0

16:00 - 16:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	15
	B - Quarry Access	0	0	94
	C - L1214-38 N	24	100	0

16:15 - 16:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	94
	C - L1214-38 N	21	100	0

16:30 - 16:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	94
	C - L1214-38 N	100	100	0

16:45 - 17:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	94
	C - L1214-38 N	90	100	0

17:00 - 17:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	69
	B - Quarry Access	0	0	100
	C - L1214-38 N	21	100	0

17:15 - 17:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

17:30 - 17:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

17:45 - 18:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

18:00 - 18:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

18:15 - 18:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

18:30 - 18:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	15	100	0

18:45 - 19:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.03	10.51	0.0	B	1.48	70.85
B-A	0.01	6.68	0.0	A	0.15	7.15
C-AB	0.03	12.35	0.0	B	1.57	75.24
C-A					1.82	87.56
A-B					0.15	7.41
A-C					2.33	111.84

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.82	0.016	1.41	0.0	0.0	10.416	B
B-A	0.00	0.00	136.46	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.58	2.58	78.47	0.033	2.54	0.0	0.0	11.849	B
C-A	3.21	3.21			3.21				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.82	0.016	1.43	0.0	0.0	10.417	B
B-A	0.00	0.00	136.97	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.47	2.47	75.73	0.033	2.47	0.0	0.0	12.151	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.82	0.016	1.43	0.0	0.0	10.417	B
B-A	0.00	0.00	136.57	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.51	2.51	76.52	0.033	2.51	0.0	0.0	12.160	B
C-A	1.18	1.18			1.18				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.41	0.016	1.43	0.0	0.0	10.467	B
B-A	0.00	0.00	136.19	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.47	2.47	75.35	0.033	2.47	0.0	0.0	12.350	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	88.01	0.017	1.51	0.0	0.0	10.403	B
B-A	0.00	0.00	137.74	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.68	1.68	76.79	0.022	1.69	0.0	0.0	12.037	B
C-A	1.08	1.08			1.08				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	87.41	0.017	1.51	0.0	0.0	10.477	B
B-A	0.00	0.00	136.79	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.66	1.66	75.36	0.022	1.66	0.0	0.0	12.168	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	4.43	4.43			4.43				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	87.71	0.017	1.51	0.0	0.0	10.440	B
B-A	0.00	0.00	137.01	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.68	1.68	76.35	0.022	1.68	0.0	0.0	12.053	B
C-A	1.08	1.08			1.08				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	87.41	0.017	1.51	0.0	0.0	10.477	B
B-A	0.00	0.00	136.26	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.73	1.73	78.12	0.022	1.73	0.0	0.0	11.909	B
C-A	3.25	3.25			3.25				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.71	0.019	1.70	0.0	0.0	10.464	B
B-A	0.00	0.00	137.09	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.03	2.03	75.63	0.027	2.03	0.0	0.0	12.106	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.86	0.019	1.71	0.0	0.0	10.445	B
B-A	0.00	0.00	136.83	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.12	2.12	78.50	0.027	2.12	0.0	0.0	11.908	B
C-A	3.23	3.23			3.23				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.56	0.019	1.71	0.0	0.0	10.482	B
B-A	0.00	0.00	136.44	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.09	2.09	77.35	0.027	2.09	0.0	0.0	11.916	B
C-A	2.15	2.15			2.15				
A-B	0.00	0.00			0.00				
A-C	3.32	3.32			3.32				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.86	0.019	1.71	0.0	0.0	10.445	B
B-A	0.00	0.00	137.17	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.06	2.06	76.77	0.027	2.06	0.0	0.0	12.007	B
C-A	1.19	1.19			1.19				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.82	0.016	1.40	0.0	0.0	10.416	B
B-A	0.00	0.00	137.61	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.30	1.30	76.59	0.017	1.31	0.0	0.0	11.937	B
C-A	1.09	1.09			1.09				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.56	0.016	1.40	0.0	0.0	10.446	B
B-A	0.00	0.00	137.00	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.32	1.32	77.33	0.017	1.32	0.0	0.0	11.896	B
C-A	2.18	2.18			2.18				
A-B	0.00	0.00			0.00				
A-C	3.32	3.32			3.32				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.63	0.016	1.40	0.0	0.0	10.436	B
B-A	0.00	0.00	137.26	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.30	1.30	76.43	0.017	1.30	0.0	0.0	11.924	B
C-A	1.09	1.09			1.09				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.39	0.016	1.40	0.0	0.0	10.465	B
B-A	0.00	0.00	136.49	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.34	1.34	78.20	0.017	1.34	0.0	0.0	11.807	B
C-A	3.38	3.38			3.38				
A-B	0.00	0.00			0.00				
A-C	4.55	4.55			4.55				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	88.01	0.014	1.25	0.0	0.0	10.375	B
B-A	0.00	0.00	137.81	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.37	1.37	77.74	0.018	1.37	0.0	0.0	11.739	B
C-A	2.18	2.18			2.18				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.71	0.014	1.25	0.0	0.0	10.411	B
B-A	0.00	0.00	137.43	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.35	1.35	76.55	0.018	1.35	0.0	0.0	11.927	B
C-A	1.09	1.09			1.09				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	86.98	0.014	1.25	0.0	0.0	10.498	B
B-A	0.00	0.00	134.97	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.81	2.81	82.48	0.034	2.79	0.0	0.0	11.601	B
C-A	2.25	2.25			2.25				
A-B	1.85	1.85			1.85				
A-C	3.44	3.44			3.44				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.54	0.014	1.25	0.0	0.0	10.431	B
B-A	0.00	0.00	135.68	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.88	2.88	84.77	0.034	2.88	0.0	0.0	11.055	B
C-A	4.28	4.28			4.28				
A-B	1.85	1.85			1.85				
A-C	2.33	2.33			2.33				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.01	0.014	1.25	0.0	0.0	10.494	B
B-A	0.00	0.00	135.26	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.46	2.46	83.45	0.029	2.46	0.0	0.0	11.108	B
C-A	2.26	2.26			2.26				
A-B	1.85	1.85			1.85				
A-C	3.32	3.32			3.32				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.44	0.014	1.25	0.0	0.0	10.441	B
B-A	0.00	0.00	135.91	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.49	2.49	84.76	0.029	2.49	0.0	0.0	10.973	B
C-A	3.34	3.34			3.34				
A-B	1.85	1.85			1.85				
A-C	3.44	3.44			3.44				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.70	0.014	1.25	0.0	0.0	10.412	B
B-A	0.00	0.00	137.46	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.01	1.01	76.57	0.013	1.02	0.0	0.0	11.101	B
C-A	1.09	1.09			1.09				
A-B	0.00	0.00			0.00				
A-C	2.33	2.33			2.33				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.70	0.014	1.25	0.0	0.0	10.410	B
B-A	0.00	0.00	137.29	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.04	1.04	78.36	0.013	1.03	0.0	0.0	11.762	B
C-A	3.28	3.28			3.28				
A-B	0.00	0.00			0.00				
A-C	2.33	2.33			2.33				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	88.01	0.020	1.73	0.0	0.0	10.431	B
B-A	0.00	0.00	137.43	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.70	1.70	78.65	0.022	1.69	0.0	0.0	11.692	B
C-A	3.25	3.25			3.25				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	87.82	0.020	1.74	0.0	0.0	10.454	B
B-A	0.00	0.00	137.59	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.63	1.63	75.73	0.021	1.63	0.0	0.0	12.015	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	88.01	0.020	1.74	0.0	0.0	10.431	B
B-A	0.00	0.00	137.73	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.65	1.65	76.74	0.021	1.65	0.0	0.0	12.016	B
C-A	1.08	1.08			1.08				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	87.44	0.020	1.74	0.0	0.0	10.501	B
B-A	0.00	0.00	136.87	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.63	1.63	75.38	0.022	1.63	0.0	0.0	12.171	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.71	0.021	1.85	0.0	0.0	10.481	B
B-A	0.00	0.00	136.70	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.89	1.89	78.47	0.024	1.88	0.0	0.0	11.874	B
C-A	3.35	3.35			3.35				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.86	0.021	1.85	0.0	0.0	10.463	B
B-A	0.00	0.00	137.16	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.86	1.86	77.70	0.024	1.86	0.0	0.0	11.826	B
C-A	2.27	2.27			2.27				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.45	0.021	1.85	0.0	0.0	10.513	B
B-A	0.00	0.00	136.40	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.83	1.83	76.14	0.024	1.83	0.0	0.0	12.021	B
C-A	1.08	1.08			1.08				
A-B	0.00	0.00			0.00				
A-C	3.44	3.44			3.44				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.86	0.021	1.85	0.0	0.0	10.463	B
B-A	0.00	0.00	137.14	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.83	1.83	76.55	0.024	1.83	0.0	0.0	12.047	B
C-A	1.19	1.19			1.19				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	87.38	0.014	1.23	0.0	0.0	10.447	B
B-A	0.00	0.00	136.22	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.49	1.49	76.96	0.019	1.50	0.0	0.0	11.948	B
C-A	2.28	2.28			2.28				
A-B	0.00	0.00			0.00				
A-C	2.33	2.33			2.33				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	86.92	0.014	1.22	0.0	0.0	10.500	B
B-A	0.00	0.00	135.68	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.47	1.47	75.68	0.019	1.47	0.0	0.0	12.106	B
C-A	1.09	1.09			1.09				
A-B	0.00	0.00			0.00				
A-C	7.98	7.98			7.98				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	87.86	0.014	1.22	0.0	0.0	10.388	B
B-A	0.00	0.00	137.45	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.49	1.49	77.58	0.019	1.49	0.0	0.0	11.914	B
C-A	2.17	2.17			2.17				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	87.82	0.014	1.22	0.0	0.0	10.393	B
B-A	0.00	0.00	137.50	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.47	1.47	76.71	0.019	1.47	0.0	0.0	11.918	B
C-A	1.20	1.20			1.20				
A-B	0.00	0.00			0.00				
A-C	1.11	1.11			1.11				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	90.34	0.029	2.58	0.0	0.0	10.361	B
B-A	1.79	1.79	137.28	0.013	1.77	0.0	0.0	6.641	A
C-AB	1.17	1.17	78.34	0.015	1.18	0.0	0.0	11.724	B
C-A	3.27	3.27			3.27				
A-B	0.00	0.00			0.00				
A-C	1.22	1.22			1.22				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	90.16	0.029	2.60	0.0	0.0	10.278	B
B-A	1.79	1.79	137.13	0.013	1.79	0.0	0.0	6.648	A
C-AB	1.16	1.16	77.42	0.015	1.16	0.0	0.0	11.778	B
C-A	2.29	2.29			2.29				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	90.21	0.029	2.60	0.0	0.0	10.272	B
B-A	1.79	1.79	137.29	0.013	1.79	0.0	0.0	6.641	A
C-AB	1.14	1.14	76.41	0.015	1.14	0.0	0.0	11.886	B
C-A	1.20	1.20			1.20				
A-B	0.00	0.00			0.00				
A-C	1.22	1.22			1.22				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	89.93	0.029	2.60	0.0	0.0	10.305	B
B-A	1.79	1.79	136.49	0.013	1.79	0.0	0.0	6.680	A
C-AB	1.15	1.15	76.86	0.015	1.15	0.0	0.0	11.895	B
C-A	2.18	2.18			2.18				
A-B	0.00	0.00			0.00				
A-C	2.22	2.22			2.22				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.51	0.016	1.38	0.0	0.0	10.242	B
B-A	0.00	0.00	137.35	0.000	0.01	0.0	0.0	0.000	A
C-AB	0.40	0.40	77.25	0.005	0.41	0.0	0.0	11.806	B
C-A	2.32	2.32			2.32				
A-B	0.00	0.00			0.00				
A-C	2.45	2.45			2.45				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.24	0.016	1.36	0.0	0.0	10.479	B
B-A	0.00	0.00	136.71	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.41	0.41	78.91	0.005	0.41	0.0	0.0	11.556	B
C-A	4.41	4.41			4.41				
A-B	0.00	0.00			0.00				
A-C	5.65	5.65			5.65				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.41	0.016	1.36	0.0	0.0	10.459	B
B-A	0.00	0.00	137.38	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.40	0.40	76.12	0.005	0.40	0.0	0.0	11.716	B
C-A	1.10	1.10			1.10				
A-B	0.00	0.00			0.00				
A-C	4.43	4.43			4.43				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.39	0.016	1.36	0.0	0.0	10.461	B
B-A	0.00	0.00	136.97	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.41	0.41	79.12	0.005	0.41	0.0	0.0	11.598	B
C-A	4.52	4.52			4.52				
A-B	0.00	0.00			0.00				
A-C	4.55	4.55			4.55				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.85	0.004	0.40	0.0	0.0	10.292	B
B-A	0.00	0.00	138.25	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.81	0.81	75.74	0.011	0.81	0.0	0.0	11.893	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	1.22	1.22			1.22				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.56	0.004	0.39	0.0	0.0	10.324	B
B-A	0.00	0.00	137.35	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.82	0.82	76.22	0.011	0.82	0.0	0.0	11.936	B
C-A	1.10	1.10			1.10				
A-B	0.00	0.00			0.00				
A-C	3.32	3.32			3.32				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.41	0.004	0.39	0.0	0.0	10.342	B
B-A	0.00	0.00	137.20	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.83	0.83	76.34	0.011	0.83	0.0	0.0	11.958	B
C-A	1.21	1.21			1.21				
A-B	0.00	0.00			0.00				
A-C	4.43	4.43			4.43				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.38	0.004	0.39	0.0	0.0	10.345	B
B-A	0.00	0.00	137.01	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.82	0.82	76.07	0.011	0.82	0.0	0.0	11.920	B
C-A	1.10	1.10			1.10				
A-B	0.00	0.00			0.00				
A-C	4.66	4.66			4.66				

+15 + Adj + Dev, 12 hrs

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	Lagan Quarry Access	T-Junction	Two-way		5.85	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time period length (min)	Time segment length (min)	Run automatically	Relationship type	Relationship
D12	+15 + Adj + Dev	12 hrs	DIRECT	07:00	19:00	720	15	✓	Simple	D4+ D5 + D6

Vehicle mix varies over time	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)	O-D data varies over time
✓	✓	✓	HV Percentages	2.00	✓

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Scaling Factor (%)
A - L1214-38 S		DIRECT	✓	100.000
B - Quarry Access		DIRECT	✓	100.000
C - L1214-38 N		DIRECT	✓	100.000

Origin-Destination Data

07:00 - 07:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	3.62	2.47	0.00

07:15 - 07:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	0.00	2.47	0.00

07:30 - 07:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	1.44	2.47	0.00

07:45 - 08:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - Quarry Access	0.00	0.00	1.43
	C - L1214-38 N	0.00	2.47	0.00

08:00 - 08:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	1.21	1.66	0.00

08:15 - 08:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.83
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	0.00	1.66	0.00

08:30 - 08:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	1.21	1.66	0.00

08:45 - 09:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - Quarry Access	0.00	0.00	1.51
	C - L1214-38 N	3.62	1.66	0.00

09:00 - 09:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	0.00	2.03	0.00

09:15 - 09:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	3.62	2.03	0.00

09:30 - 09:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.62
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	2.41	2.03	0.00

09:45 - 10:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.71
	C - L1214-38 N	1.44	2.03	0.00

10:00 - 10:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	1.21	1.28	0.00

10:15 - 10:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.62
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	2.41	1.28	0.00

10:30 - 10:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	1.21	1.28	0.00

10:45 - 11:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	5.06
	B - Quarry Access	0.00	0.00	1.40
	C - L1214-38 N	3.85	1.28	0.00

11:00 - 11:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	2.41	1.33	0.00

11:15 - 11:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	1.21	1.33	0.00

11:30 - 11:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	3.85
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	2.65	2.73	0.00

11:45 - 12:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	2.65
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	4.83	2.73	0.00

12:00 - 12:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	3.62
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	2.65	2.39	0.00

12:15 - 12:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	1.85	3.85
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	3.85	2.39	0.00

12:30 - 12:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.65
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	1.21	0.99	0.00

12:45 - 13:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.65
	B - Quarry Access	0.00	0.00	1.25
	C - L1214-38 N	3.62	0.99	0.00

13:00 - 13:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	3.62	1.63	0.00

13:15 - 13:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	0.00	1.63	0.00

13:30 - 13:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	0.00
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	1.21	1.63	0.00

13:45 - 14:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - Quarry Access	0.00	0.00	1.74
	C - L1214-38 N	0.00	1.63	0.00

14:00 - 14:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	3.85	1.80	0.00

14:15 - 14:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	2.65	1.80	0.00

14:30 - 14:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.85
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	1.21	1.80	0.00

14:45 - 15:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.85
	C - L1214-38 N	1.44	1.80	0.00

15:00 - 15:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.65
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	2.65	1.45	0.00

15:15 - 15:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	8.91
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	1.21	1.45	0.00

15:30 - 15:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	2.41	1.45	0.00

15:45 - 16:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.21
	B - Quarry Access	0.00	0.00	1.22
	C - L1214-38 N	1.44	1.45	0.00

16:00 - 16:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.44
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	3.62	1.12	0.00

16:15 - 16:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	2.65	1.12	0.00

16:30 - 16:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.44
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	1.44	1.12	0.00

16:45 - 17:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.41
	B - Quarry Access	1.79	0.00	2.60
	C - L1214-38 N	2.41	1.12	0.00

17:00 - 17:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	2.88
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	2.65	0.39	0.00

17:15 - 17:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	6.27
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	4.83	0.39	0.00

17:30 - 17:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.83
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	1.21	0.39	0.00

17:45 - 18:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	5.06
	B - Quarry Access	0.00	0.00	1.37
	C - L1214-38 N	5.06	0.39	0.00

18:00 - 18:15

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	1.44
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	0.00	0.81	0.00

18:15 - 18:30

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	3.62
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	1.21	0.81	0.00

18:30 - 18:45

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	4.83
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	1.44	0.81	0.00

18:45 - 19:00

Demand (Veh/TS)

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0.00	0.00	5.29
	B - Quarry Access	0.00	0.00	0.39
	C - L1214-38 N	1.21	0.81	0.00

Vehicle Mix

07:00 - 07:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

07:15 - 07:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

07:30 - 07:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

07:45 - 08:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

08:00 - 08:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

08:15 - 08:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

08:30 - 08:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

08:45 - 09:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:00 - 09:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:15 - 09:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:30 - 09:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

09:45 - 10:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

10:00 - 10:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	27	100	0

10:15 - 10:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

10:30 - 10:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	27	100	0

10:45 - 11:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

11:00 - 11:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

11:15 - 11:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

11:30 - 11:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	86	0

11:45 - 12:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	22
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	86	0

12:00 - 12:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	84	0

12:15 - 12:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	84	0

12:30 - 12:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

12:45 - 13:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

13:00 - 13:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

13:15 - 13:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

13:30 - 13:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	27	100	0

13:45 - 14:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	90
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

14:00 - 14:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

14:15 - 14:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

14:30 - 14:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	23
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

14:45 - 15:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

15:00 - 15:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	100
	C - L1214-38 N	79	100	0

15:15 - 15:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

15:30 - 15:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

15:45 - 16:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	100
	C - L1214-38 N	6	100	0

16:00 - 16:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	6
	B - Quarry Access	0	0	94
	C - L1214-38 N	31	100	0

16:15 - 16:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	27
	B - Quarry Access	0	0	94
	C - L1214-38 N	16	100	0

16:30 - 16:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	94
	C - L1214-38 N	100	100	0

16:45 - 17:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	100
	B - Quarry Access	0	0	94
	C - L1214-38 N	90	100	0

17:00 - 17:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	65
	B - Quarry Access	0	0	100
	C - L1214-38 N	16	100	0

17:15 - 17:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

17:30 - 17:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

17:45 - 18:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

18:00 - 18:15

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	0	100	0

18:15 - 18:30

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

18:30 - 18:45

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	6	100	0

18:45 - 19:00

Heavy Vehicle Percentages

		To		
		A - L1214-38 S	B - Quarry Access	C - L1214-38 N
From	A - L1214-38 S	0	0	0
	B - Quarry Access	0	0	100
	C - L1214-38 N	100	100	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/TS)	Total Junction Arrivals (Veh)
B-C	0.03	10.52	0.0	B	1.48	70.85
B-A	0.01	6.69	0.0	A	0.15	7.15
C-AB	0.03	12.36	0.0	B	1.57	75.44
C-A					2.02	97.06
A-B					0.15	7.41
A-C					2.58	123.88

Main Results for each time segment

07:00 - 07:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.80	0.016	1.41	0.0	0.0	10.418	B
B-A	0.00	0.00	136.38	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.59	2.59	78.70	0.033	2.55	0.0	0.0	11.814	B
C-A	3.50	3.50			3.50				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

07:15 - 07:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.80	0.016	1.43	0.0	0.0	10.419	B
B-A	0.00	0.00	136.94	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.47	2.47	75.72	0.033	2.47	0.0	0.0	12.144	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

07:30 - 07:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.80	0.016	1.43	0.0	0.0	10.419	B
B-A	0.00	0.00	136.47	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.52	2.52	76.65	0.033	2.52	0.0	0.0	12.140	B
C-A	1.39	1.39			1.39				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

07:45 - 08:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.43	1.43	87.35	0.016	1.43	0.0	0.0	10.473	B
B-A	0.00	0.00	136.09	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.47	2.47	75.30	0.033	2.47	0.0	0.0	12.356	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

08:00 - 08:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	88.01	0.017	1.51	0.0	0.0	10.403	B
B-A	0.00	0.00	137.73	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.68	1.68	76.87	0.022	1.70	0.0	0.0	12.031	B
C-A	1.18	1.18			1.18				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

08:15 - 08:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	87.35	0.017	1.51	0.0	0.0	10.483	B
B-A	0.00	0.00	136.69	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.66	1.66	75.31	0.022	1.66	0.0	0.0	12.172	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	4.83	4.83			4.83				

08:30 - 08:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	87.68	0.017	1.51	0.0	0.0	10.443	B
B-A	0.00	0.00	136.92	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.68	1.68	76.39	0.022	1.68	0.0	0.0	12.046	B
C-A	1.18	1.18			1.18				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

08:45 - 09:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.51	1.51	87.35	0.017	1.51	0.0	0.0	10.483	B
B-A	0.00	0.00	136.11	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.74	1.74	78.32	0.022	1.74	0.0	0.0	11.892	B
C-A	3.54	3.54			3.54				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

09:00 - 09:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.68	0.019	1.70	0.0	0.0	10.467	B
B-A	0.00	0.00	137.04	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.03	2.03	75.61	0.027	2.03	0.0	0.0	12.099	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

09:15 - 09:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.85	0.019	1.71	0.0	0.0	10.447	B
B-A	0.00	0.00	136.76	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.13	2.13	78.74	0.027	2.13	0.0	0.0	11.883	B
C-A	3.52	3.52			3.52				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

09:30 - 09:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.52	0.020	1.71	0.0	0.0	10.487	B
B-A	0.00	0.00	136.34	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.10	2.10	77.48	0.027	2.10	0.0	0.0	11.893	B
C-A	2.35	2.35			2.35				
A-B	0.00	0.00			0.00				
A-C	3.62	3.62			3.62				

09:45 - 10:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.71	1.71	87.85	0.019	1.71	0.0	0.0	10.447	B
B-A	0.00	0.00	137.11	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.07	2.07	76.94	0.027	2.07	0.0	0.0	11.983	B
C-A	1.40	1.40			1.40				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

10:00 - 10:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.80	0.016	1.40	0.0	0.0	10.418	B
B-A	0.00	0.00	137.56	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.30	1.30	76.66	0.017	1.32	0.0	0.0	11.923	B
C-A	1.19	1.19			1.19				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

10:15 - 10:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.52	0.016	1.40	0.0	0.0	10.451	B
B-A	0.00	0.00	136.89	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.33	1.33	77.46	0.017	1.33	0.0	0.0	11.878	B
C-A	2.37	2.37			2.37				
A-B	0.00	0.00			0.00				
A-C	3.62	3.62			3.62				

10:30 - 10:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.60	0.016	1.40	0.0	0.0	10.440	B
B-A	0.00	0.00	137.18	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.30	1.30	76.48	0.017	1.30	0.0	0.0	11.914	B
C-A	1.19	1.19			1.19				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

10:45 - 11:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.40	1.40	87.32	0.016	1.40	0.0	0.0	10.473	B
B-A	0.00	0.00	136.29	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.35	1.35	78.49	0.017	1.35	0.0	0.0	11.779	B
C-A	3.78	3.78			3.78				
A-B	0.00	0.00			0.00				
A-C	5.06	5.06			5.06				

11:00 - 11:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	88.01	0.014	1.25	0.0	0.0	10.373	B
B-A	0.00	0.00	137.78	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.38	1.38	77.90	0.018	1.38	0.0	0.0	11.706	B
C-A	2.37	2.37			2.37				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

11:15 - 11:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.68	0.014	1.25	0.0	0.0	10.412	B
B-A	0.00	0.00	137.36	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.35	1.35	76.61	0.018	1.35	0.0	0.0	11.912	B
C-A	1.19	1.19			1.19				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

11:30 - 11:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	86.86	0.014	1.25	0.0	0.0	10.512	B
B-A	0.00	0.00	134.70	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.82	2.82	82.63	0.034	2.80	0.0	0.0	11.584	B
C-A	2.55	2.55			2.55				
A-B	1.85	1.85			1.85				
A-C	3.85	3.85			3.85				

11:45 - 12:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.47	0.014	1.25	0.0	0.0	10.439	B
B-A	0.00	0.00	135.49	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.90	2.90	85.04	0.034	2.90	0.0	0.0	11.023	B
C-A	4.66	4.66			4.66				
A-B	1.85	1.85			1.85				
A-C	2.65	2.65			2.65				

12:00 - 12:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	86.93	0.014	1.25	0.0	0.0	10.504	B
B-A	0.00	0.00	135.06	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.47	2.47	83.64	0.030	2.47	0.0	0.0	11.084	B
C-A	2.57	2.57			2.57				
A-B	1.85	1.85			1.85				
A-C	3.62	3.62			3.62				

12:15 - 12:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.39	0.014	1.25	0.0	0.0	10.448	B
B-A	0.00	0.00	135.74	0.000	0.00	0.0	0.0	0.000	A
C-AB	2.50	2.50	85.05	0.029	2.50	0.0	0.0	10.937	B
C-A	3.74	3.74			3.74				
A-B	1.85	1.85			1.85				
A-C	3.85	3.85			3.85				

12:30 - 12:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.65	0.014	1.25	0.0	0.0	10.418	B
B-A	0.00	0.00	137.35	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.01	1.01	76.60	0.013	1.03	0.0	0.0	11.080	B
C-A	1.19	1.19			1.19				
A-B	0.00	0.00			0.00				
A-C	2.65	2.65			2.65				

12:45 - 13:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.25	1.25	87.65	0.014	1.25	0.0	0.0	10.416	B
B-A	0.00	0.00	137.16	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.04	1.04	78.57	0.013	1.04	0.0	0.0	11.742	B
C-A	3.57	3.57			3.57				
A-B	0.00	0.00			0.00				
A-C	2.65	2.65			2.65				

13:00 - 13:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	88.01	0.020	1.73	0.0	0.0	10.431	B
B-A	0.00	0.00	137.38	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.70	1.70	78.90	0.022	1.70	0.0	0.0	11.655	B
C-A	3.54	3.54			3.54				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:15 - 13:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	87.80	0.020	1.74	0.0	0.0	10.456	B
B-A	0.00	0.00	137.56	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.63	1.63	75.72	0.021	1.63	0.0	0.0	12.003	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

13:30 - 13:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	88.01	0.020	1.74	0.0	0.0	10.431	B
B-A	0.00	0.00	137.71	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.65	1.65	76.82	0.021	1.65	0.0	0.0	12.006	B
C-A	1.18	1.18			1.18				
A-B	0.00	0.00			0.00				
A-C	0.00	0.00			0.00				

13:45 - 14:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.74	1.74	87.39	0.020	1.74	0.0	0.0	10.507	B
B-A	0.00	0.00	136.78	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.63	1.63	75.34	0.022	1.63	0.0	0.0	12.175	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

14:00 - 14:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.68	0.021	1.85	0.0	0.0	10.485	B
B-A	0.00	0.00	136.58	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.90	1.90	78.79	0.024	1.89	0.0	0.0	11.840	B
C-A	3.76	3.76			3.76				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

14:15 - 14:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.85	0.021	1.85	0.0	0.0	10.465	B
B-A	0.00	0.00	137.09	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.87	1.87	77.96	0.024	1.87	0.0	0.0	11.782	B
C-A	2.58	2.58			2.58				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

14:30 - 14:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.37	0.021	1.85	0.0	0.0	10.524	B
B-A	0.00	0.00	136.22	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.83	1.83	76.14	0.024	1.83	0.0	0.0	12.010	B
C-A	1.18	1.18			1.18				
A-B	0.00	0.00			0.00				
A-C	3.85	3.85			3.85				

14:45 - 15:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.85	1.85	87.85	0.021	1.85	0.0	0.0	10.465	B
B-A	0.00	0.00	137.05	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.84	1.84	76.68	0.024	1.84	0.0	0.0	12.024	B
C-A	1.40	1.40			1.40				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

15:00 - 15:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	87.29	0.014	1.23	0.0	0.0	10.459	B
B-A	0.00	0.00	135.96	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.50	1.50	77.10	0.019	1.50	0.0	0.0	11.928	B
C-A	2.59	2.59			2.59				
A-B	0.00	0.00			0.00				
A-C	2.65	2.65			2.65				

15:15 - 15:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	86.80	0.014	1.22	0.0	0.0	10.516	B
B-A	0.00	0.00	135.41	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.47	1.47	75.63	0.019	1.47	0.0	0.0	12.115	B
C-A	1.18	1.18			1.18				
A-B	0.00	0.00			0.00				
A-C	8.91	8.91			8.91				

15:30 - 15:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	87.85	0.014	1.22	0.0	0.0	10.388	B
B-A	0.00	0.00	137.39	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.49	1.49	77.74	0.019	1.49	0.0	0.0	11.898	B
C-A	2.37	2.37			2.37				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

15:45 - 16:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.22	1.22	87.80	0.014	1.22	0.0	0.0	10.393	B
B-A	0.00	0.00	137.45	0.000	0.00	0.0	0.0	0.000	A
C-AB	1.47	1.47	76.89	0.019	1.47	0.0	0.0	11.894	B
C-A	1.41	1.41			1.41				
A-B	0.00	0.00			0.00				
A-C	1.21	1.21			1.21				

16:00 - 16:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	90.32	0.029	2.58	0.0	0.0	10.364	B
B-A	1.79	1.79	137.15	0.013	1.77	0.0	0.0	6.648	A
C-AB	1.18	1.18	78.53	0.015	1.18	0.0	0.0	11.685	B
C-A	3.57	3.57			3.57				
A-B	0.00	0.00			0.00				
A-C	1.44	1.44			1.44				

16:15 - 16:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	90.12	0.029	2.60	0.0	0.0	10.282	B
B-A	1.79	1.79	137.03	0.013	1.79	0.0	0.0	6.653	A
C-AB	1.16	1.16	77.66	0.015	1.16	0.0	0.0	11.755	B
C-A	2.61	2.61			2.61				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

16:30 - 16:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	90.15	0.029	2.60	0.0	0.0	10.279	B
B-A	1.79	1.79	137.11	0.013	1.79	0.0	0.0	6.650	A
C-AB	1.14	1.14	76.50	0.015	1.14	0.0	0.0	11.855	B
C-A	1.42	1.42			1.42				
A-B	0.00	0.00			0.00				
A-C	1.44	1.44			1.44				

16:45 - 17:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	2.60	2.60	89.87	0.029	2.60	0.0	0.0	10.312	B
B-A	1.79	1.79	136.33	0.013	1.79	0.0	0.0	6.688	A
C-AB	1.16	1.16	76.95	0.015	1.16	0.0	0.0	11.885	B
C-A	2.38	2.38			2.38				
A-B	0.00	0.00			0.00				
A-C	2.41	2.41			2.41				

17:00 - 17:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.42	0.016	1.38	0.0	0.0	10.252	B
B-A	0.00	0.00	137.15	0.000	0.01	0.0	0.0	0.000	A
C-AB	0.40	0.40	77.45	0.005	0.41	0.0	0.0	11.798	B
C-A	2.63	2.63			2.63				
A-B	0.00	0.00			0.00				
A-C	2.88	2.88			2.88				

17:15 - 17:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.16	0.016	1.36	0.0	0.0	10.489	B
B-A	0.00	0.00	136.49	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.42	0.42	79.17	0.005	0.42	0.0	0.0	11.517	B
C-A	4.80	4.80			4.80				
A-B	0.00	0.00			0.00				
A-C	6.27	6.27			6.27				

17:30 - 17:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.35	0.016	1.36	0.0	0.0	10.465	B
B-A	0.00	0.00	137.24	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.40	0.40	76.14	0.005	0.40	0.0	0.0	11.697	B
C-A	1.20	1.20			1.20				
A-B	0.00	0.00			0.00				
A-C	4.83	4.83			4.83				

17:45 - 18:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	1.37	1.37	87.32	0.016	1.36	0.0	0.0	10.469	B
B-A	0.00	0.00	136.76	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.42	0.42	79.49	0.005	0.42	0.0	0.0	11.562	B
C-A	5.03	5.03			5.03				
A-B	0.00	0.00			0.00				
A-C	5.06	5.06			5.06				

18:00 - 18:15

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.82	0.004	0.40	0.0	0.0	10.296	B
B-A	0.00	0.00	138.19	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.81	0.81	75.72	0.011	0.81	0.0	0.0	11.884	B
C-A	0.00	0.00			0.00				
A-B	0.00	0.00			0.00				
A-C	1.44	1.44			1.44				

18:15 - 18:30

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.52	0.004	0.39	0.0	0.0	10.330	B
B-A	0.00	0.00	137.24	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.83	0.83	76.25	0.011	0.83	0.0	0.0	11.932	B
C-A	1.19	1.19			1.19				
A-B	0.00	0.00			0.00				
A-C	3.62	3.62			3.62				

18:30 - 18:45

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.35	0.004	0.39	0.0	0.0	10.348	B
B-A	0.00	0.00	137.07	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.83	0.83	76.49	0.011	0.83	0.0	0.0	11.949	B
C-A	1.42	1.42			1.42				
A-B	0.00	0.00			0.00				
A-C	4.83	4.83			4.83				

18:45 - 19:00

Stream	Total Demand (Veh/TS)	Junction Arrivals (Veh)	Capacity (Veh/TS)	RFC	Throughput (Veh/TS)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-C	0.39	0.39	87.29	0.004	0.39	0.0	0.0	10.356	B
B-A	0.00	0.00	136.81	0.000	0.00	0.0	0.0	0.000	A
C-AB	0.83	0.83	76.06	0.011	0.83	0.0	0.0	11.911	B
C-A	1.19	1.19			1.19				
A-B	0.00	0.00			0.00				
A-C	5.29	5.29			5.29				

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INTRODUCTION

15.1 This chapter of the Environmental Impact Assessment Report (EIAR), prepared by SLR Consulting Ireland, addresses the potential interaction of environmental impacts arising from the proposed development at the existing quarry at Carrigcleena More, Bweeng, Co. Cork.

15.2 The proposed development being applied for under this current planning application is shown on EIAR Figure 2-2 and will consist of:

- Continued use of the existing permitted quarry, ancillary processing plant and facilities, and access beyond 2034 (the existing permitted duration);
- Lateral extension of the existing permitted quarry area to a depth of c.110 mOD (the permitted quarry floor level in the existing quarry) over c.3.7 hectares;
- Construction of a new settlement pond (1,000 m^2) and upgrade of the existing surface water management and settlement pond system at site;
- Realignment of a section of the existing local road to the south of the proposed extension area;
- Overburden storage;
- Operation landscaping including perimeter screening berms around the proposed extension area;
- Restoration of the quarry to natural habitat after-uses;

All related ancillary site works within an overall application area of c. 28.8 hectares, and all for a period of 20 years and a further 2 years to complete final restoration of the site.

15.3 Further information on the proposed development, site activities, environmental management systems and controls at the application sites are provided in the Chapter 2 of this EIAR.

15.4 All of the predictable significant impacts of the proposed development and the existing and proposed measures in place to mitigate them have been outlined in this EIAR.

15.5 However, for any development with the potential for significant environmental impact there is also the potential for interaction amongst these impacts. The result of these interactions may either exacerbate the magnitude of the impact or ameliorate it. The interaction of impacts on the surrounding environment needs to be addressed as part of the Environmental Impact Assessment process.

15.6 This Environmental Impact Assessment Report was prepared by SLR Consulting on behalf of Breedon Materials Ltd., trading as Breedon Ireland as an integrated document, rather than a collection of separate reports. The impacts that arise as a result of the interaction between several aspects of the development have, therefore been addressed in the main body of each EIAR chapter.

The Interaction of the Foregoing

15.7 The interaction between the various environmental topics has been covered within each of the EIAR chapters, 4 through to 14, where relevant.

15.8 A matrix method has been used[1], in which the environmental components addressed in the previous sections of this EIAR have been placed on both axes of a matrix; these interactions are summarised in **Table 15-1** below.

15.9 The purpose of the effects matrix is to identify potential interactions. Actual interactions and their significance are dealt with in the relevant chapter of the EIAR. An overview of the key interactions is provided below in this chapter.

Table 15-1
Potential Impact Interaction and Key Interrelationships Matrix

	Population & Human Health	Biodiversity	Land, Soils & Geology	Water	Climate	Air Quality	Noise & Vibration	Material Assets	Cultural Heritage	Landscape and Visual	Traffic
Population & Human Health						■	■			■	■
Biodiversity						■	■				
Land, Soils & Geology				■					■		
Water			■		■						
Climate				■							
Air Quality	■	■									
Noise & Vibration	■	■									
Material Assets											

[1] As per EPA guidelines (2022)

	Population & Human Health	Biodiversity	Land, Soils & Geology	Water	Climate	Air Quality	Noise & Vibration	Material Assets	Cultural Heritage	Landscape and Visual	Traffic
Cultural Heritage											
Landscape and Visual											
Traffic											

Overview of key INTERACTIONS

Population and Human Health

15.10 In relation to the key interactions of human receptors with air quality, noise & vibration, landscape and traffic, these are addressed in EIAR Chapter 9 (Air Quality), Chapter 10 (Noise & Vibration), Chapter 13 (Landscape) and Chapter 14 (Traffic).

Biodiversity

15.11 In relation to biodiversity there is potential for interaction with air quality and noise & vibration, and these interactions are addressed in Chapter 9 (Air Quality) and Chapter 10 (Noise & Vibration).

15.12 Following review of the existing dust deposition, noise & vibration results and detailed assessments it is concluded that the proposed operations within the application area will have an insignificant dust, noise and vibration impact on ecological receptors. Due to the separation distance between the site and the nearest designated European (Natura 2000) site(s) any potential dust, noise and vibration impact on same will be negligible / none.

Land, Soils and Geology

15.13 The interaction between Land, Soils & Geology and Cultural Heritage is addressed in Chapter 6 (Land, Soils & Geology). The proposed development will not impact any County Geological Sites. Interaction with Water is addressed in Chapter 7 (Water), see below.

Water

15.14 In relation to water there is potential for interaction with land, soils & geology and climate, and these are addressed in Chapter 6 (Land, Soil & Geology) and Chapter 7 (Water) of the EIAR.

15.15 The water management at the site considers climate (weather conditions). There are existing mitigation and management measures in place to prevent spills and manage the water

environment. Continued implementation of these measures will ensure that there will be no significant effects owing to the interaction of land, soils and geology and the water environment.

Climate

15.16 The interaction of climate (weather conditions) with the water environment is addressed in Chapter 7 (Water), in terms of surface water, groundwater and water management at the site.

Air Quality

15.17 In relation to air quality (in particular dust deposition) there is potential for interaction with human and ecological receptors, and this is addressed in Chapter 9 (Air Quality).

15.18 Following review of the existing dust deposition results and a detailed dust assessment it is concluded it is concluded that the proposed development, with the range of mitigation and management measures to be implemented, and with the design measures incorporated into the working scheme, will have an insignificant dust impact on any assessed receptors.

15.19 Due to the separation distance between the site and the nearest designated European (Natura 2000) any potential dust impact on same will be negligible.

Noise & Vibration

15.20 In relation to noise and vibration there is potential for interaction with human and ecological receptors, and this is addressed in Chapter 10 (Noise & Vibration).

15.21 Following review of the existing noise results and detailed noise & vibration assessments it is concluded that the proposed development will have an insignificant / negligible impact on human or ecological receptors. Due to the separation distance between the proposed development and the nearest designated European (Natura 2000) sites there will be no noise or vibration impact arising at these locations.

Material Assets

15.22 Based on the assessment completed it is considered that there is no potential for any significant interaction between material assets (waste management and built services) and the other environmental topics.

Cultural Heritage

15.23 Potential interactions associated with Land, Soils and Geology in terms of Geological Heritage are added in Chapter 6 – Land, Soil & Geology. The proposed development will not encroach impact any County Geological Sites.

Landscape & Visual

15.24 The proposed development has the potential to impact on population (human) amenity through changes to the landscape and views / prospects. The detailed landscape & visual assessment provided in Chapter 13 (Landscape) concludes that the visual effects on views would range from none for the vast majority of locations within the study area, to moderate or less for a small number of locations within 1km to the north and west and within 2km to

the south of the application area (i.e. impacts not regarded as significant). On completion of all restoration works the predicted landscape effects would reduce to negligible and the visual effects to minor/negligible.

Traffic

15.25 Potential interactions associated with traffic movements from the proposed development with the general population in the form of other road users are addressed in Chapter 14 (Traffic). The detailed traffic assessment concluded that the road network will continue to operate within capacity for the Opening Year (2025), 2030 and 2040.

15.26 Chapter 9 (Air Quality) provides details of the existing management / mitigation measures that are in place at the quarry to prevent / minimise generation of traffic-related dust on the existing internal access roads and at the quarry entrance.

REFERENCES

Environmental Protection Agency (2022) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.