Environmental Impact Assessment Report

Strategic Housing Development, Land at Rosshill, Galway.

Volume 2: Appendices: 2-1 - 12-1

Table of Contents

Volume 2: Appendices 2-1 to 12-1

SEE FURTHER VOLUMES:

TII
Bonneagar Iompair Éireann
Transport Infrastructure Ireland

Received on
1? AUG 2019
181058-a
Eoin Gibson

Mr. Eoin Gibson
MKO
Tuam Road
Galway
H91 VW84

Dáta | Date	Ár dTag | Our Ref.	Bhur dTag | Your Ref.
8 August 2019	**TII19-106620**	**181058-a**

Re: EIAR Scoping Request to support future Strategic Housing Development (SHD) application at Rosshill, Galway on behalf of Kegata Ltd.

Dear Mr. Gibson,

Transport Infrastructure Ireland (TII) acknowledges receipt of your EIAR Scoping request by received by post 24 July 2019 in respect of the above proposed project.

The issuing of this correspondence is provided as best practice guidance only and does not prejudice TII's statutory right to make any observations, requests for further information, objections or appeals following the examination of any valid application referred.

The approach to be adopted by TII in making such submissions or comments will seek to uphold official policy and guidance as outlined in the Spatial Planning and National Roads Guidelines for Planning Authorities (2012). Regard should also be had to other relevant guidance available at www.TII.ie.

In this instance, we note the proposal is to prepare an EIAR to support a Strategic Housing Development proposal for 350 residential units crèche, commercial/ retail space over approx. 10 ha. at Rosshill, Galway. The site is regular in shape with northern boundary formed by the Galway - Dublin rail line that is transversed by a local road accessing the R921. This local road is called the 'Rosshill Road' in submitted documentation, runs alongside the rail line for part of the northern boundary of the subject site and is to be used to access the proposed development.

With respect to EIAR Scoping issues, the recommendations indicated below provide only general guidance for the preparation of EIAR, which may affect the national road network. The developer should have regard, *inter alia*, to the following;

1. As set down in the Spatial Planning and National Roads Guidelines, it is in the public interest that, in so far as is reasonably practicable, that the national road network continues to serve its intended strategic purpose. TII would be specifically concerned as to potential significant impacts the development would have on the national road network (and junctions with national roads) in the proximity of the proposed development.

Bonneagar Iompair Éireann
Ionad Gnó Gheata na Páirce
Sráid Gheata na Páirce
Baile Átha Cliath 8
Éire, D08 DK10

Transport Infrastructure Ireland
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Parkgate Street
Dublin 8
Ireland, D08 DK10

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+353 (0)1 646 3601

2. The stated intention to prepare a Traffic and Transport Assessment (TTA) as part of the EIAR is noted. Where appropriate, subject to meeting the appropriate thresholds and criteria and having regard to best practice, a TTA be carried out in accordance with relevant guidelines, noting traffic volumes attending the site and traffic routes to/from the site with reference to impacts on the national road and Luas networks, including junctions of lower category roads with those networks. TII's TTA Guidelines (2014) should be referred to in relation to proposed development with potential impacts on the national road network. The scheme promoter is also advised to have regard to Section 2.2 of the TII TTA Guidelines which addresses requirements for sub-threshold TTA.

3. The designers are asked to consult TII Publications to determine whether a Road Safety Audit is required.

4. Assessments and design and construction and maintenance standards and guidance are available at TII Publications that replaced the NRA Design Manual for Roads and Bridges (DMRB) and the NRA Manual of Contract Documents for Road Works (MCDRW).

5. Environmental Impact Assessment shall include provision for travel planning / mobility management planning in the interests of protecting national roads capacity in the interests of sustainable travel policy.

Notwithstanding, any of the above, the developer should be aware that this list is non-exhaustive, thus site and development specific issues should be addressed in accordance with best practice.

I hope that the above comments are of use in your EIAR preparation.

Yours sincerely,

Natasha Crudden
Regulatory & Administration Unit

Our Ref: **G Pre00213/2019**
(Please quote in all related correspondence)

03/09/19
Block 1, G.F.S.C.
Moneenageisha Road
Galway
Via email

Re: proposed development of 350 residential units, creche, commercial/retail provision and ancillary works at Rosshill, Galway

A chara

On behalf of the Department of Culture, Heritage and the Gaeltacht, I refer to correspondence received in connection with the above.

Outlined below are heritage-related observations/recommendations of the Department under the stated heading(s).

Nature Conservation

The lands in question are located in the townland of Rosshill and are adjacent to the Galway Bay Complex Special Area of Conservation (SAC) (Site Code 000268) and located 130m from Inner Galway Bay Special Protected Area (SPA) (Site Code 004031).

Information about these sites is available from the National Parks and Wildlife Service website (www.npws.ie), including site boundary data, site synopses, lists of qualifying interests (i.e. the Annex I habitats and Annex II species for which the sites are designated), and generic conservation objectives. In addition, site-specific conservation objectives are available for some sites; those that are available can be accessed via the following links:

https://www.npws.ie/protected-sites/spa/004031
https://www.npws.ie/protected-sites/sac/000268

In accordance with Section 177U of the Planning and Development Act 2000, as amended, the proposed development must be screened for Appropriate Assessment by the competent authority which, in this case, is the planning authority. Screening should be undertaken in view of best scientific knowledge to determine whether the proposed development, either individually or in combination with other plans and projects, is likely to have significant effects on the European site in view of its conservation objectives. Screening should consider the likely effects of operation as well as all aspects of construction and site preparation.

In particular, consideration should be given to the effects of external lighting on adjacent woodland within the SAC and fragmentation of wildlife corridors which could negatively impact on bat species during and after the development. A full bat survey should be carried out by an experienced bat ecologist at an appropriate time of year.

If the risk of significant effects on a European site cannot be excluded on the basis of objective information, or if there is uncertainty as to the absence of significant effects, Appropriate Assessment is required (Section 177V).

The Department will be in a position to advise the planning authority further on receipt of further information in the form of a Natura Impact Statement or other relevant documentation.

You are requested to send further communications to this Department's Development Applications Unit (DAU) at **manager.dau@chg.gov.ie** (team monitored); if this is not possible, correspondence may alternatively be sent to:

The Manager
Development Applications Unit (DAU)
Department of Culture, Heritage and the Gaeltacht
Newtown Road
Wexford
Y35 AP90

Is mise, le meas

Connor Rooney
Development Applications Unit

To MK0

24 July 2019

SHD application at Rosshill Galway

Attention Eoin Gilson
info@mkoireland.ie

Dear Eoin

Thank you for EIAR scoping consultation request.
We wish to make submission on this file referred to us as follows:

Because of the location and design of the proposal there is a preliminary need to justify the location suitability of this proposal for walkable and cycling access to public transport and schools. There is a need to ensure that it does not become unsustainably car dependent because OF DISTANCE FROM Galway city centre and employment locations.

The EIAR needs to address:

1 **Ireland's obligations at UN and EU level and in the Climate Action and Low Carbon Development Act 2015 and overarching Government planning policy through "DoECLG Planning Policy Guidelines in January 2015" which set out a range of considerations on climate**:

"The planning process plays a very significant role in promoting patterns of development which help Ireland meet its international obligations by:

• tackling the sources of climate change by reducing Ireland's carbon footprint;

• securing less energy and travel intensive development patterns;

• facilitating the generation of energy from low carbon sources; and

• adapting to the effects of climate change."

2 **The 49 Action recommendations in the target based Government *Department of Transport "Smarter Travel – A New Transport Policy For Ireland" 2009***

This NATIONAL policy was set out by the Department of Transport in 2009 in "*Smarter Travel* " which contained clear targets to stabilise the total kilometres travelled by the national car fleet at 2009 levels, and reduce the overall national figure for car based workplace travel from 65 % to 45%, by 2020. It set out 49 specific actions including biennial reports on progress starting in 2010.

In additions to this the National Cycling Framework requires a 10% cycle journey target.

Just as a development needs to have a sustainable water supply and wastewater disposal, the same applies to integration with sustainable transport

The development needs to integrated with the meeting of Government overarching transport policy and targets as stated in ***Department of Transport "Smarter Travel – A New Transport Policy For Ireland" 2009***

This is a matter to be addressed by your client as applicant as much as An Bord Pleanala, and Galway Coucil.

Your application will need to provide for a range of measures including the appointment of a mobility manager for both the construction of the development and any ongoing operation. This would need to include a range of measures, such as safe cycling routes to schools from the application site requiring liason with relevant schools and the council.

We will note how you and your client respond to this submission.

Ian Lumley

Advocacy Officer

Eoin Gilson

From: esbnetworks@esb.ie
Sent: 22 July 2019 14:39
To: Eoin Gilson
Subject: Re: 181058-a Rosshill SHD - EIAR Scoping [#289437]

Good Afternoon Eoin,

Thank you for your email which has been forwarded on to the relevant office.

Please contact me again if I can be of further assistance.

Kind regards,

Nicola

ESB Networks Customer Care | T: 1850372757 | +353 21 2386555 | F: +353 21 4844261 | www.esbnetworks.ie

WARNING: ESB Networks will not be liable for acting on any instructions issued via your e-mail address where it transpires that such instructions were not sent by you.

--Original Message--
From: egilson@mkoireland.ie
Date: 19/07/2019 04:58 PM
To: esbnetworks@esb.ie
Subject: 181058-a Rosshill SHD - EIAR Scoping

Dear Sir/Madam,

Please see attached cover letter and EIAR Scoping document for a proposed housing development in Rosshill, Co. Galway.

Kind Regards,

Eoin Gilson

From: noreplyntacrm ntacrm <noreplyntacrm@nationaltransport.ie>
Sent: 19 July 2019 17:04
To: Eoin Gilson
Subject: Your enquiry has been received. Case reference #: CAS-78486-R1G0J4 NTA:00000080000089484

CASE REFERENCE #: CAS-78486-R1G0J4

DEPARTMENT RESPONSIBLE:

Dear Sir or Madam,

Thank you for contacting the National Transport Authority. Your enquiry has been received and will be dealt with as soon as possible. We aim to respond to all enquiries within 15 working days. A copy of your enquiry is displayed below.

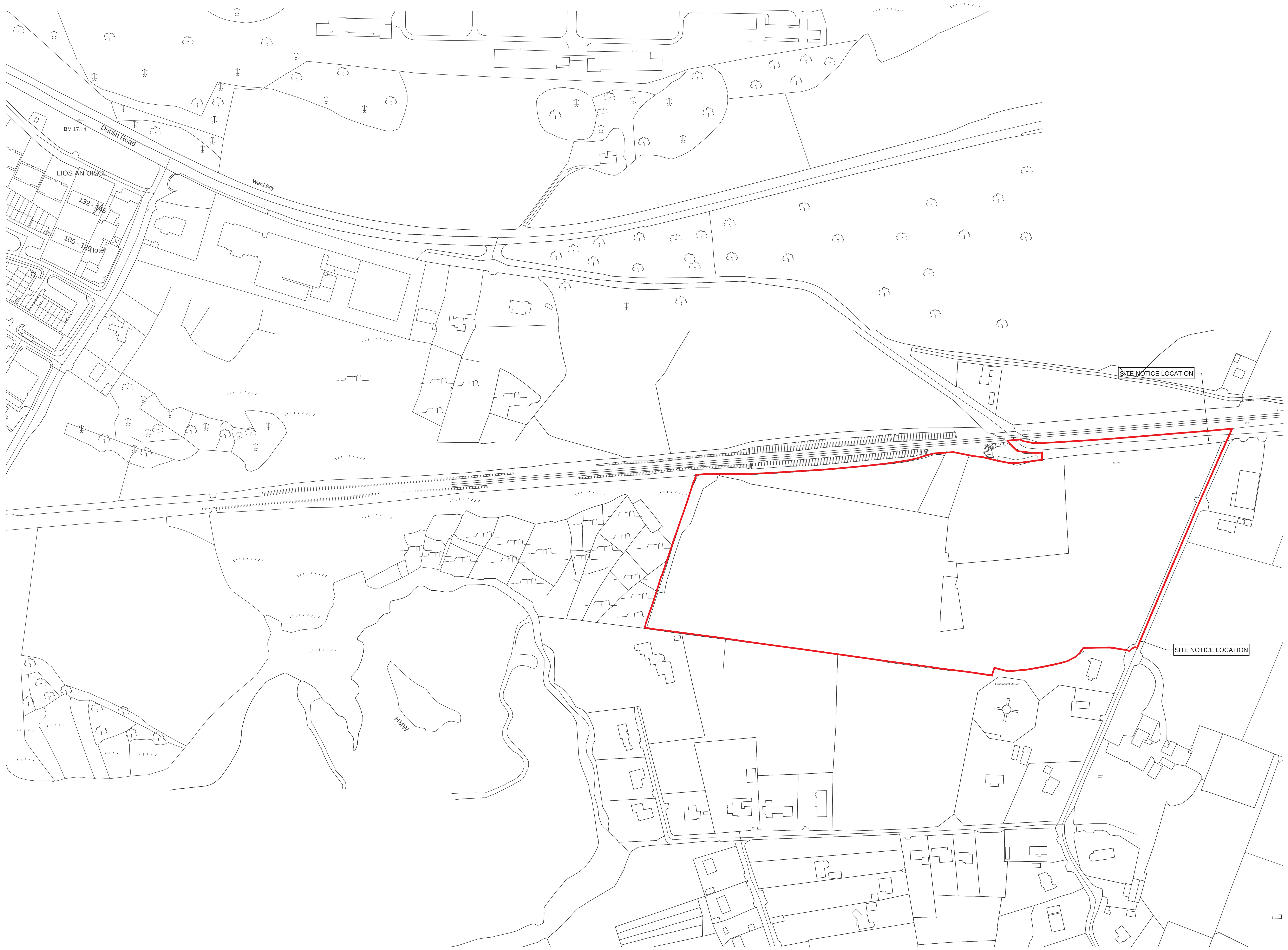
Kind regards,
National Transport Authority

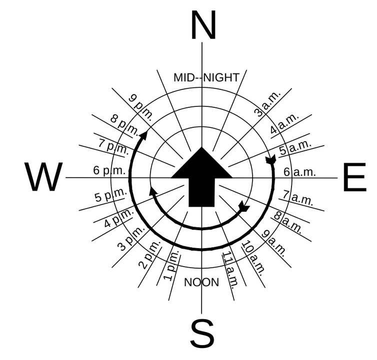
A Dhuine Uaisle,

Go raibh maith agat as ucht do theagmháil leis Údarás Náisiúnta Iompair. Fuarthas d'fhiosrúchán agus déileálfar leis chomh luath agus is féidir. Tá sé mar aidhm againn gach fiosrúchán a fhreagairt laistigh de 15 lá oibre. Taispeántar cóip d'fhiosrúchán thíos.

Le dea-ghuí,
An t-Údarás Náisiúnta Iompair

Description: **Dear Sir/Madam, Please see attached cover letter and EIAR Scoping document for a proposed housing development in Rosshill, Co. Galway. Kind Regards, Eoin Gilson. Eoin Gilson BSc MSc (Env.) Environmental Scientist MKO Tuam Road, Galway Ireland, H91 VW84 353 (0) 91 735611 www.mkoireland.ie McCarthy Keville O'Sullivan Ltd. T/A MKO. Registered in Ireland No. 462657. VAT No. IE9693052R This email and any attached files or emails transmitted with it are confidential and intended solely for the use of the individual(s) or entity to whom it is addressed. If the reader is not a representative of the intended recipient(s), any review, dissemination or copying of this message or the information it contains is prohibited. If you have received this email in error please notify the sender of the email and delete the email. MKO does not represent or warrant that any attachment hereto is free from computer viruses or other defects. The opinions expressed in this e-mail and any attachments may be those of the author and are not necessarily those of MKO**
Subject: **181058-a Rosshill SHD - EIAR Scoping**
Contact Name: **egilson@mkoireland.ie**
Email Address: **egilson@mkoireland.ie**





O.S.I map reproduced under licence AR 00113319

Description:
Digital Cartographic Model (DCM)

Publisher / Source:
Ordnance Survey Ireland (OSi)

Data Source / Reference:
PRIME2

File Format:
Autodesk AutoCAD (DWG_R2013)

File Name:
v_50003579_1.dwg

Clip Extent / Area of Interest (AOI):
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LRX,LRY= 534496.7126,724617.9346
ULX,ULY= 533666.7126,725232.9346
URX,URY= 534496.7126,725232.9346

Projection / Spatial Reference:
Projection= IRENET95_Irish_Transverse_Mercator

Centre Point Coordinates:
X,Y= 534081.7126,724925.4346

Data Extraction Date:
Date= 13-Apr-2018

Version / Release:
Version= 1.0

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The representation on this map of a road, track or footpath is not evidence of the existence of a right of way.

Ordnance Survey maps never show legal property boundaries, nor do they show ownership of physical features.

SITE LOCATION MAP

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:2500
Drawing Purpose: PLANNING
Project: Provision for Wayleaves Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019
Drawn by: sor
Checked by: JOM
Paper size:
CTB file:
LTScale:
File path:

File Ref.	Subject:	Project No.	Drawing No.	Rev.
3.09	Site Location Map	18128	3001	

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Architecture + Project Management

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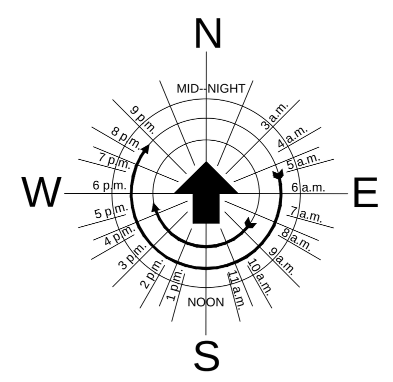
MASTER SITE LAYOUT PLAN

NOTE : PLEASE REFER TO ENGINEERS DRAWINGS & REPORTS FOR SERVICE CONNECTION DETAILS

Overall site Mix:		Mix by type:	
038 no. 1 Bedroom units	11.1%	157 Apartments	45.9%
125 no. 2 Bedroom units	36.5%	069 Terraces	20.2%
136 no. 3 Bedroom units	39.8%	114 Semi-Detached	33.3%
043 no. 4 Bedroom units	12.6%	002 Detached	00.6%
	100%		100%



LEGEND

Site boundary outlined in red

OVERALL SITE AREA : **100,693 sqm :- 10.069HA :- 24.881 Acre**
Verges to Old Dublin Road & Rosshill Rd. **: 3,381 sqm :- 0.338 HA**
Junction area **: 628 sqm :- 0.063 HA**
RA zoned Land to west boundary **: 1,292 sqm :- 0.129 HA**
Developable Area : 95,392 sqm :- 9.539 HA :- 23.572 Acre

Galway City Council Development plan 2017-2023:
Site zoned Low Density Residential (LDR)

RESIDENTIAL TOTAL NO. OF UNITS = 342

Density:
35.8 Units per Ha - Residential Density (342 total units on 9.539 ha.)
14.5 Units per Acre - Residential Density (342 total units on 23.572 acre)

Plot ratio **: 0.37 :1** (max allowable 0.46:1)
Site Coverage **: 15.34%**

45.9% Apartments = 157 Units
54.1% Houses = 185 Units

Residential Dwelling Units:

Type 'A-A6'	- 4 bed	Semi -Detached	- Circa 125.4 sqm	TOTAL 36 UNITS
Type 'A2'	- 4 bed	Detached	- Circa 125.4sqm	TOTAL 02 UNITS
Type 'B-B7'	- 3 bed	Semi -D	- Circa 110.4 sqm	TOTAL 24 UNITS
Type 'C-C8'	- 3 bed	Semi -D	- Circa 108.2 sqm	TOTAL 44 UNITS
Type 'C-C10'	- 3 bed	Terrace	- Circa 108.2 sqm	TOTAL 63 UNITS
Type 'D'	- 2 bed	Terrace	- Circa 84.4 sqm	TOTAL 06 UNITS
Type 'E'	- 3 bed	Long semi-D	- Circa 107 sqm	TOTAL 05 UNITS
Type 'F'	- 4 bed	Long semi-D	- Circa 129.8 sqm	TOTAL 05 UNITS

TOTAL UNITS ON SITE = 185 UNITS

Apartment Units:

Type '1A- 1D'	- 1 bed	Apartment	- Circa 49.2sqm (varies)	TOTAL 038 UNITS
Type '2A - 2N'	- 2 bed	Apartment	- Circa 78sqm(varies)	TOTAL 119 UNITS

TOTAL UNITS ON SITE = 157 UNITS

Public open space requirement over developable area: 15% - 14,309sqm
Public open space provided- Over 21,533sqm - 22.57%
(above 10m wide/ 200sqm & reasonably level usable space)
Overall Green and landscaped space across the site: 25,130sqm - 25.8%

01 Master Site Layout Plan
Scale: 1:1000

MASTER SITE LAYOUT PLAN

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:1000
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019
Drawn by: sor
Checked by: JOM
Paper size:
CTB file:
LTScale:
File path:

File Ref.	Subject:	Project No.	Drawing No.	Rev.
3.09	MASTER SITE LAYOUT PLAN	18128	3002	-

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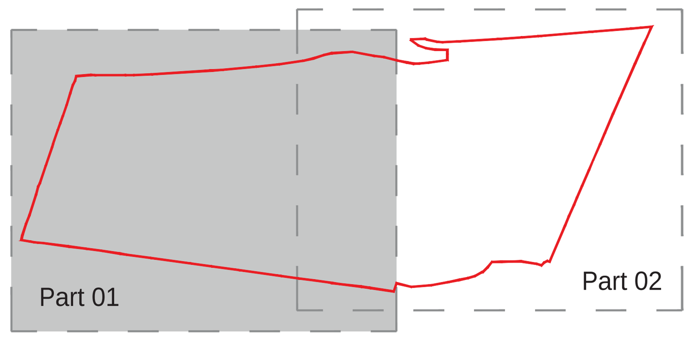
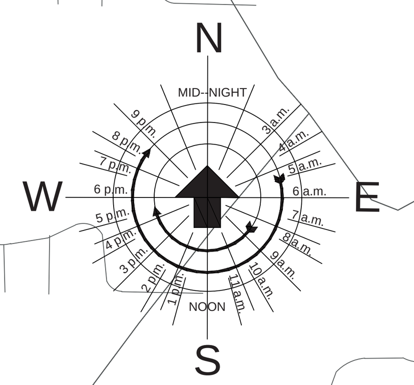
PART 01- SITE LAYOUT PLAN



02 Location key
Scale: n.t.s

NOTE : PLEASE REFER TO ENGINEERS DRAWINGS & REPORTS FOR SERVICE CONNECTION DETAILS



01 PART 01 Site Layout Plan
Scale: 1:500

LEGEND

Site boundary outlined in red

OVERALL SITE AREA : **100,693 sqm :- 10.069HA :- 24.881 Acre**
Verges to Old Dublin Road & Rosshill Rd. **: 3,381 sqm :- 0.338 HA**
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Site Coverage **: 15.34%**

45.9% Apartments = 157 Units
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Residential Dwelling Units:

Type 'A-A6'	- 4 bed Semi -Detached	- Circa 125.4 sqm	TOTAL 36 UNITS
Type 'A2'	- 4 bed Detached	- Circa 125.4sqm	TOTAL 02 UNITS
Type 'B-B7'	- 3 bed Semi -D	- Circa 110.4 sqm	TOTAL 24 UNITS
Type 'C-C8'	- 3 bed Semi -D	- Circa 108.2 sqm	TOTAL 44 UNITS
Type 'C-C10'	- 3 bed Terrace	- Circa 108.2 sqm	TOTAL 63 UNITS
Type 'D'	- 2 bed Terrace	- Circa 84.4 sqm	TOTAL 06 UNITS
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038 no. 1 Bedroom units	11.1%
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	100%

Mix by type:

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No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

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Scale: 1:500
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019 Drawn by: sor Checked by: JOM
Paper size: CTB file: LTScale:
File path:

File Ref. 3.09
Subject: PART 01 - SITE LAYOUT PLAN
Project No. 18128
Drawing No. 3003
Rev. -

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W: onom.ie

PART 02- SITE LAYOUT PLAN

NOTE : PLEASE REFER TO ENGINEERS DRAWINGS & REPORTS FOR SERVICE CONNECTION DETAILS

LEGEND

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01 PART 02 Site Layout Plan
Scale: 1:500

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114 Semi-Detached	33.3%
002 Detached	00.6%
	100%

Part 01
Part 02

02 Location key
Scale: n.t.s

PART 02- SITE LAYOUT PLAN

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:500
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019 Drawn by: sor Checked by: JOM
Paper size: CTB file: LTScale:
File path:

File Ref. 3.09 | Subject: PART 02 - SITE LAYOUT PLAN | Project No. 18128 | Drawing No. 3004 | Rev. -

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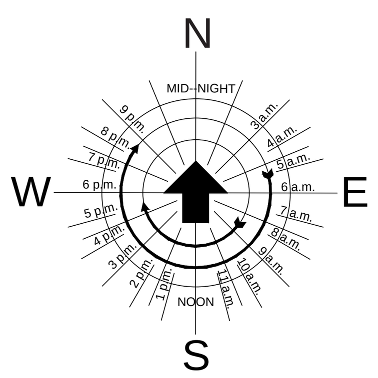

01 Overall Existing Site Survey
Scale: 1:1000

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

OVERALL EXISTING SITE SURVEY

Scale: 1:1000
Drawing Purpose: PLANNING
Project: Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019
Drawn by: sor
Checked by: JOM
Paper size:
CTB file:
LTScale:
File path:

File Ref. 3.09
Subject: OVERALL EXISTING SITE SURVEY
Project No. 18128
Drawing No. 3005
Rev.

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Architecture + Project Management

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02 Location key
Scale: n.t.s

01 Site Survey part 01
Scale: 1:500

SITE SURVEY PART 01

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:500
Drawing Purpose: PLANNING
Project: Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019 Drawn by: sor Checked by: JOM
Paper size: CTB file: LTScale:
File path:

File Ref. 3.09
Subject: SITE SURVEY PART 01
Project No. 18128
Drawing No. 3006
Rev.

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01 Site Survey part 02
Scale: 1:500

02 Location key
Scale: n.t.s

SITE SURVEY PART 02

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:1500
Drawing Purpose: PLANNING
Project: Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019   Drawn by: sor   Checked by: JOM
Paper size: CTB file: LTScale:
File path:

File Ref. 3.09
Subject: SITE SURVEY PART 02
Project No. 18128
Drawing No. 3007
Rev.

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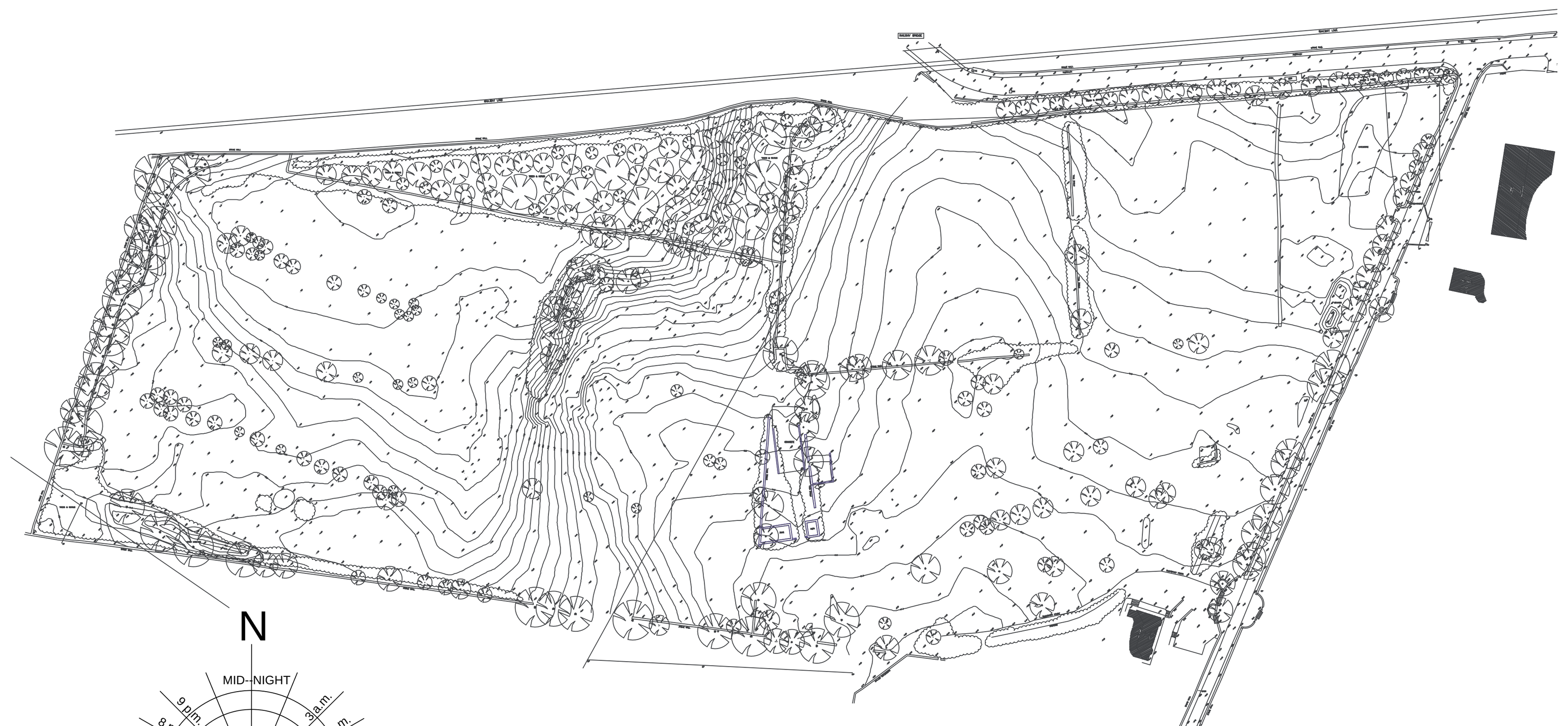
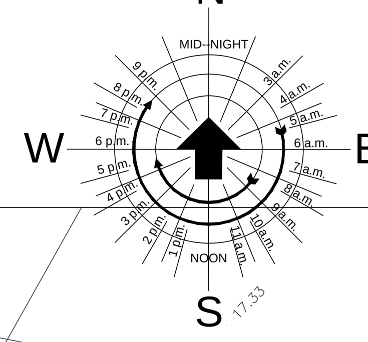
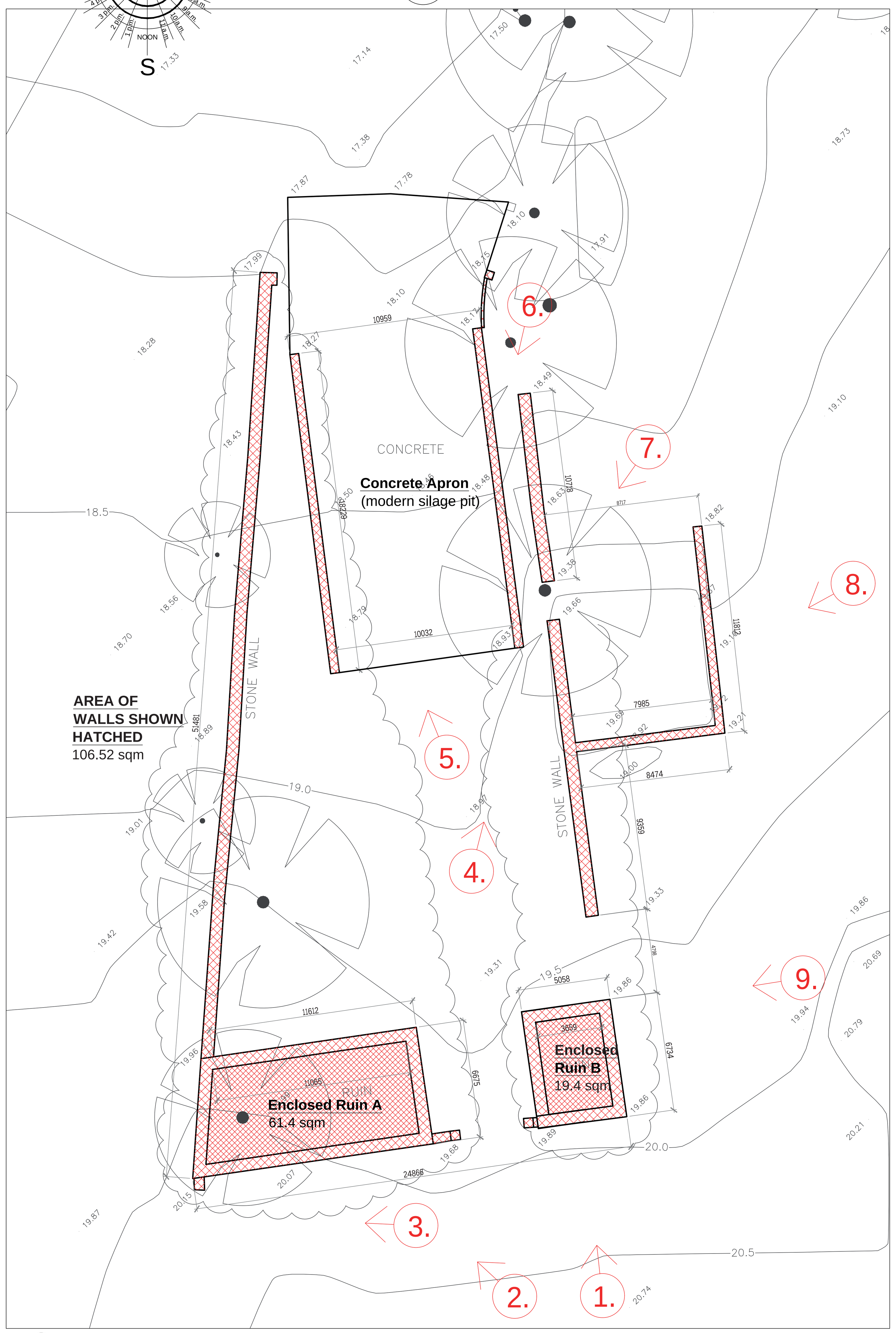




01 Key Plan



02 Plans of enclosing walls, ruins & concrete apron to be demolished

Scale: 1:200

Photo Location 1

Photo Location 2

Photo Location 3

Photo Location 4

Photo Location 5

Photo Location 6

Photo Location 7

Photo Location 8

Photo Location 9

AREA TO BE DEMOLISHED SHOWN HATCHED IN RED

Area of walls to be demolished : 106.52sqm
Area of Enclosure A: 61.40sqm
Area of Enclosure B: 19.40sqm
TOTAL AREA OF STRUCTURES: 187.32sqm

DEMOLITIONS - Ruins & enclosing walls

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: as shown
Drawing Purpose: PLANNING
Project: Deveopment at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019
Drawn by: sor
Checked by: JOM
Paper size:
CTB file:
LTScale:
File path:

File Ref.: 3.09
Subject: DEMOLITION DRAWING- Ruins & enclosing walls
Project No.: 18128
Drawing No.: 3008
Rev.:

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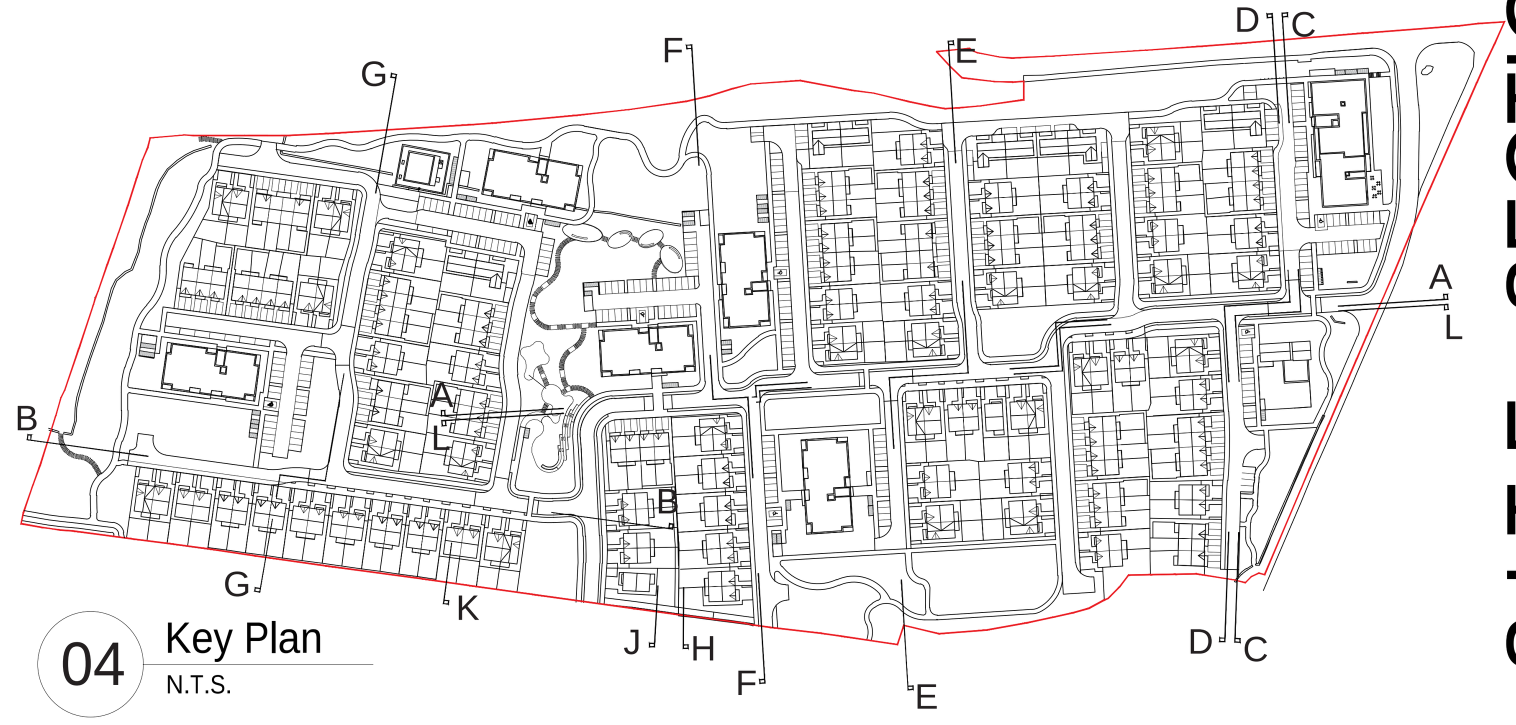
01 Site Context Elevation D-D
Scale: 1:500

02 Site Context Elevation D-D Part 1
Scale: 1:200

03 Site Context Elevation D-D Part 2
Scale: 1:200

SITE SECTION D-D



04 Key Plan
N.T.S.

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:500, 1: 200
Drawing Purpose: PLANNING
Project: Proposed Multi-use Development at Rosshill, Galway
Client: Kegata Ltd.
Date: December 2019
Drawn by: sor
Checked by: JON
Paper size:
CTB file:
LTScale:
File path:

File Ref.: 3.09
Subject: SITE SECTION D-D
Project No.: 18128
Drawing No.: 3013
Rev.:

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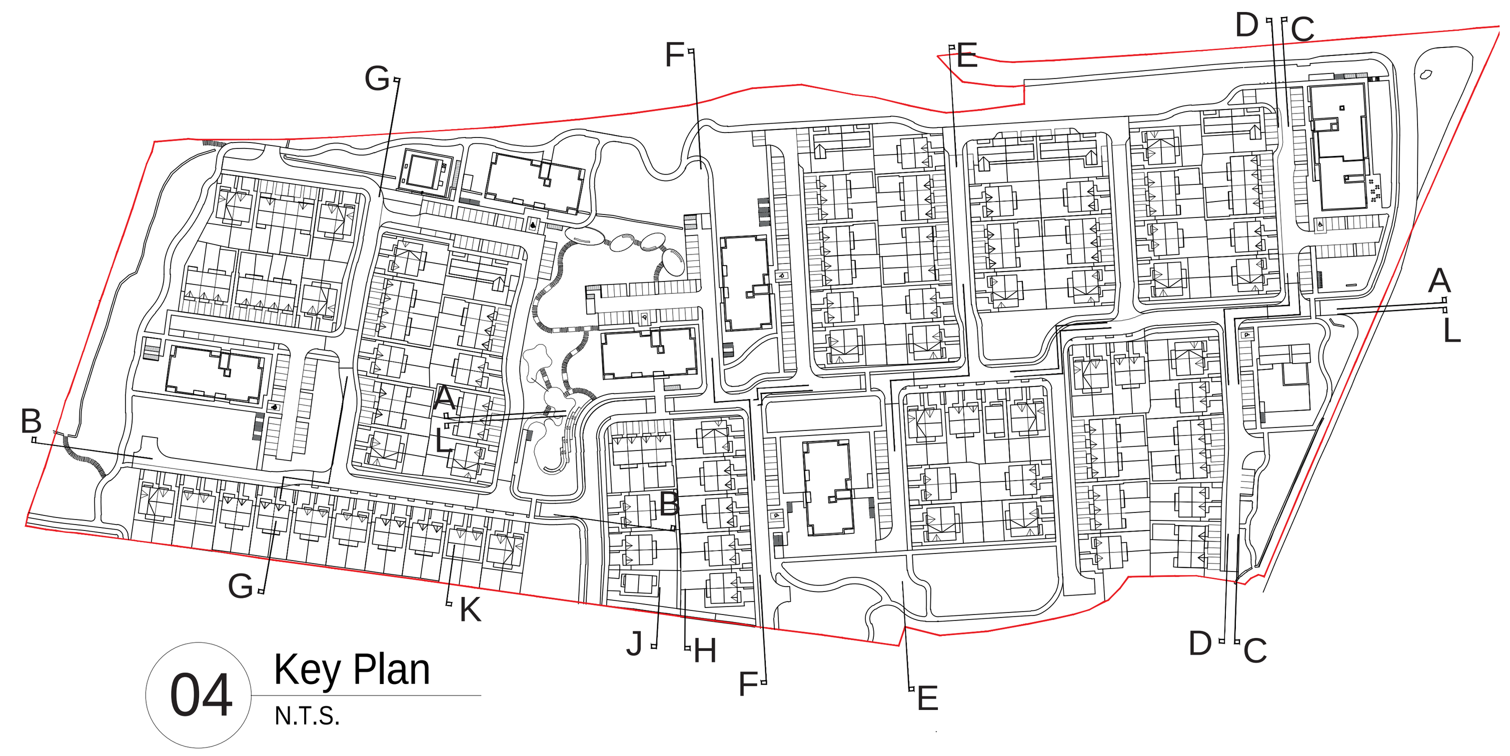
01 Site Context Elevation E-E
Scale: 1:500



04 Key Plan
N.T.S.

02 Site Context Elevation E-E (part 01)
Scale: 1:200

03 Site Context Elevation E-E (Part 02)
Scale: 1:200

SITE SECTION E-E

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:500, 1: 200
Drawing Purpose: PLANNING
Project: Proposed Multi-use Development at Rosshill, Galway
Client: Kegata Ltd.
Date: December 2019 Drawn by: IF Checked by: JON
Paper size: CTB file: LTScale:
File path:

File Ref. 3.09
Subject: SITE SECTION E-E
Project No. 18128
Drawing No. 3014
Rev.

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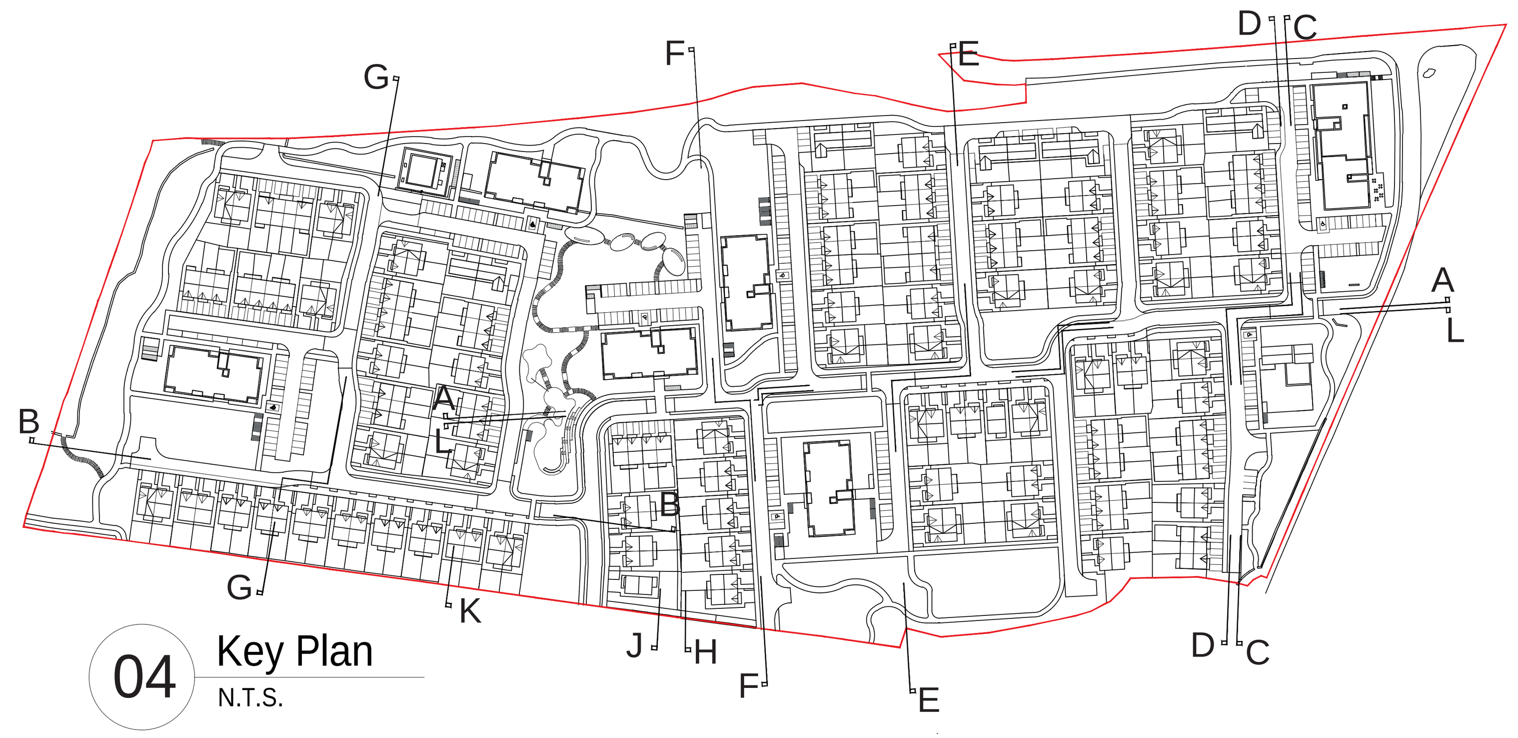
01 Site Context Elevation F-F

Scale: 1:500

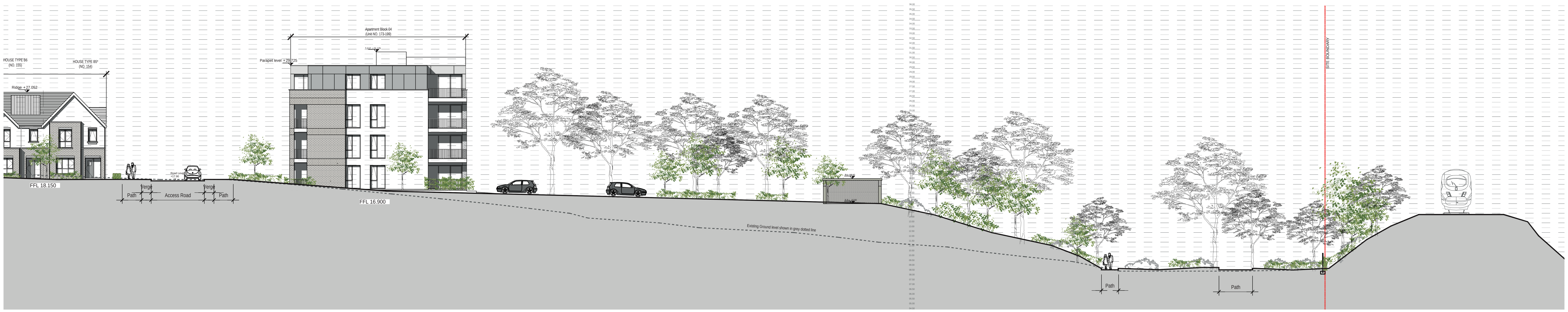


04 Key Plan

N.T.S.

02 Site Context Elevation F-F Part 1

Scale: 1:200



03 Site Context Elevation F-F Part 2

Scale: 1:200

SITE SECTION F-F

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:500, 1: 200

Drawing Purpose: PLANNING

Project: Proposed Multi-use Development at Rosshill, Galway

Client: Kegata Ltd.

Date: December 2019 Drawn by: IF Checked by: JON

Paper size: CTB file: LTScale:

File path:

File Ref. 3.09

Subject: SITE SECTION F-F

Project No. 18128

Drawing No. 3015

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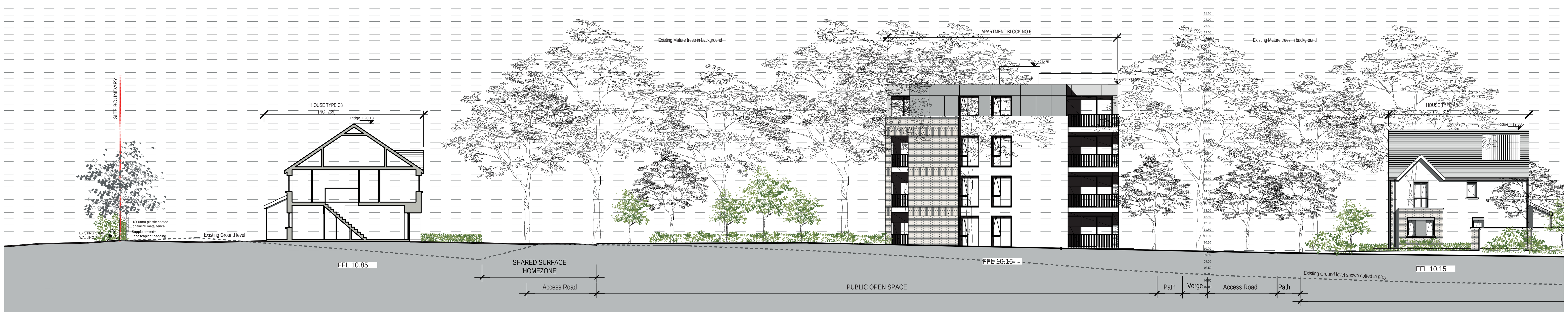
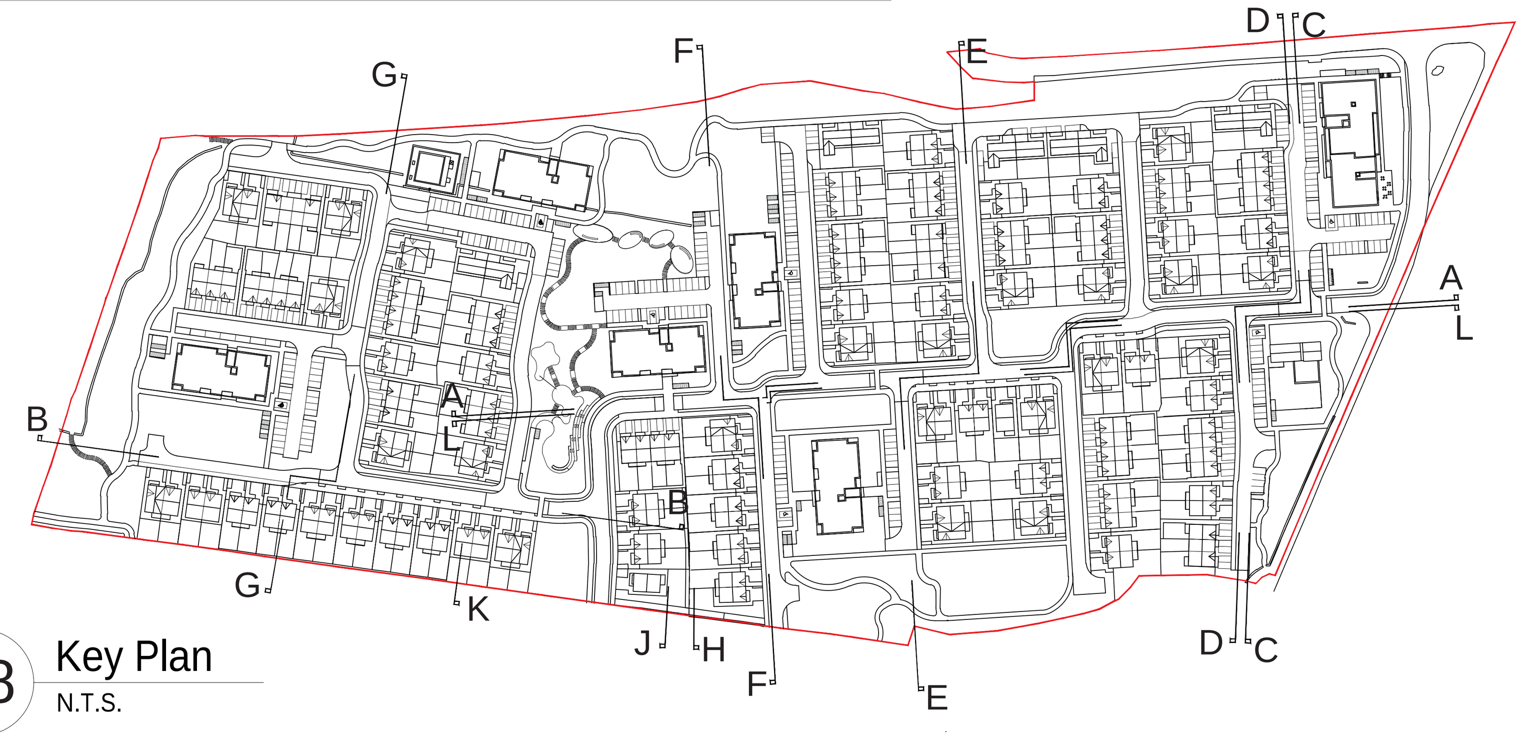
01 Site Context Elevation G-G
Scale: 1:500



02 Site Context Elevation G-G Part 1
Scale: 1:200

03 Site Context Elevation G-G Part 2
Scale: 1:200



08 Key Plan
N.T.S.

SITE SECTION G-G

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:500, 1: 200
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway
Client: Kegata Ltd.
Date: December 2019 Drawn by: JW Checked by: JON
Paper size: CTB file: LTScale:
File path:

File Ref. 3.09
Subject: SITE SECTION G-G
Project No. 18128
Drawing No. 3016
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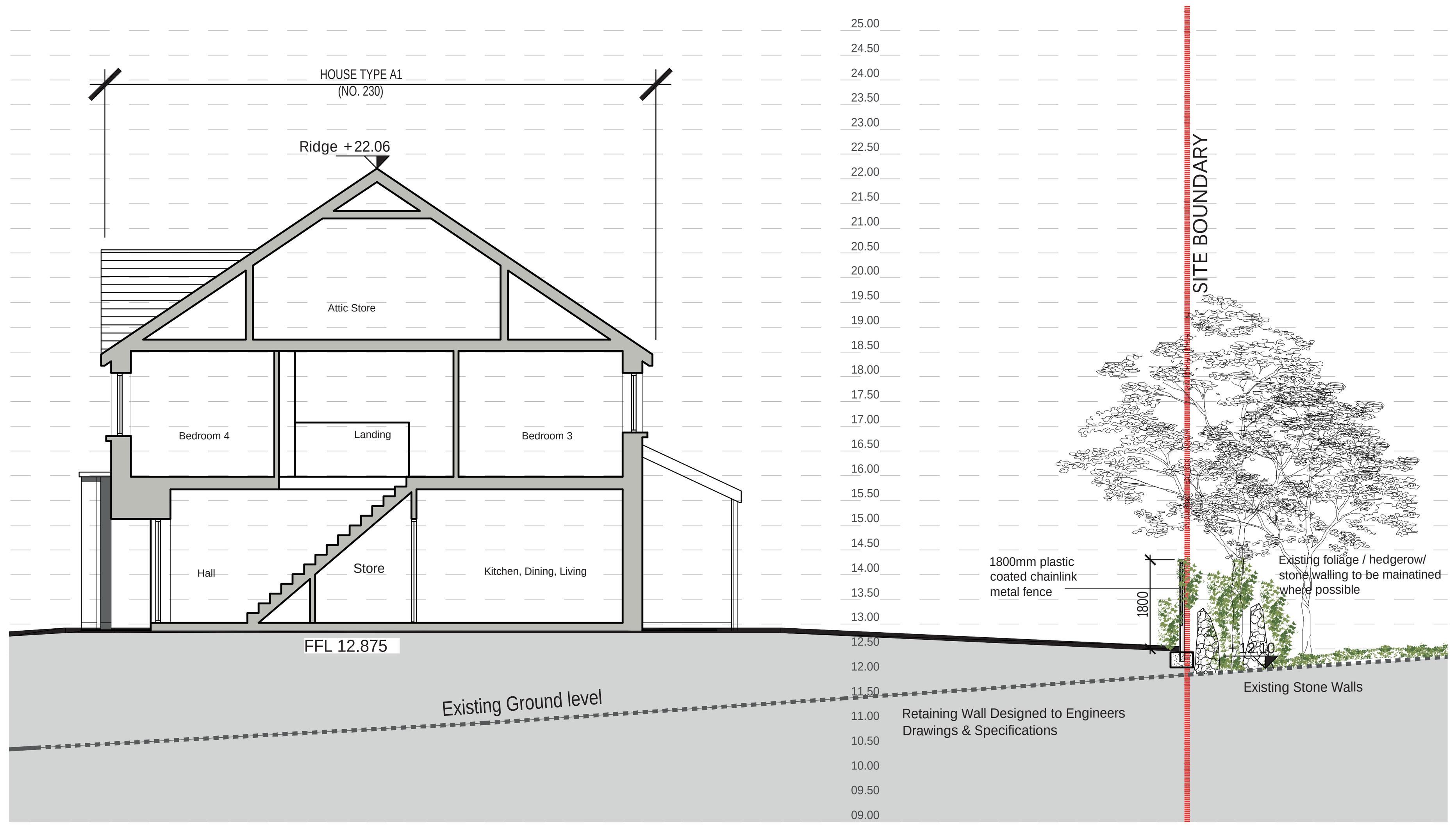
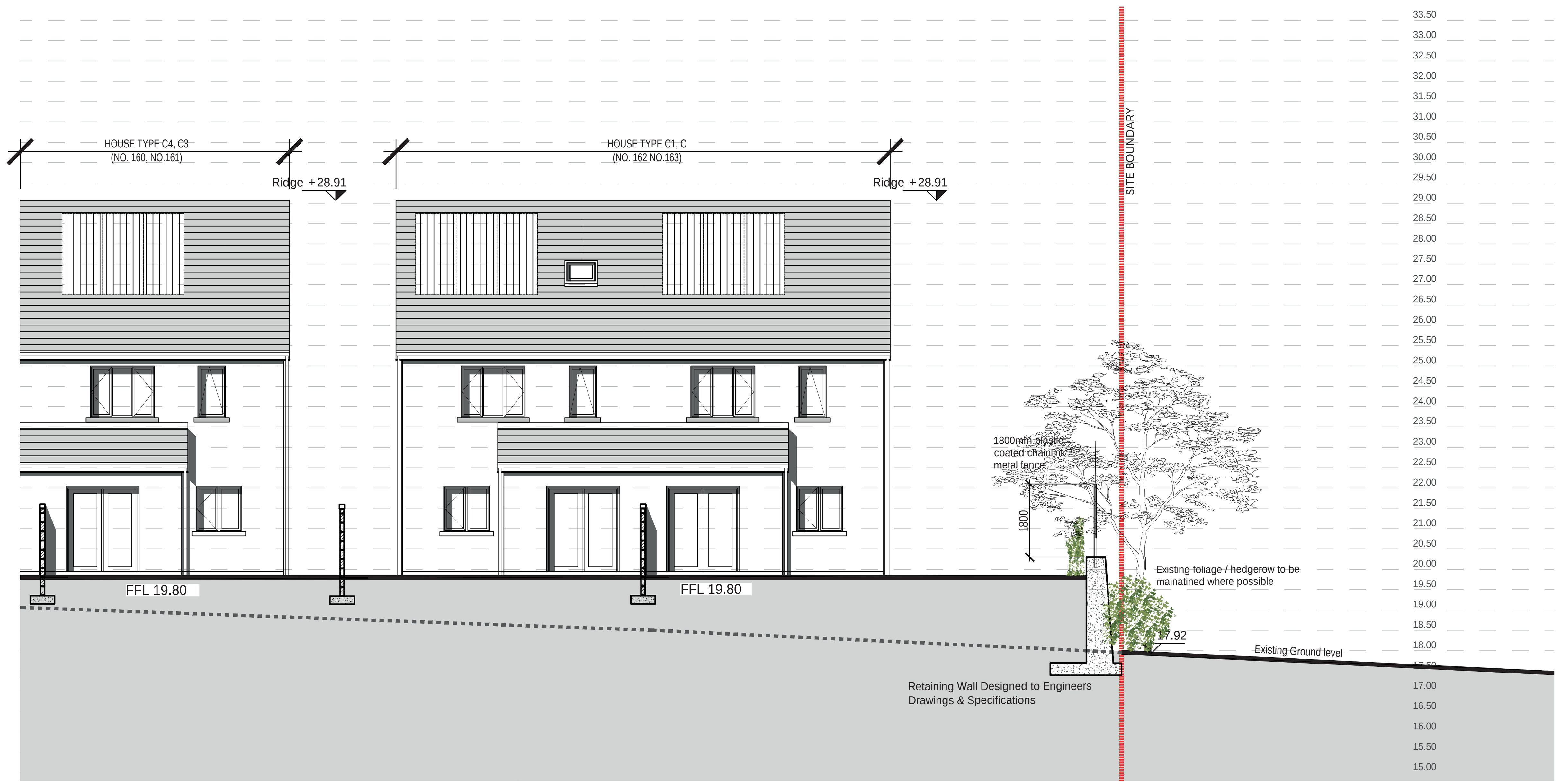
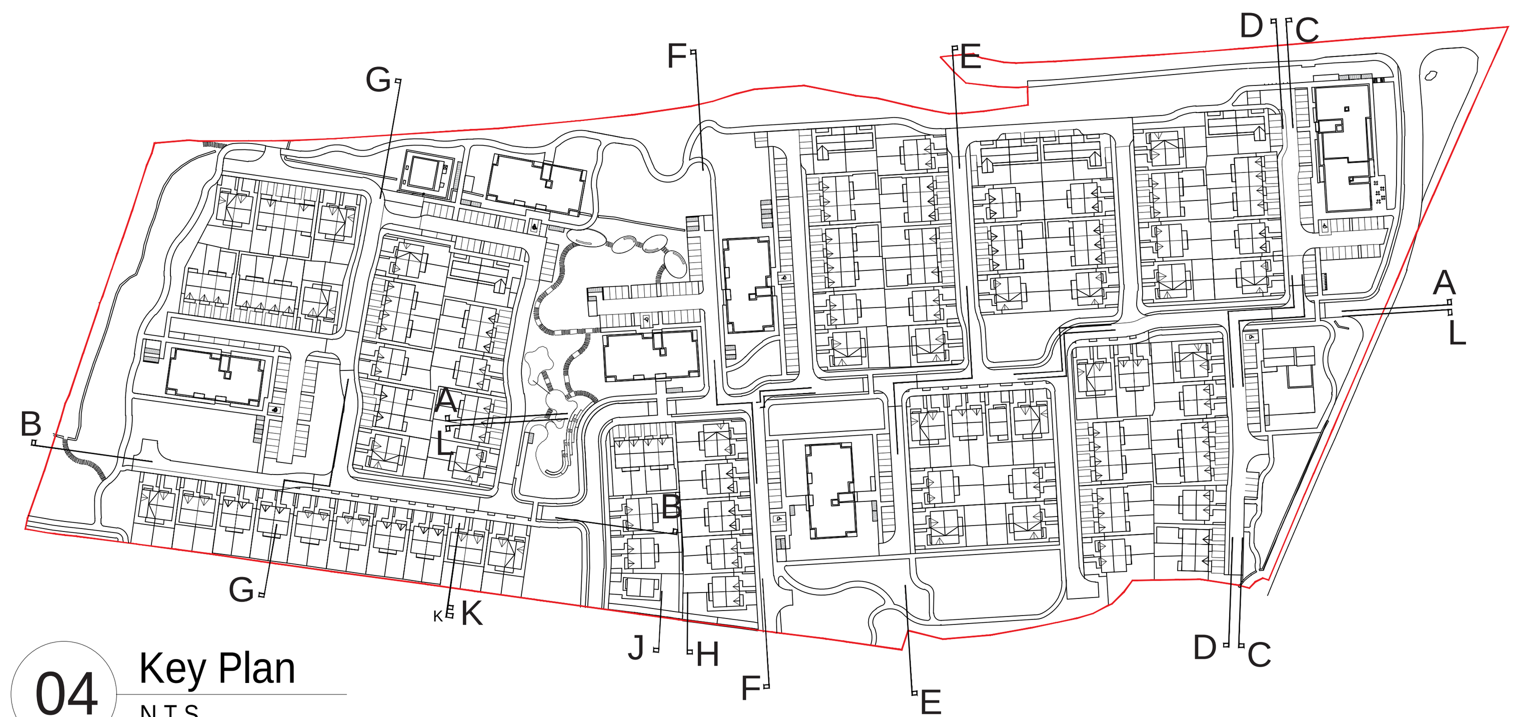
01 Site Section H-H
Scale: 1:100



03 Site Section K-K
Scale: 1:100



02 Site Section J-J
Scale: 1:100



04 Key Plan
N.T.S.

SITE SECTION H-H, J-J, K-K

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:500, 1: 100
Drawing Purpose: PLANNING
Project: Proposed Multi-use Development at Rosshill, Galway
Client: Kegata Ltd.
Date: December 2019
Drawn by: IF
Checked by: JON
Paper size:
CTB file:
LTScale:
File path:

File Ref.: 3.09
Subject: SITE SECTION H-H, J-J, K-K
Project No.: 18128
Drawing No.: 3017
Rev.:

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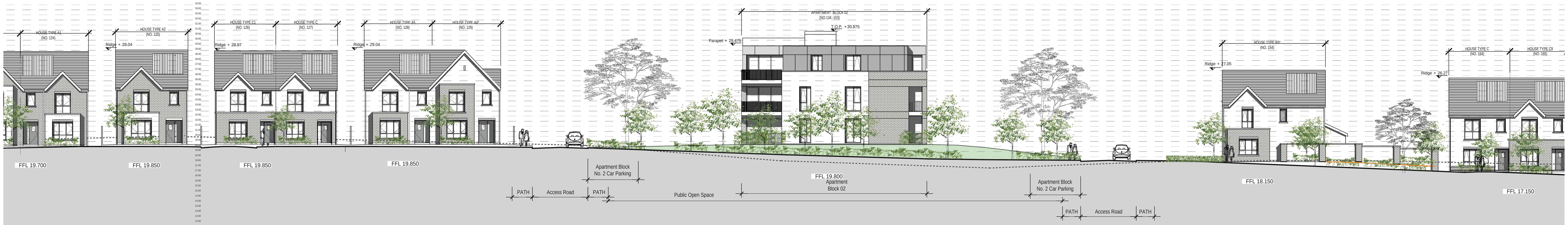
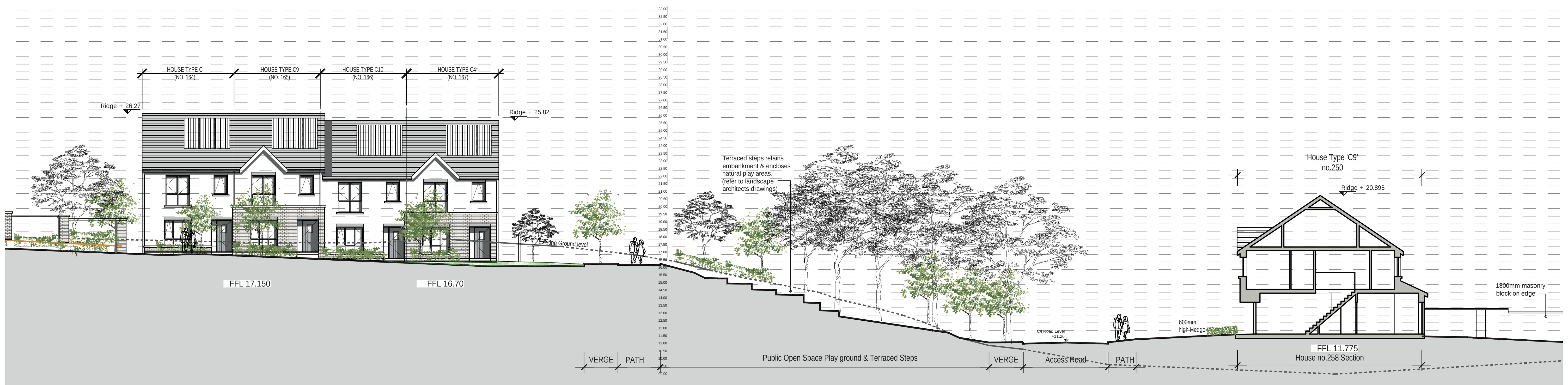
01 Site Context Elevation L-L
Scale: 1:500

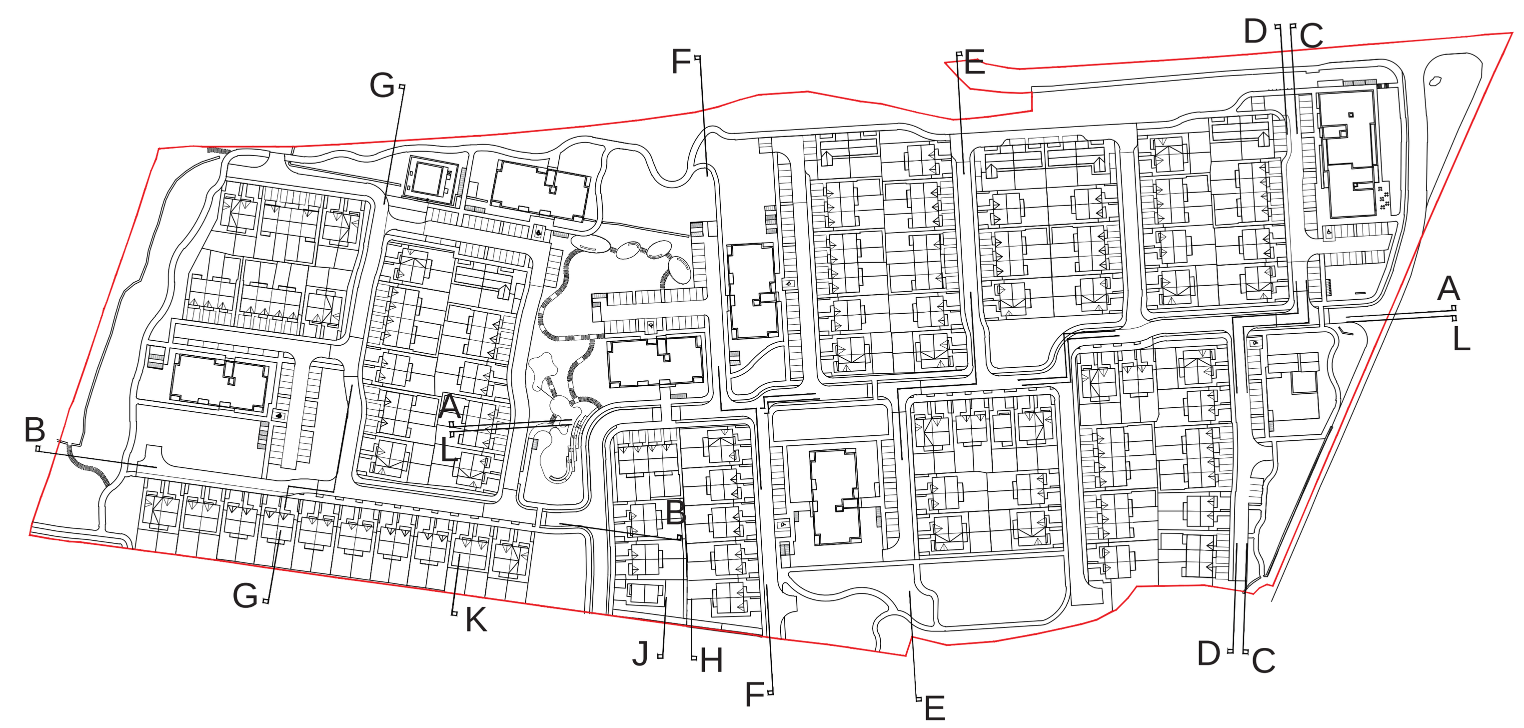
02 Site Context Elevation L-L PART 1
Scale: 1:200



03 Site Context Elevation L-L PART 2
Scale: 1:200



04 Site Context Elevation L-L PART 3
Scale: 1:200



05 Key Plan
N.T.S.

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No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:500 & 1:200
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway
Client: Kegata Ltd.
Date: DECEMBER 2019 Drawn by: sor Checked by: JON
Paper size: CTB file: LTScale:
File path:

File Ref. 3.09
Subject: SITE SECTION L-L
Project No. 18128
Drawing No. 3018
Rev.

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SITE SECTION L-L & CONTEXT ELEVATION

SITE CONNECTIONS & OPEN SPACES

LEGEND

Site boundary outlined in red

OVERALL SITE AREA : 100,693 sqm :- 10.069HA :- 24.881 Acre
Verges to Old Dublin Road & Rosshill Rd. : 3,381 sqm :- 0.338 HA
Junction area : 628 sqm :- 0.063 HA
RA zoned Land to west boundary : 1,292 sqm :- 0.129 HA
Developable Area : 95,392 sqm :- 9.539 HA :- 23.572 Acre

	Primary Access road/ Main Avenue
	Secondary Access road/ Local Access
	Tertiary Access / Shared surface/ Homezone
	Predestrian links between green spaces
	Shared surface/ Homezone

01 Site Layout Plan
Scale: 1:1000

SITE CONNECTIONS & OPEN SPACES

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No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:1000
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019
Drawn by: sor
Checked by: JOM
Paper size:
CTB file:
LTScale:
File path:

File Ref. 3.09
Subject: SITE LAYOUT CONNECTIONS
Project No. 18128
Drawing No. 3020
Rev.

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SITE PUBLIC OPEN SPACES

LEGEND

Site boundary outlined in red

OVERALL SITE AREA :	**100,693 sqm :- 10.069HA :- 24.881 Acre**	
Verges to Old Dublin Road & Rosshill Rd.	**: 3,381 sqm :- 0.338 HA**	
Junction area	**: 628 sqm :- 0.063 HA**	
RA zoned Land to west boundary	**: 1,292 sqm :- 0.129 HA**	

Developable Area : **95,392 sqm :- 9.539 HA :- 23.572 Acre**

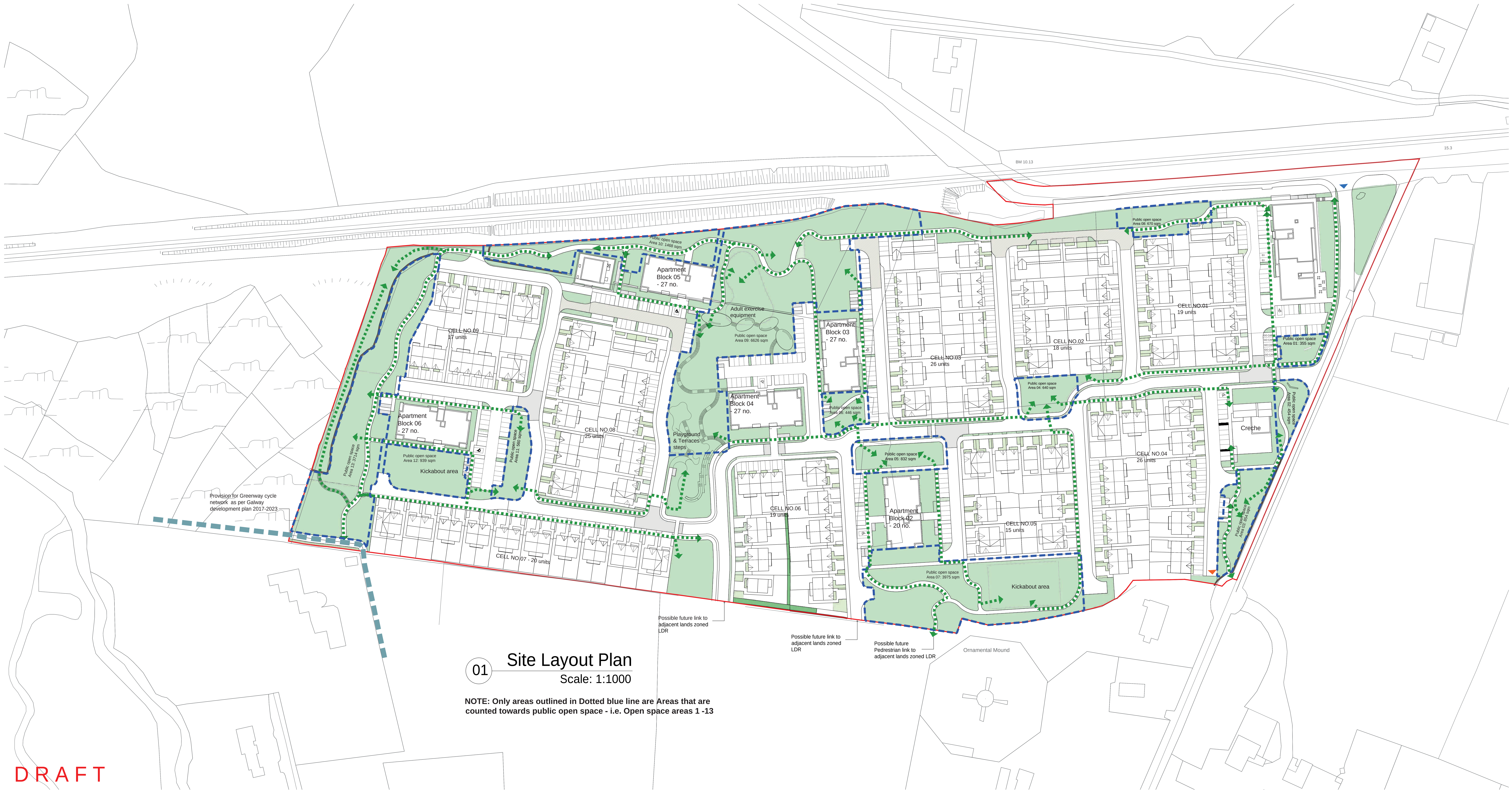
NOTE: Only areas outlined in Dotted blue line are Areas that are counted towards public open space - i.e. Open space areas 1 -13

Public open spaces:

Open space area 01	- Circa 355sqm
Open space area 02	- Circa 454sqm
Open space area 03	- Circa 854sqm
Open space area 04	- Circa 640sqm
Open space area 05	- Circa 832sqm
Open space area 06	- Circa 446sqm
Open space area 07	- Circa 3,975sqm
Open space area 08	- Circa 670sqm
Open space area 09	- Circa 6,626sqm
Open space area 10	- Circa 1,468sqm
Open space area 11	- Circa 560sqm
Open space area 12	- Circa 939sqm
Open space area 13	- Circa 3,714sqm

TOTAL PUBLIC OPEN SPACE ON SITE = 21,533 sqm

Public open space requirement over developable area: 15% - 14,309sqm
Public open space provided- **Over 21,533sqm - 22.57%**
(above 10m wide/ 200sqm, amenity & reasonably level usable space)
Overall Green and landscaped spaces **25,130sqm - 25.8%**



01 Site Layout Plan
Scale: 1:1000

NOTE: Only areas outlined in Dotted blue line are Areas that are counted towards public open space - i.e. Open space areas 1 -13

SITE PUBLIC OPEN SPACES

DRAFT

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:1000
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019
Drawn by: sor
Checked by: JOM
Paper size:
CTB file:
LTScale:
File path:

File Ref. 3.09
Subject: SITE PUBLIC OPEN SPACES
Project No. 18128
Drawing No. 3021
Rev.

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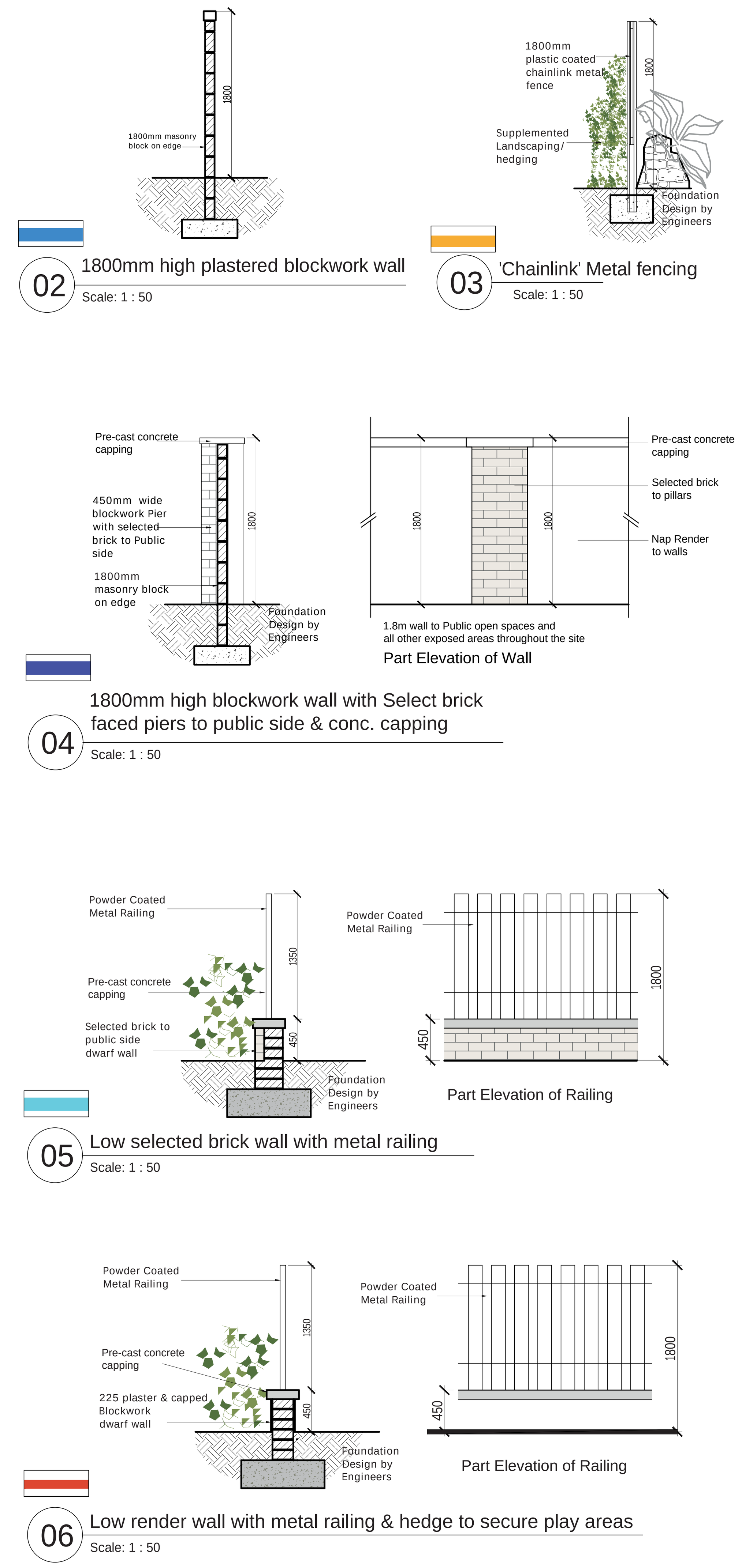
SITE BOUNDARY TREATMENTS

LEGEND

Site boundary outlined in red

OVERALL SITE AREA : **100,693 sqm :- 10.069HA :- 24.881 Acre**
Verges to Old Dublin Road & Rosshill Rd. **: 3,381 sqm :- 0.338 HA**
Junction area **: 628 sqm :- 0.063 HA**
RA zoned Land to west boundary **: 1,292 sqm :- 0.129 HA**
Developable Area : 95,392 sqm :- 9.539 HA :- 23.572 Acre

(blue)	1800mm high Blockwork wall with conc. Capping
(dark blue)	1800mm high plastered blockwork wall with Brick face piers (to public side) with Capping
(pink)	approx. 550 to 1200mm high hedging to front driveways/gardens and primary elevations
(red)	450mm low render wall with 1350mm roll top powder coated metal railing to creche. Hedgerow screening in front.
(green dashed)	2400mm 'Ibex' or similar powder coated metal fence sublimented with hedgerow to development side
(orange)	Existing hedging to to cut back & maintained. 1800mm green plastic coated chain link & hedging to supplement existing where required
(light blue)	450mm low Brick wall with 1350mm roll top powder coated metal railing
(brown)	Existing stone walling to be maintained and made good / supplemented where required. Existing mature trees to be maintained where possible.
(teal)	reinforced concrete retaining wall to engineers design & specification. Landscaped box planter to reduce visual impact of retaining wall.



SITE BOUNDARY TREATMENTS

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: As Shown
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019 Drawn by: sor Checked by: JOM
Paper size: CTB file: LTScale:
File path:

File Ref. 3.09
Subject: SITE LAYOUT BOUNDARY TREATMENTS
Project No. 18128
Drawing No. 3022
Rev.

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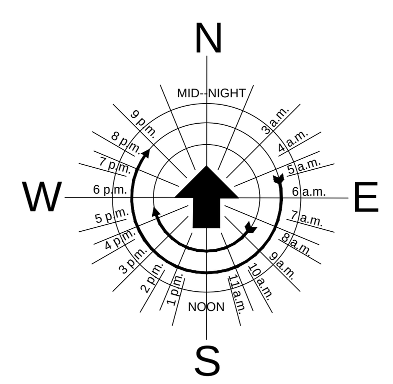
INDICATIVE PHASING PLAN

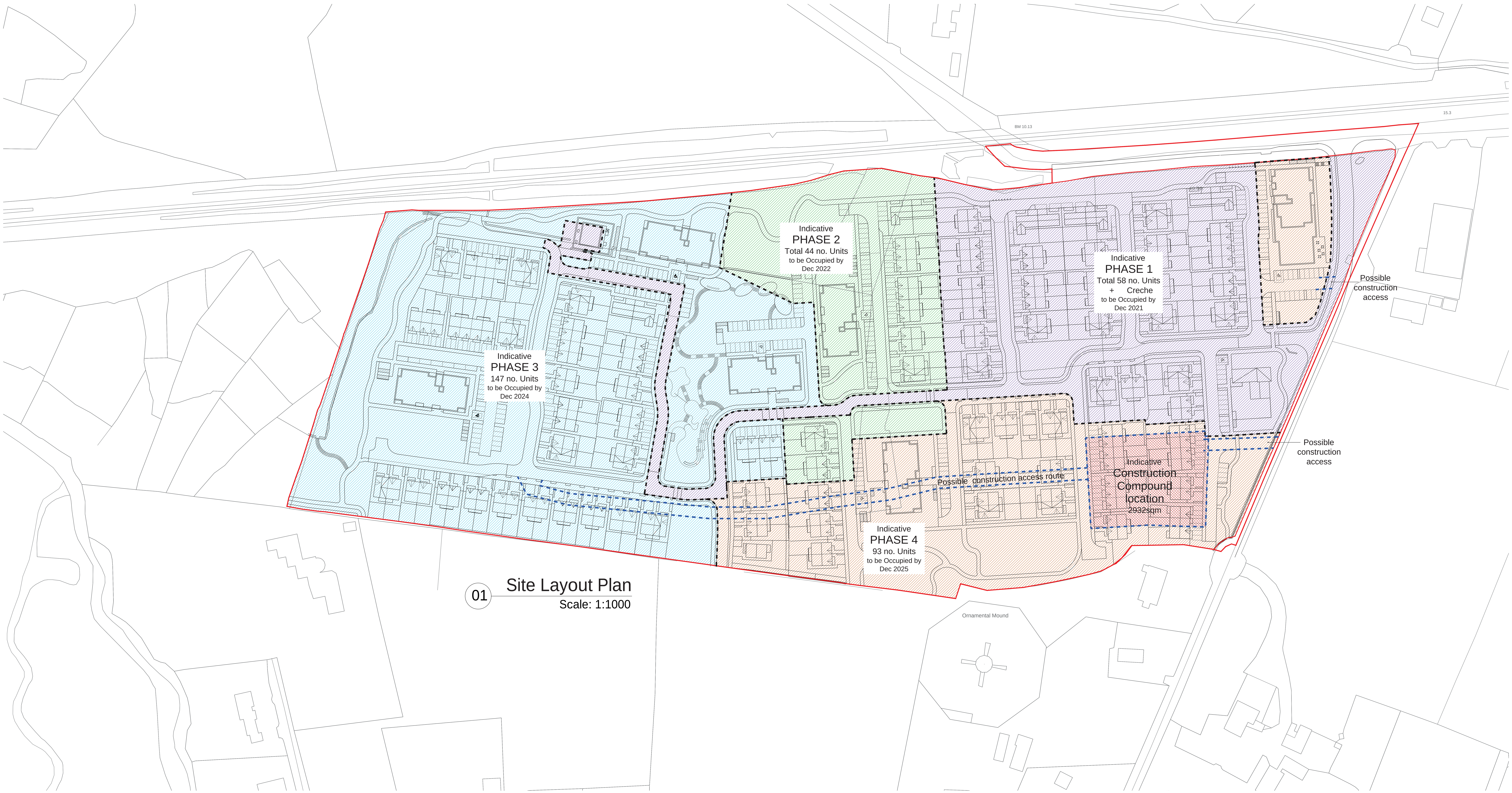


LEGEND

Site boundary outlined in red

OVERALL SITE AREA : **100,825 sqm :- 10.082 HA :- 24.914 Acre**
Verges to Old Dublin Road & Rosshill Rd. **: 3513 sqm :- 0.351 HA**
Junction area **: 628 sqm :- 0.063 HA**
RA zoned Land to west boundary **: 1292 sqm :- 0.129 HA**
Developable Area : 95,392 sqm :- 9.539 HA :- 23.572 AcreAcre

RESIDENTIAL TOTAL NO. OF UNITS = 342



01 Site Layout Plan
Scale: 1:1000

INDICATIVE PHASING PLAN

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:1000
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019 Drawn by: sor Checked by: JOM
Paper size: CTB file: LTScale:
File path:

File Ref.: 3.09
Subject: INDICATIVE PHASING DIAGRAM
Project No.: 18128
Drawing No.: 3025
Rev.:

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SITE CHARACTER AREAS

CHARACTER AREAS

To enhance the distinctiveness and way finding through the site a number of Character areas are proposed through the scheme, hard-landscaped area, shared surfaces and green open spaces. These areas are defined through landscape topology the building forms, uses and architecture found in each area. Each character area joins an melds into the next with paths an linkages and a coherent design style.

01 - Village

This area contains larger buildings forming the entrance and community focus to the scheme providing amenities and services to passers by as well as to the inhabitants of the proposed scheme. Uses & services include proposed are a creche, local shop, community rooms as well as a number of apartments units.

02 - Meadow Clusters

The topography to this area is generally flat suiting semi-detached and terraced dwellings. Pediment Gables are a prominent feature to the residential buildings. Buildings are pulled from but facing the northern boundary to provide a passive surveillance to a landscaped 2.5m wide pedestrian path and wider landscaped route. This path links the commercial/ retail village area though to the wooded areas to the north boundary down to the broadleaf tree line to the very west of the site with access to adult exercise equipment, public open spaces and playground areas. An existing recorded monument GA094 - 070 (a Folly) sits to the south of the site. A large public open space is proposed on site adjoining the folly creating a rectilinear space respecting the Folly's siting.

03 - Waterview Wood

This area is central located in the scheme and is proposed as a number of apartments in a parkland setting. The topography contains a landscaped sloped areas. Views are to be maintained from central access routes to the adjoining landscape and Galway Bay beyond. Extensive landscaping is proposed around the buildings. It is aimed to maintain existing tree groups and existing dry stone walling where possible. Woodland paths punctuated with adult exercise equipment are proposed towards the northern boundary.

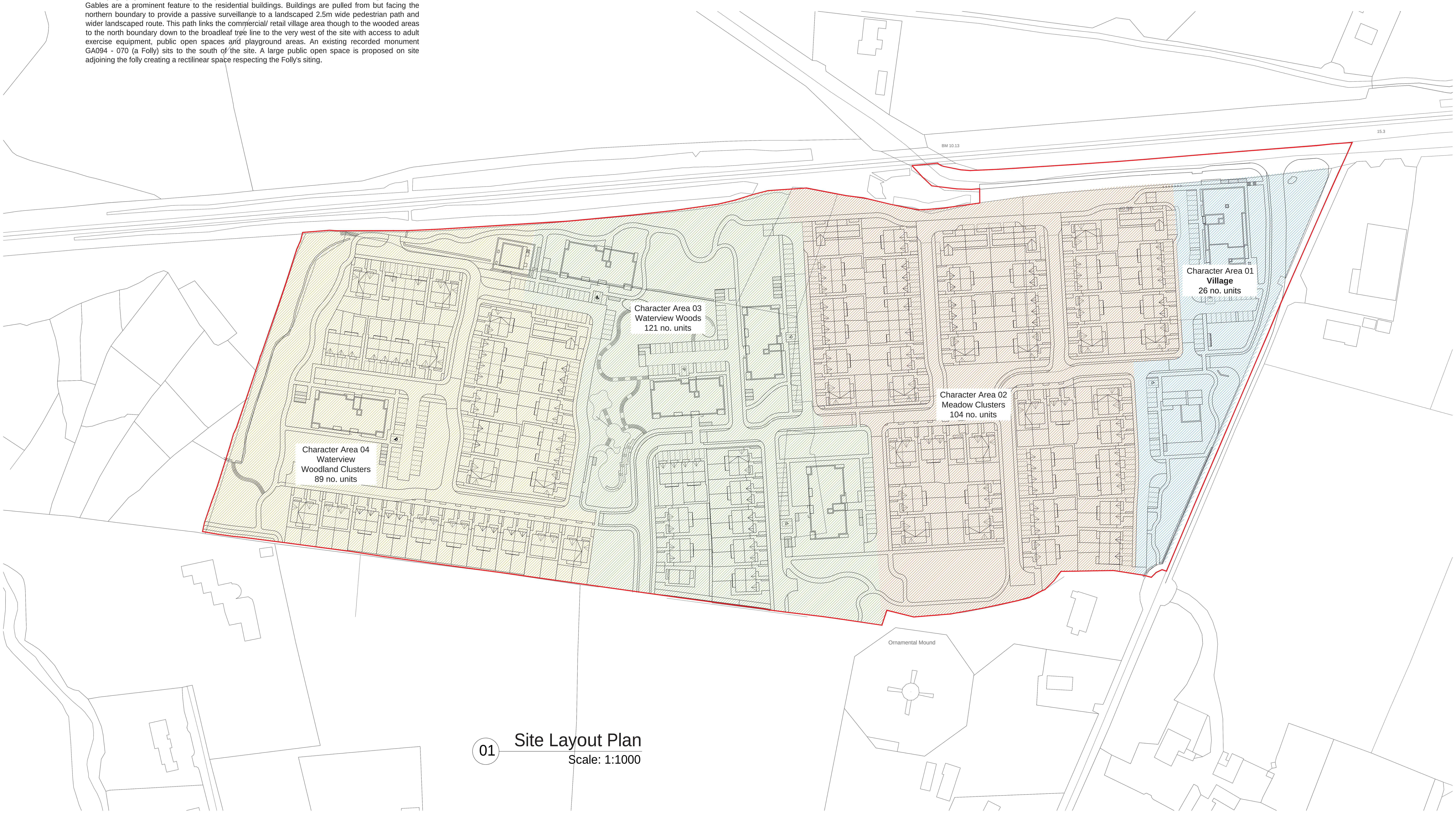
04 - Woodland Clusters

The lower area of the site is relatively flat and has a line of impressive mature broadleaf trees to the west of the site with dry stone walling. This remarkable amenity is to be maintained with all development works kept away from root protection areas. Woodland walks will permeate this treed boundary linking up with with the public pathways along the northern boundary. Given the topography the area is mainly made up of semi-detached and terraced housing. An apartment building is positioned close to a public kick about area and with direct access to the mature broadleaf trees.

Site boundary outlined in red

OVERALL SITE AREA :	100,693 sqm :- 10.069HA :- 24.881 Acre
Verges to Old Dublin Road & Rosshill Rd.	: 3,381 sqm :- 0.338 HA
Junction area	: 628 sqm :- 0.063 HA
RA zoned Land to west boundary	: 1,292 sqm :- 0.129 HA
Developable Area : 95,392 sqm :- 9.539 HA :- 23.572 Acre	

RESIDENTIAL TOTAL NO. OF UNITS = 342



01 Site Layout Plan
Scale: 1:1000

SITE CHARACTER AREAS

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:1000
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019 Drawn by: sor Checked by: JOM
Paper size: CTB file: LTScale:
File path:

File Ref. 3.09
Subject: SITE LAYOUT - Character Areas
Project No. 18128
Drawing No. 3026
Rev.

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SOCIAL PROVISION - INDICATIVE PART V ALLOCATION

LEGEND

Site boundary outlined in red

OVERALL SITE AREA :	100,693 sqm :- 10.069HA :- 24.881 Acre	
Verges to Old Dublin Road & Rosshill Rd.	: 3,381 sqm :- 0.338 HA	
Junction area	: 628 sqm :- 0.063 HA	
RA zoned Land to west boundary	: 1,292 sqm :- 0.129 HA	

Developable Area : 95,392 sqm :- 9.539 HA :- 23.572 Acre

RESIDENTIAL TOTAL NO. OF UNITS = 342

Part V requirement:
10% of no. of units = 34 units
34 no. units proposed
10% of residential gross floor area (31,791sqm) = 3,179.1sqm
3186.5 sqm proposed

Social provision Mix:	
01 no. 1 Bedroom units	2.9%
16 no. 2 Bedroom units	47.1%
14 no. 3 Bedroom units	41.2%
03 no. 4 Bedroom units	8.8%
	100%

Mix by type:	
15 Apartments	44.1%
11 Terraced	32.4%
08 Semi-Detached	23.5%
	100%

34 provided
(Indicative proposal highlighted in orange)

Unit types

01 No. Apartment type '1A'	1 bed/2 person - Circa 49.2 sqm
02 No. Apartment type '2B'	2 bed/4 person - Circa 78.2 sqm
05 No. Apartment type '2C'	2 bed/4 person - Circa 79.3 sqm
02 No. Apartment type '2D'	2 bed/4 person - Circa 80.4 sqm
05 No. Apartment type '2E'	2 bed/3 person - Circa 70.6 sqm
01 No. House type 'A1'	4bed/2 storey/ Semi - D - Circa 126.7 sqm
01 No. House type 'A6'	4bed/2 storey/ Semi - D - Circa 128.5 sqm
01 No. House type 'B2'	3bed/2 storey/ Semi - D - Circa 112 sqm
01 No. House type 'B3'	3bed/2 storey/ Semi - D - Circa 112 sqm
03 No. House type 'C'	3bed/2 storey/ Semi - D - Circa 108.2 sqm
03 No. House type 'C2'	3bed/2 storey/ Semi - D - Circa 108.2 sqm
01 No. House type 'C5'	3bed/2 storey/ Semi - D - Circa 108.2 sqm
01 No. House type 'C6'	3bed/2 storey/ Semi - D - Circa 108.2 sqm
02 No. House type 'C9'	3bed/2 storey/ Semi - D - Circa 108.2 sqm
01 No. House type 'C10'	3bed/2 storey/ Semi - D - Circa 108.2 sqm
02 No. House type 'D'	2bed/2 storey/ Semi - D - Circa 84.4 sqm
01 No. House type 'E'	3bed/2 storey/ Semi - D - Circa 107.8 sqm
01 No. House type 'F'	4bed/2 storey/ Semi - D - Circa 129.8 sqm

01 Site Layout Plan
Scale: 1:1000

SOCIAL PROVISION - INDICATIVE PART V ALLOCATION

CONDITIONS OF USE OF THIS DRAWING: 1. The use of or reliance upon this drawing shall be deemed to be acceptance of these conditions of use unless otherwise agreed in writing, such written agreement to be sought from and issued by the Architects prior to the use or reliance upon this drawing. 2. O'Neill O'Malley Ltd., their agents, Architects, employees or directors shall not be liable for any loss damage or injury consequential or otherwise, howsoever caused for failure to comply with any or all of these conditions. 3. This drawing, the design and contents contained herein are copyright, all rights reserved. No part hereof may be copied or reproduced partially or wholly in any form whatsoever without the prior written consent of the copyright owners O'Neill O'Malley Ltd. 4. The client is granted a copyright licence to use this drawing and its contents for the purpose of which the drawing has been prepared. If this drawing has been produced for construction purposes the licence will only be valid for a single three dimensional reproduction and shall expire once a single reproduction has occurred. Such a licence only passes to the Client on payment of Architects fees in full and in any event the licence cannot be assigned without the prior written consent of O'Neill O'Malley Ltd. 5. Do not scale off this drawing. Figured metric dimensions only should be taken off this drawing. Imperial dimensions, if any, contained on this drawing are given for illustration purposes only. 6. This drawing is to be relied upon only for the purposes for which it was prepared. This drawing is not to be relied upon for construction purposes and no implied or expressed warranty is given as to the suitability for construction purposes unless the drawing is stated to be for construction purposes. 7. All contractors, whether main or sub-contractors, must visit the site and are responsible for taking and checking any and all dimensions and levels that relate to the works. 8. Where this drawing contains discrepancies in relation to other relevant documents, such discrepancies shall be brought to the attention of the Architects who shall issue a written instruction as to which information is to be followed, and until such Architects instruction has been issued any work carried out on foot of the discrepancies shall be unauthorised. 9. References to National standards, whether to Irish (IS) British (BS) or otherwise, or codes of practice (CP) shall be deemed to refer to the relevant standard or code current at the date of issue of the drawing not withstanding any reference to the contrary or to any earlier standard. 10. Any reference to the "Architect" or "Architects" on this or any other relevant document shall be construed to apply to a director of O'Neill O'Malley Ltd. who has been nominated as the partner-in-charge or to the nominated project Architect but only while such Architect remains in the employment of O'Neill O'Malley Ltd. 11. Any questions as to the meaning or application of these conditions shall be submitted in writing to the Architect for his ruling and such a ruling shall be conclusive as to the meaning or application of these conditions. 12. All information shown relating to existing structure and construction detail is preliminary and subject to 'opening up' and confirmation by the contractor. Any discrepancies are to be referred to the Architect. 13. Proprietary items shall be fixed in strict accordance with manufacturers instructions. 14. Sizes of proprietary items shall be checked with manufacturer and checked for compliance with design detail. 15. Contractor is responsible for procuring any proprietary items required/specified with due attention to 'lead-in' times ensuring compliance with programme dates.

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:1000
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 19
Drawn by: sor
Checked by: JOM
Paper size:
CTB file:
LTScale:
File path:

File Ref. 3.09
Subject: Indicative Social provision
Project No. 18128
Drawing No. 3027
Rev.

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TOBIN
Patrick J. Tobin & Co. Ltd.

SHD Residential Development

at Roshill, Galway

DRAWING REGISTER & RECORD OF DRAWINGS ISSUED

PROJECT NO:	10690
SHEET: 1	PAGE: 1

DISTRIBUTION

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Client	Kegata Ltd	Bernard Duffy, Barry Duffy		
Planning	MKO	Meabhann Crowe		
Architect	ONOM	Shane O'Rourke, John O'Malley		
Landscape Architect	CSR Landscaping	Keith Mittchell		

STATUS: D=DRAFT, P=PLANNING, DS=DESIGN STAGE, T=TENDER, C=CONSTRUCTION — P

STAGE 3 - SUBMISSION

	DATE OF ISSUE
Day	16
Month	12
Year	19
Issued by	RD

DWG. No:	DRAWING TITLE	SIZE	SCH	Current Revision	Issue 1
10690-2000	Trial Hole Location	A1		C	C
10690-2001	Proposed Drainage and Watermain Layout. Key Plan	A1		F	F
10690-2002	Proposed Drainage Layout. Part 1	A1		D	D
10690-2003	Proposed Drainage Layout. Part 2	A1		D	D
10690-2004	Proposed Watermain Layout. Part 1	A1		F	F
10690-2005	Proposed Watermain Layout. Part 2	A1		E	E
10690-2006	Proposed Roads Layout. Part 1	A1		C	C
10690-2007	Proposed Roads Layout. Part 2	A1		C	C
10690-2008	Standard Watermain Details	A1		B	B
10690-2009	Manhole Details Sheet 1	A1		B	B
10690-2010	Manhole Details Sheet 2	A1		B	B
10690-2011	Pipe Bedding Details	A1		B	B
10690-2012	Typical Pumping Station Details	A3		B	B
10690-2013	Existing Pedestrian, Cycle & Public Transport Infrasturcture	A1		B	B
10690-2014	Proposed Pedestrian Cycle & Public Transport Infrastructure	A1		B	B
10690-2015	Fire Fighting Requirements	A1		A	A
10690-2016	Autotrack Analysis - Large Car	A0		A	A
10690-2017	Autotrack Analysis - Refuse Truck	A0		A	A
10690-2018	Autotrack Analysis - Fire Tender	A0		A	A

THE INFORMATION ON THIS DRAWING IS TO THE ORDNANCE SURVEY IRELAND ITM COORDINATE SYSTEM

Site Boundary

Test Hole 1m x 1m x 2m fill with 1m³ of water

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
C	05/12/19	Revised Layout	RD	BH
B	17.07.19	New Background	FG	RD
A	11.07.19	First Issue	JK	BH

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Test Hole Location

Scale @ A1: 1:1000 @ A3 1:2000

Prepared by: JK | Checked: BH | Date: July 2019

Project Director: M. McD.

Drawing Status: Plannning

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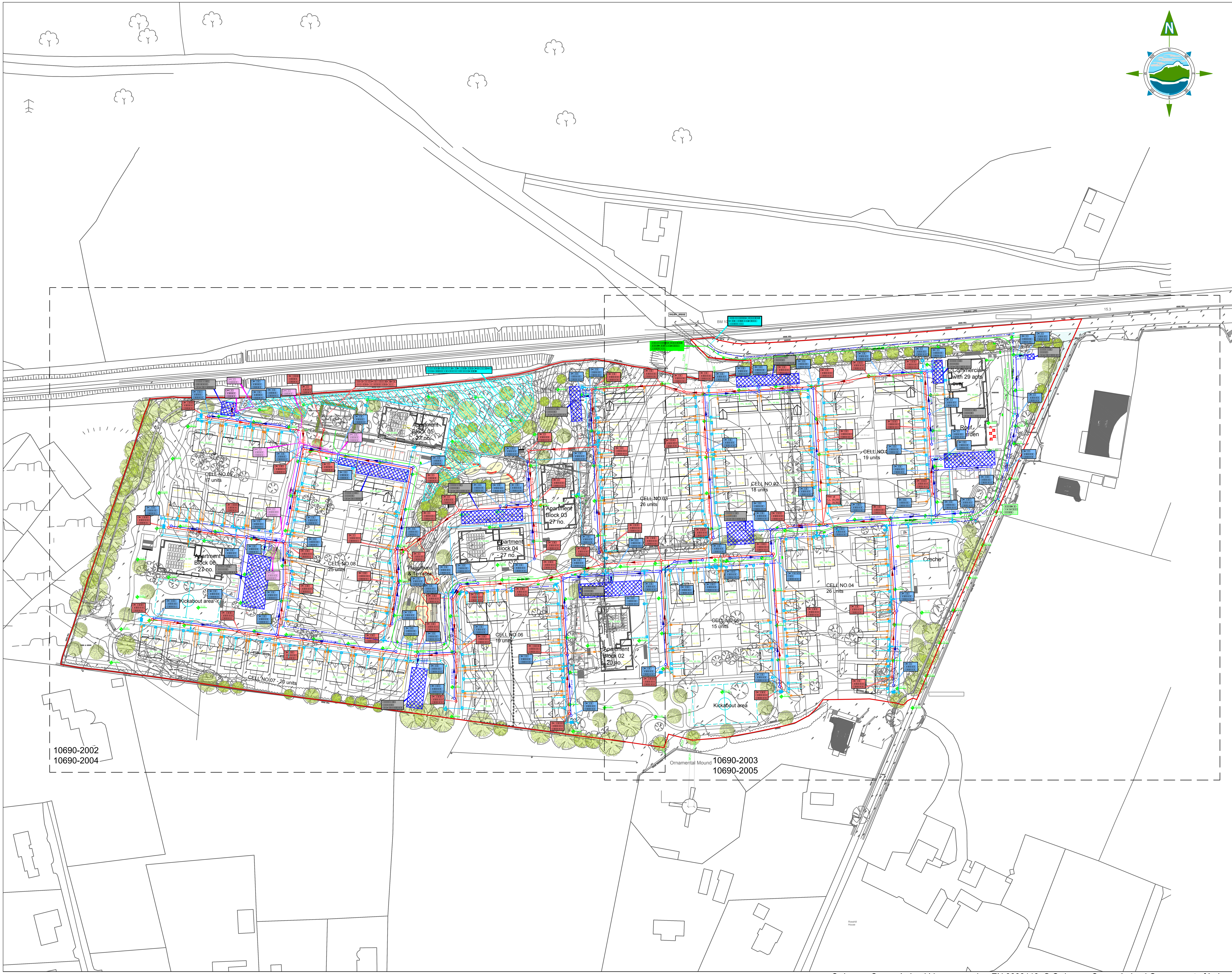
Drawing No.: 10690-2000 Revision: C



LEGEND

- Site Boundary
- Proposed Ø 150mm HDPE Rising Main
- Proposed Foul Sewer and Manhole
- Proposed Inspection Chamber and Connection
- Proposed Storm Sewer and Manhole
- Proposed Soakpit
- Proposed Overflow Network and Manhole
- Proposed Storm overflow Retention Swale
- Proposed Petrol Interceptor
- Proposed Level
- Finished Floor Level
- Proposed Ø 200mm PE100 SDR 17 Water Supply Pipe
- Proposed Ø 150mm PE100 SDR 17 Water Supply Pipe
- Proposed Ø 25/32mm PE80 SDR 17 House Connection and Water Meter
- Proposed Sluice Valve
- Proposed Fire Hydrant
- Proposed Bulk Meter
- Proposed Air Valve
- Proposed Scour Valve Chamber
- Proposed Thrust Block
- Proposed Wash Out Hydrant

NOTES:

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Rev	Date	Description	By	Chkd.
F	03/12/19	Revised after IW Comments	RD	BH
E	02/12/19	Revised after IW Comments	RD	BH
D	02.12.2019	Minor Revisions to Layout IW Comments Addressed	RD	BH
C	05.11.2019	Revised Architect Layout	JK	RD
B	17.07.19	New Backgorund	FG	RD
A	10.07.19	First Issue	JK	BH

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Proposed Drainage and Watermain Layout Key Plan

Scale @ A1: 1:1000 A3: 1:2000

Prepared by: JK | Checked: BH | Date: July 2019

Project Director: M. McD.

Drawing Status: Plannning

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www.tobin.ie

Drawing No.: 10690-2001 Revision: F

Individual wastewater connection to each dwelling will be as per Standard Detail STD-WW-02.

The inspection chamber will be in compliance with STD-WW-03 and STD-WW-13 and will be located within 1m of each site boundary.

Pipe materials shall comply with section 3.13. of the Code of Practice.
Pipe materials will be Unplasticised PVC for the main sewers as per Section 3.13.3 of the Code of Practice.

Manholes will conform to standard details STD-WW-09, STD-WW-10, STD-WW-11 and / or STD-WW-12 as appropriate.

Separation distances from foul sewers to structures and other utilities will comply with Section 3.5 of the Code of Practice.

Refer to STD-W-12A, STD-WW-06, STD-WW-06A & 3.26 of the code of practice for Planting Restrictions of Water and Waste Water. Root protection to be ReRoot 2000 OR Similar, if required

Refer to detail STD-W-11 for typical services layout distances & STD-WW-05 for wastewater typical services layout, and 3.21 Wastewater Code of Practice

Scour valve on an offline pipe to be agreed by local authority. See section 3.16.4 and 3.21 of the Water Code of Practice. Connection to Stormwater

Refer to section 3.5.16 of the waste water code of practice for unavoidable services crossover

Manhole covers located in grass areas to have 200mm all round concrete plinth and 100mm deep formed C20/25 concrete, 20mm aggregate, bedded in Clause 804 material

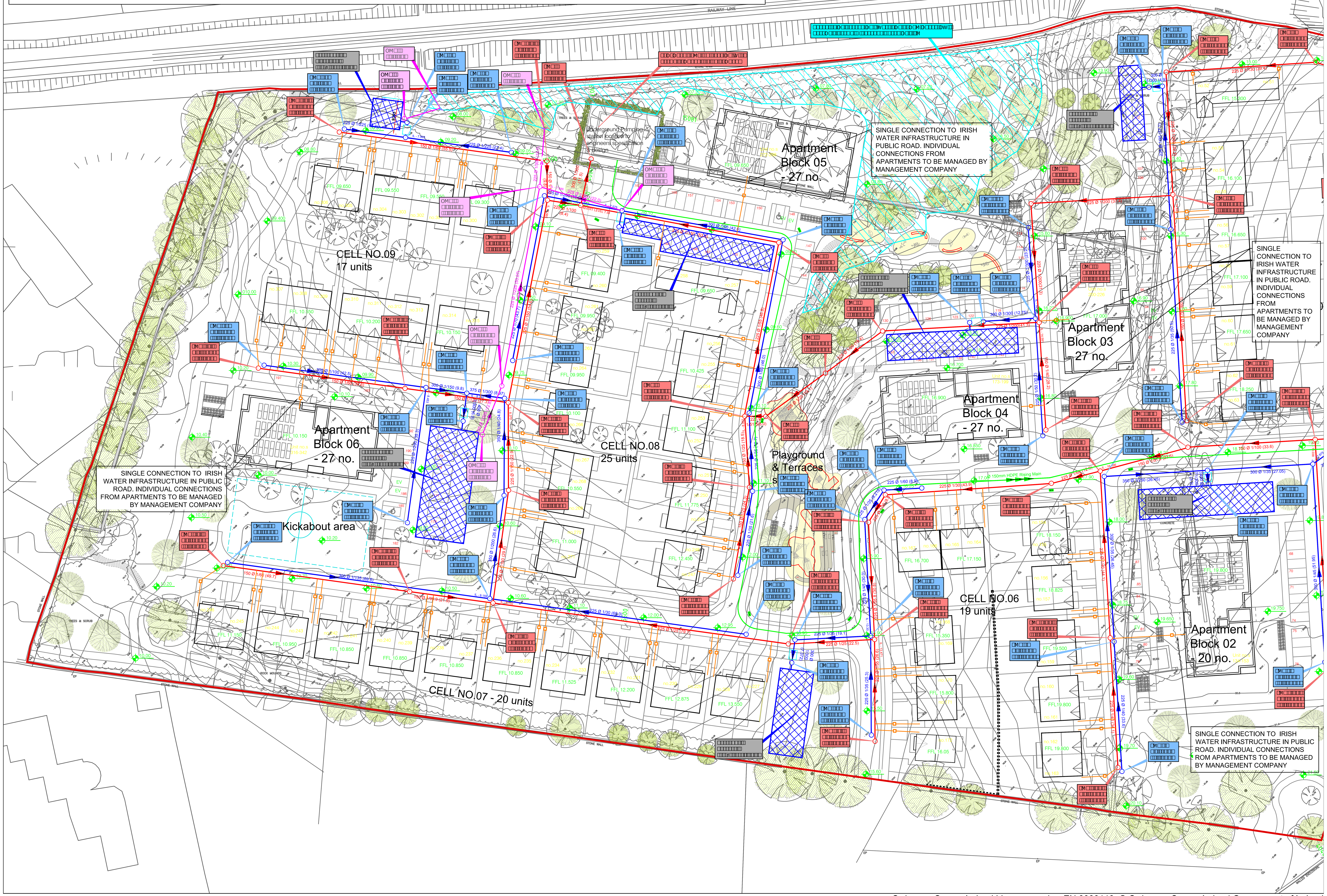
Refer to 3.5.13 of the Code of Practice for staggered systems details

Refer to section 3.14 of the Waste Water Code of Practice for Rising Main pipe materials

External face of proposed manhole chamber to be a minimum of 0.5m from kerb line and external face of sewers are a minimum of 1m from kerb line. See section 3.5.15 of Wastewater Code of Practice

Invert level of existing storm and foul manholes
at connection point on the main road to be checked and confirmed prior to commencement of any works on site.

ALL WORKS WILL BE CARRIED OUT IN ACCORDANCE WITH THE IRISH WATER CODES OF PRACTICE AND IRISH WATER DETAILS



LEGEND

- Site Boundary
- Proposed Ø 150mm HDPE Rising Main
- Proposed Foul Sewer and Manhole
- Proposed Inspection Chamber and Connection
- Proposed Storm Sewer and Manhole
- Proposed Soakpit
- Proposed Overflow Network and Manhole
- Proposed Storm overflow Retention Swale
- Proposed Petrol Interceptor
- Proposed Level
- Finished Floor Level
- Rising Main marker post

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
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3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
D	02.12.2019	Minor revisions to Layout IW Comments Addressed	RD	BH
C	05.11.2019	Revised Architect Layout	JK	RD
B	17.07.19	New Background	FG	RD
A	10.07.19	First Issue	JK	BH

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Proposed Drainage Layout Part 1

Scale @ A1: 1:500 A3: 1:1000

Prepared by: JK | Checked: BH | Date: July 2019

Project Director: M. McD.

Drawing Status: Plannning

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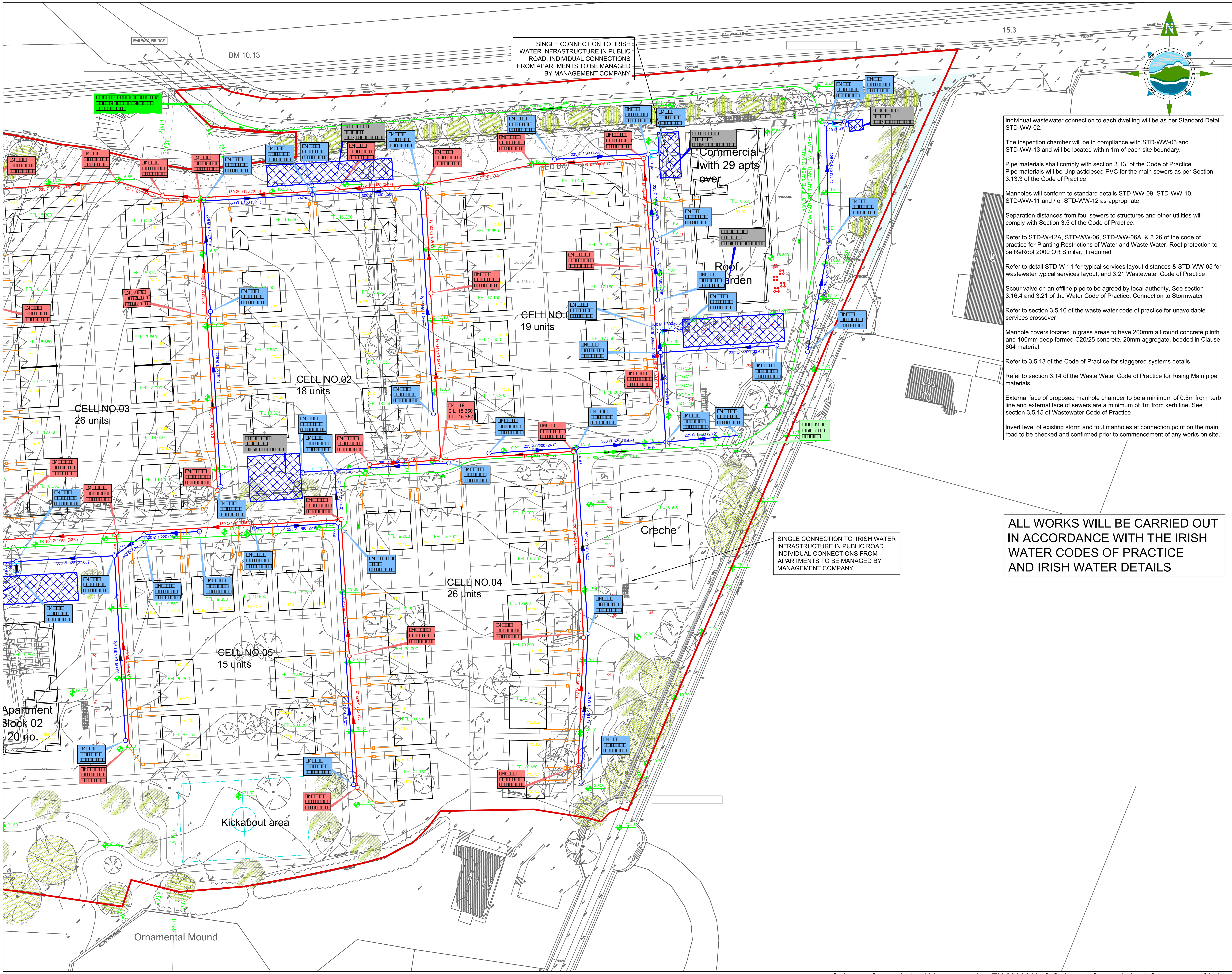
Drawing No.: 10690-2002 Revision: D



Individual wastewater connection to each dwelling will be as per Standard Detail STD-WW-02.

The inspection chamber will be in compliance with STD-WW-03 and STD-WW-13 and will be located within 1m of each site boundary.

Pipe materials shall comply with section 3.13. of the Code of Practice.
Pipe materials will be Unplasticiesed PVC for the main sewers as per Section 3.13.3 of the Code of Practice.

Manholes will conform to standard details STD-WW-09, STD-WW-10, STD-WW-11 and / or STD-WW-12 as appropriate.

Separation distances from foul sewers to structures and other utilities will comply with Section 3.5 of the Code of Practice.

Refer to STD-W-12A, STD-WW-06, STD-WW-06A & 3.26 of the code of practice for Planting Restrictions of Water and Waste Water. Root protection to be ReRoot 2000 OR Similar, if required

Refer to detail STD-W-11 for typical services layout distances & STD-WW-05 for wastewater typical services layout, and 3.21 Wastewater Code of Practice

Scour valve on an offline pipe to be agreed by local authority. See section 3.16.4 and 3.21 of the Water Code of Practice. Connection to Stormwater

Refer to section 3.5.16 of the waste water code of practice for unavoidable services crossover

Manhole covers located in grass areas to have 200mm all round concrete plinth and 100mm deep formed C20/25 concrete, 20mm aggregate, bedded in Clause 804 material

Refer to 3.5.13 of the Code of Practice for staggered systems details

Refer to section 3.14 of the Waste Water Code of Practice for Rising Main pipe materials

External face of proposed manhole chamber to be a minimum of 0.5m from kerb line and external face of sewers are a minimum of 1m from kerb line. See section 3.5.15 of Wastewater Code of Practice

Invert level of existing storm and foul manholes at connection point on the main road to be checked and confirmed prior to commencement of any works on site.

ALL WORKS WILL BE CARRIED OUT IN ACCORDANCE WITH THE IRISH WATER CODES OF PRACTICE AND IRISH WATER DETAILS

LEGEND

- Site Boundary
- Proposed Ø 150mm HDPE Rising Main
- Proposed Foul Sewer and Manhole
- Proposed Inspection Chamber and Connection
- Proposed Storm Sewer and Manhole
- Proposed Soakpit
- Proposed Overflow Network and Manhole
- Proposed Storm overflow Retention Swale
- Proposed Petrol Interceptor
- Proposed Level
- FFL 00.00 Finished Floor Level
- Rising Main marker post

NOTES:

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4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
D	02.12.19	Minor revisions to layout Irish Water commetns addressed	RD	BH
C	05.11.2019	Revised Architect Layout	JK	RD
B	17.07.19	New Background	FG	RD
A	10.07.19	First Issue	JK	BH

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Proposed Drainage Layout Part 2

Scale @ A1: 1:500 A3: 1:1000

Prepared by:	Checked:	Date:
JK	BH	July 2019

Project Director: M. McD.

Drawing Status: Planning

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www.tobin.ie

Drawing No.: 10690-2003 Revision: D

Notes:

Watermain infrastructure to be constructed in accordance with Irish Water Code of Practice IW-CDS-5020-03 & Standard Details IW-CDS-5020-01.

Watermain loops to encompass a minimum of four houses connections and a fire hydrant.

Watermains to be a minimum 750mm from the kerb and 300mm from any other service. typical service layout distances (hori□ontally and vertically) as per service (std-W-11).

All watermains to be a minimum of 3.0m from small si□ed amenity tress and 6.0m from deciduous trees (STD-W-12a).

Watermain to be kept 1.5m to 2.0m from trees with root protection. Trees to be no greater than medium si□e as per iw-cds-5020-03 e.g. ash, holly, whitebeam or similar.
Refer to STD-W-12A, STD-W-06, STD-W-06A & 3.26 of the code of practice for Planting Restrictions of Water and Waste Water. Root protection to be ReRoot 2000 or Similar

Location of valves, manholes, hydrants are shown indicative only on this drawing, it is the contractors responsibility to ensure that the positions on the ground are in accordance with IW-CDS-5020-03.

Water main house connections to comply with section 3.7 & 3.15.3 of the water code of practice and STD-W-26 standard detail.

Air valves and Hydrants to comply with 3.18 of the code of practice, where provided in grass areas, shall be surrounded by concrete plinth, 200mm all round and 100mm deep formed with C20/25 concrete, 20mm aggregate si□e, bedded in Clause 804 material. The plinth shall incorporate mild steel reinforcement links all around and shall have bull nose finish around its external perimeter.

Scour valve on an offline pipe to be agreed by local authority. See section 3.16.4 and 3.21 of the Water Code of Practice.

Manhole covers located in grass areas to have 200mm all round concrete plinth and 100mm deep formed C20/25 concrete, 20mm aggregate, bedded in Clause 804 material.

Pipe material shall be HDPE or MDPE in accordance with Section 3.9 and shall comply with Section 3.9 of the Irish Water Code of Practice.

For water main connection to dwellings refer to M&E drawing detailing □Pop Up□locations.
All water mains and connections to be installed in accordance with I.W. code of practice IW - CDS - 5020 - 03

Thrust Blocks to watermains as per IW Standards Detail STD - W - 28.

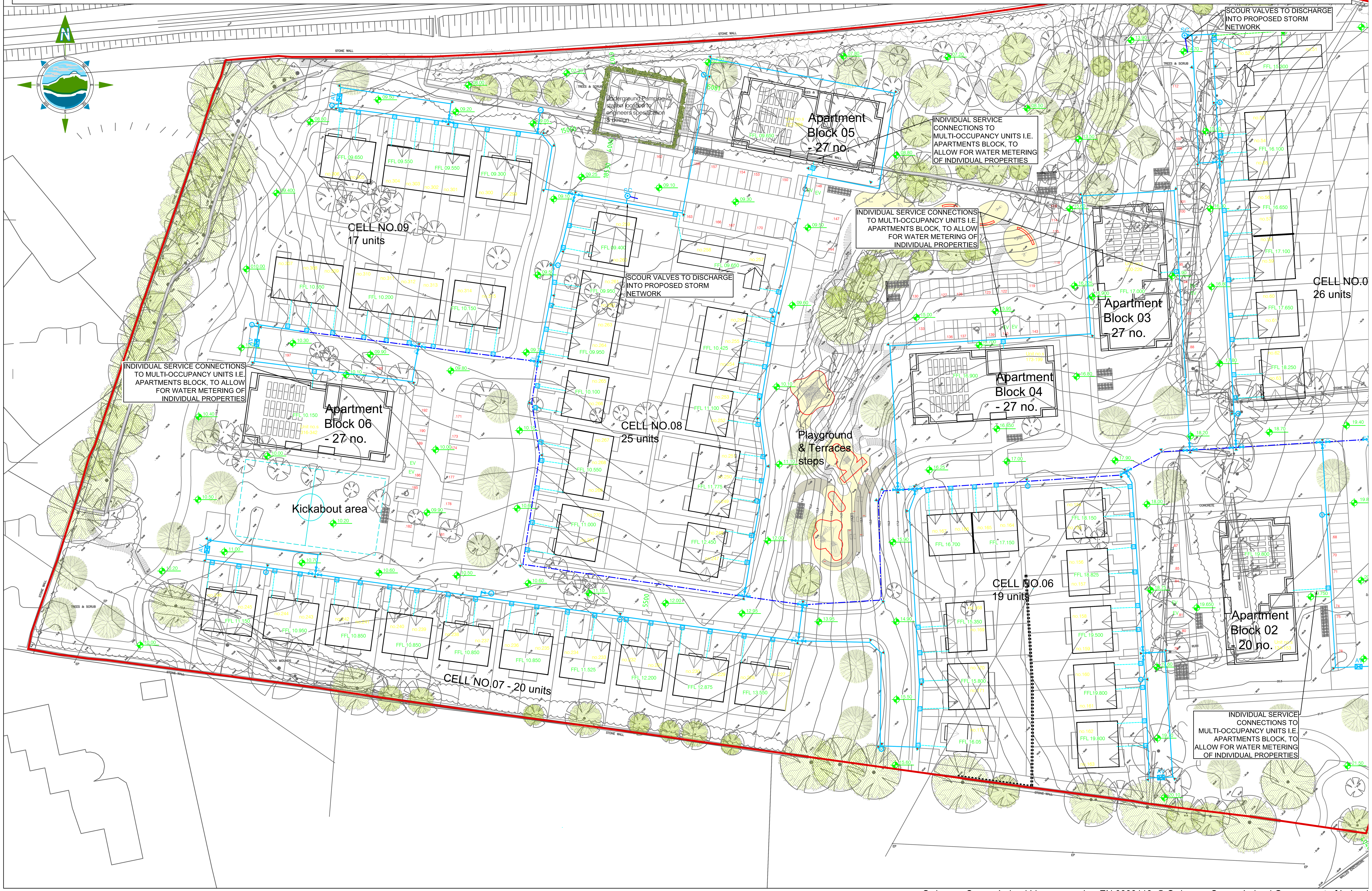
Three way Sluice Valve arrangement to be constructed with Ductile Iron and in accordance with Irish Water specification and Standard Detail drawings - STD-W-04 to STD-W-10.

Scour Valves located at low points as shown. A non return valve is to be provided in this manhole to prevent backflow to the water supply network system and connection to be agreed with the Local Authority, see section 3.16.4 ad 3.21 pf the Water Code of Practice.

Scour valve to to have scour chamber as per STD-W-30.

Washout Hydrant as per IW Standard detail STD-W-30A

Interconnecting pipework between valves, hydrants to be Ductile iron fittings as per relevant Irish Water Standard detail. IW Standard details can be found at the following location
www.water.ie/connections/developer-services/



LEGEND

- Site Boundary
- Proposed Ø 200mm PE100 SDR 17 Water Supply Pipe
- Proposed Ø 150mm PE100 SDR 17 Water Supply Pipe
- Proposed Ø 25mm PE80 SDR 17 House Connection and Water Meter
- Proposed Ø 32mm PE80 SDR 17 House Connection and Water Meter
- SV Proposed Sluice Valve
- H Proposed Fire Hydrant
- BM Proposed Bulk Meter
- AV Proposed Air Valve
- SC Proposed Scour Valve Chamber
- Proposed Thrust Block
- 15.00 Proposed Level
- W Proposed Wash Out Hydrant

NOTES:

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5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
F	03/12/19	Revised after IW Comments	RD	BH
E	02/12/19	Revised after IW Comments	RD	BH
D	02/12/19	Air & Scour Valves Added & Minor Revisions	FG	RD
C	05.11.2019	Revised Architect Layout	JK	RD
B	17.07.19	New Background	FG	RD
A	10.07.19	First Issue	JK	BH

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Proposed Watermain Layout Part 1

Scale @ A1: 1:500 A3: 1:1000

Prepared by: JK | Checked: BH | Date: July 2019

Project Director: M. McD.

Drawing Status: Plannning

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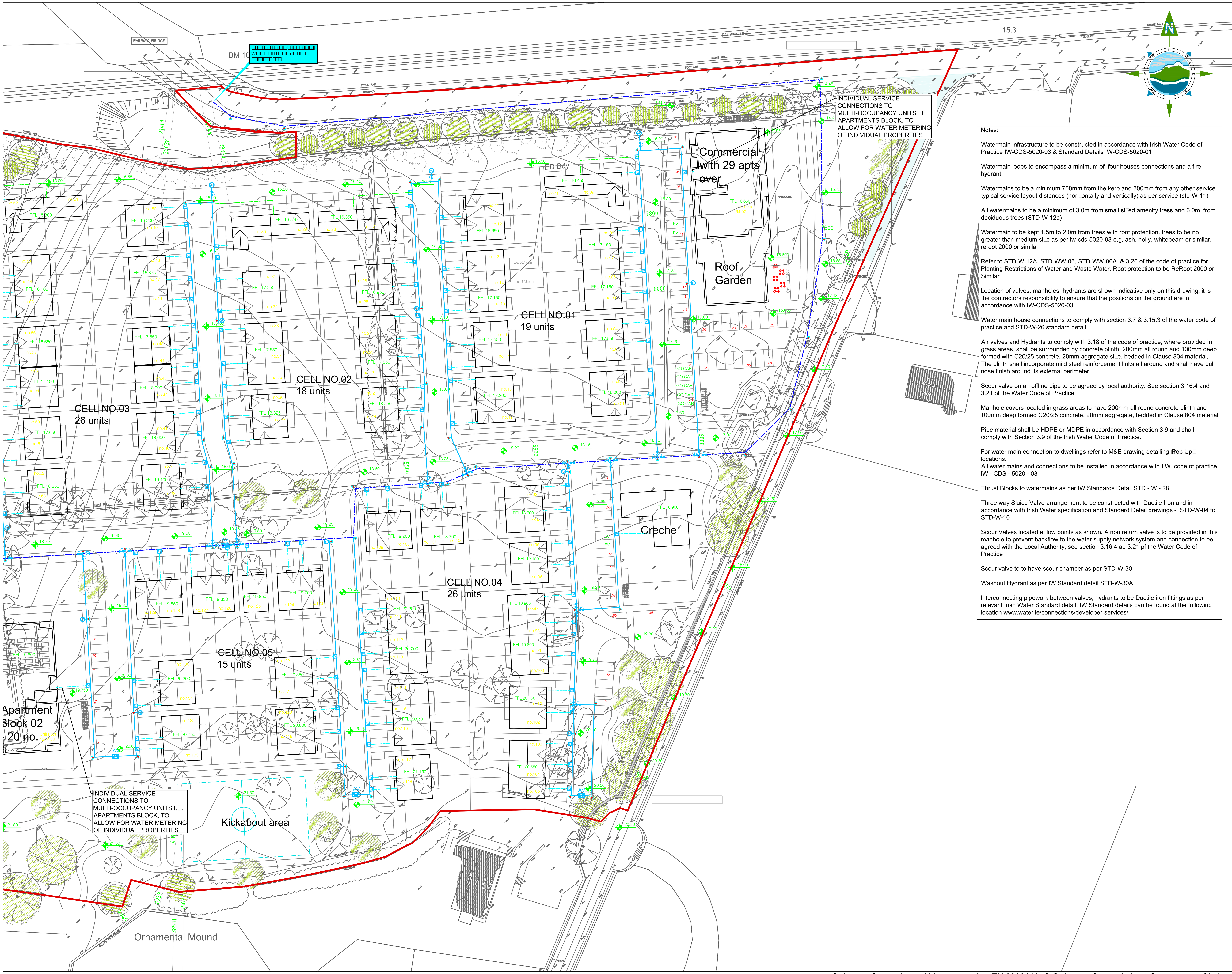
Drawing No.: 10690-2004 Revision: F



Notes:

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Watermain to be kept 1.5m to 2.0m from trees with root protection. trees to be no greater than medium si□e as per iw-cds-5020-03 e.g. ash, holly, whitebeam or similar. reroot 2000 or similar

Refer to STD-W-12A, STD-WW-06, STD-WW-06A & 3.26 of the code of practice for Planting Restrictions of Water and Waste Water. Root protection to be ReRoot 2000 or Similar

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For water main connection to dwellings refer to M&E drawing detailing □Pop Up□ locations.
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Scour Valves located at low points as shown. A non return valve is to be provided in this manhole to prevent backflow to the water supply network system and connection to be agreed with the Local Authority, see section 3.16.4 ad 3.21 pf the Water Code of Practice

Scour valve to to have scour chamber as per STD-W-30

Washout Hydrant as per IW Standard detail STD-W-30A

Interconnecting pipework between valves, hydrants to be Ductile iron fittings as per relevant Irish Water Standard detail. IW Standard details can be found at the following location www.water.ie/connections/developer-services/

LEGEND

- Site Boundary
- Proposed Ø 200mm PE100 SDR 17 Water Supply Pipe
- Proposed Ø 150mm PE100 SDR 17 Water Supply Pipe
- Proposed Ø 25mm PE80 SDR 17 House Connection and Water Meter
- Proposed Ø 32mm PE80 SDR 17 House Connection and Water Meter
- SV — Proposed Sluice Valve
- H — Proposed Fire Hydrant
- BM — Proposed Bulk Meter
- AV — Proposed Air Valve
- SC — Proposed Scour Valve Chamber
- Proposed Thrust Block
- 15.00 — Proposed Level
- WO — Proposed Washout Hydrant

NOTES:

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Rev	Date	Description	By	Chkd.
E	02/12/19	Revised after IW Comments	RD	BH
D	02/12/19	Air & Scour Valves Added & Minor Revisions	FG	RD
C	05.11.2019	Revised Architect Layout	JK	RD
B	17.07.19	New Background	FG	RD
A	10.07.19	First Issue	JK	BH

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Proposed Watermain Layout Part 2

Scale @ A1: 1:500 A3: 1:1000

Prepared by:	Checked:	Date:
JK	BH	July 2019

Project Director: M. McD.

Drawing Status: Planning

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Drawing No.: 10690-2005 Revision: E

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THE INFORMATION ON THIS DRAWING IS TO THE ORDNANCE SURVEY IRELAND ITM COORDINATE SYSTEM

Symbol	Description
G	Proposed Road Gully Location
PROPOSED 5.30	Proposed Level
	Proposed Direction of Road Fall
	Tactile Paving
	Proposed Paving
	Proposed Raised Junction
	Proposed Road Signage to Traffic Signs manul - Chapter 8
	Proposed Dropped Kerbs
STOP	Proposed STOP Road marking to Traffic Sign Manuel - Chapter 7
	Proposed YIELD Road marking to Traffic Sign Manuel - Chapter 7

NOTES:

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Rev	Date	Description	By	Chkd.
C	09.12.19	Issued for Planning Revised Layout	RD	BH
B	17.07.19	New Background	FG	RD
A	11.07.19	First Issue	JH	RD

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Proposed Roads Layout Part 1

Scale @ A1: 1:500

Prepared by:	Checked:	Date:
JH	RD	July 2019

Project Director: M. McD.

Drawing Status: Planning

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www.tobin.ie

Drawing No.: 10690-2006

Revision: C

THE INFORMATION ON THIS DRAWING IS TO THE ORDNANCE SURVEY IRELAND ITM COORDINATE SYSTEM

- Proposed Road Gully Location
- Proposed Level
- Proposed Direction of Road Fall
- Tactile Paving
- Proposed Paving
- Proposed Raised Junction
- Proposed Road Signage to Traffic Signs manul - Chapter 8
- Proposed Dropped Kerbs
- Proposed 'STOP' Road marking to Traffic Sign Manuel - Chapter 7
- Proposed 'YIELD' Road marking to Traffic Sign Manuel - Chapter 7

NOTES:

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Rev	Date	Description	By	Chkd.
C	12.12.19	Issue for Planning Revised Layout	RD	BH
B	17.07.19	New Background	FG	RD
A	11.07.19	First Issue	JH	RD

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Proposed Roads Layout Part 2

Scale @ A1: 1:500

Prepared by: JH | Checked: RD | Date: July 2019

Project Director: M. McD.

Drawing Status: Plannning

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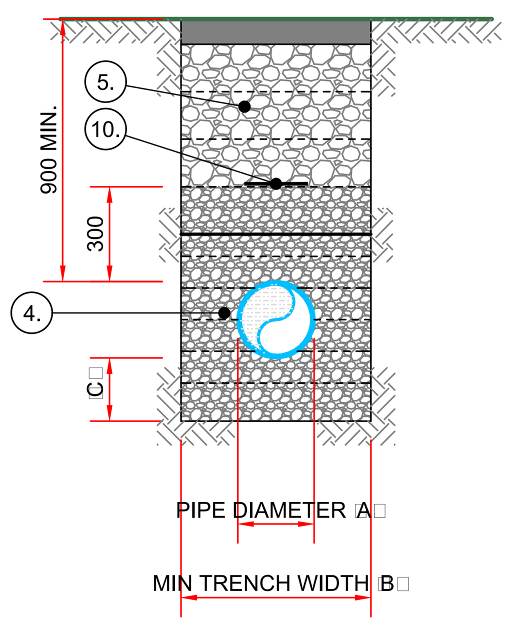
Drawing No.: 10690-2007 Revision: C

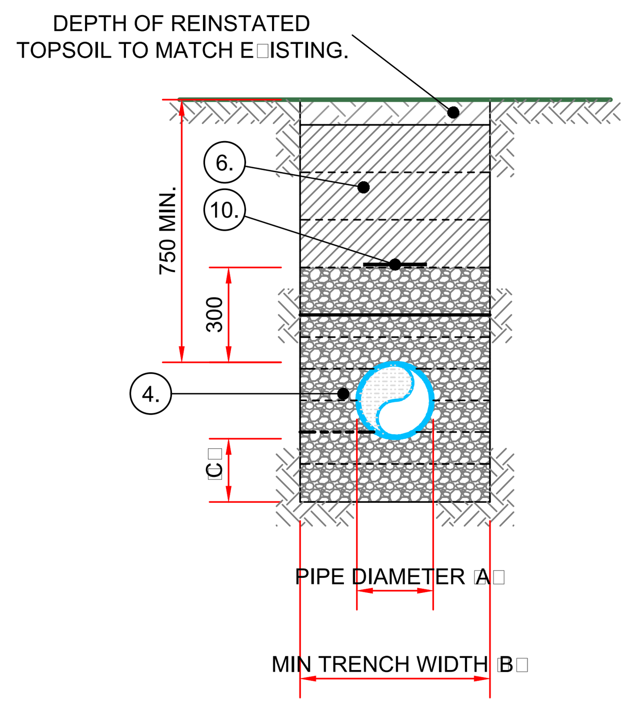


UNDER ROADS / HARDSTANDINGS / FOOTPATHS

SCALE A1 - 1:20
SCALE A3 - 1:40

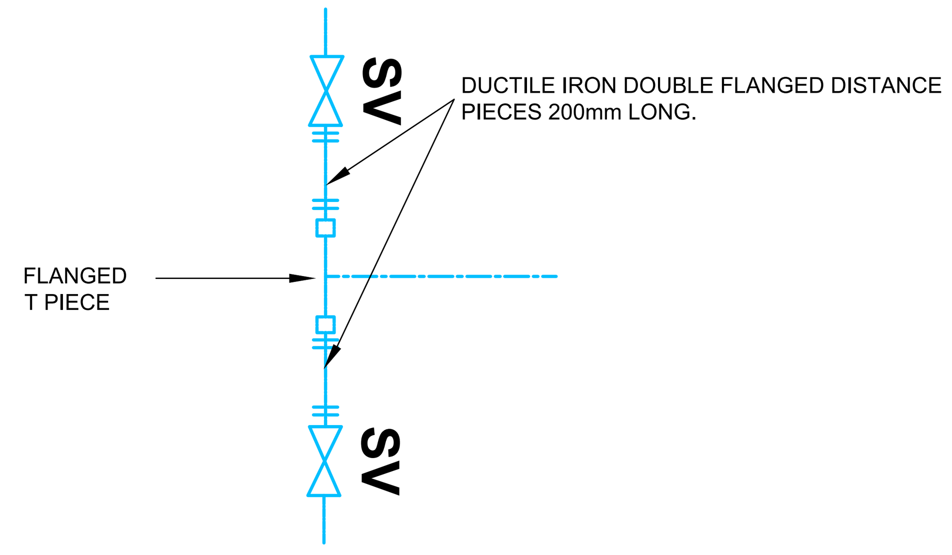
PIPE SI□E A□(mm)	WIDTH OF TRENCH B□(mm)
□80	SEE NOTE 11.
100	500
150	600
200	600
250	750
300	750
350	750
400	900
450	900

PIPE SI□E A□(mm)	DEPTH OF BEDDING C□(mm)
□200	150
□500	200



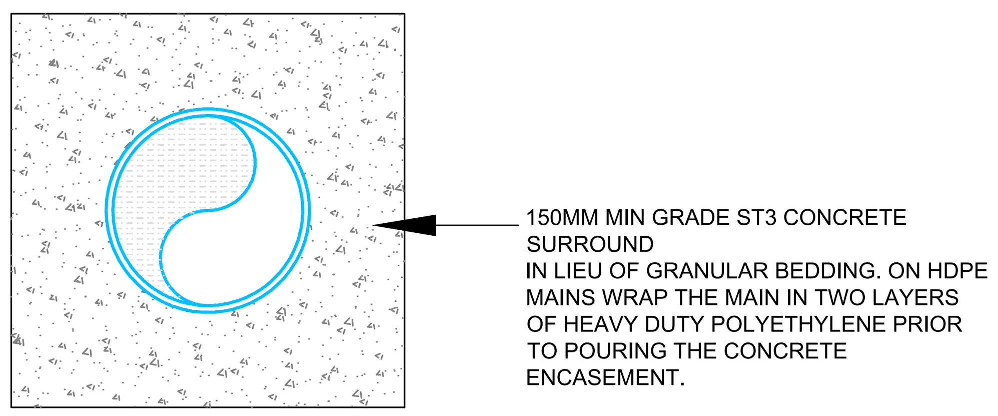
UNDER LANDSCAPED AREAS

SCALE A1 - 1:20
SCALE A3 - 1:40



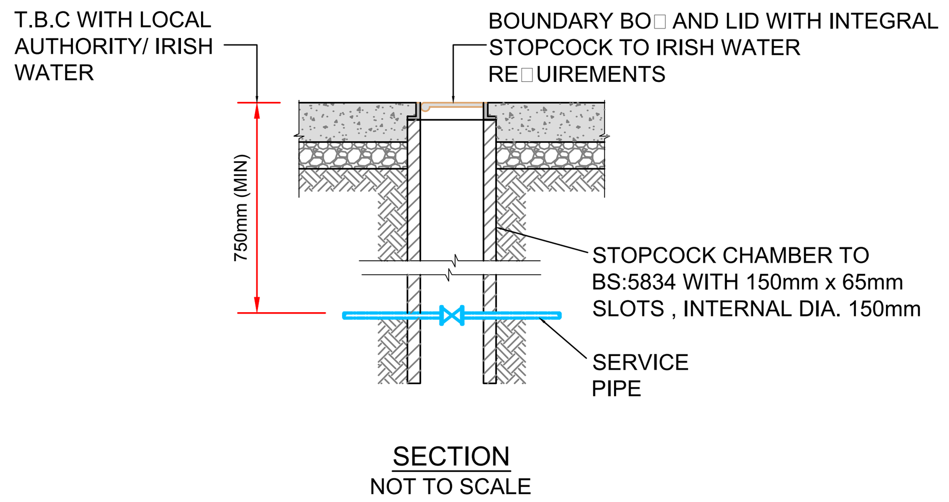
SCHEMATIC OF PROPOSED MAIN CONNECTION TO E□ISTING WATERMAIN

N.T.S.



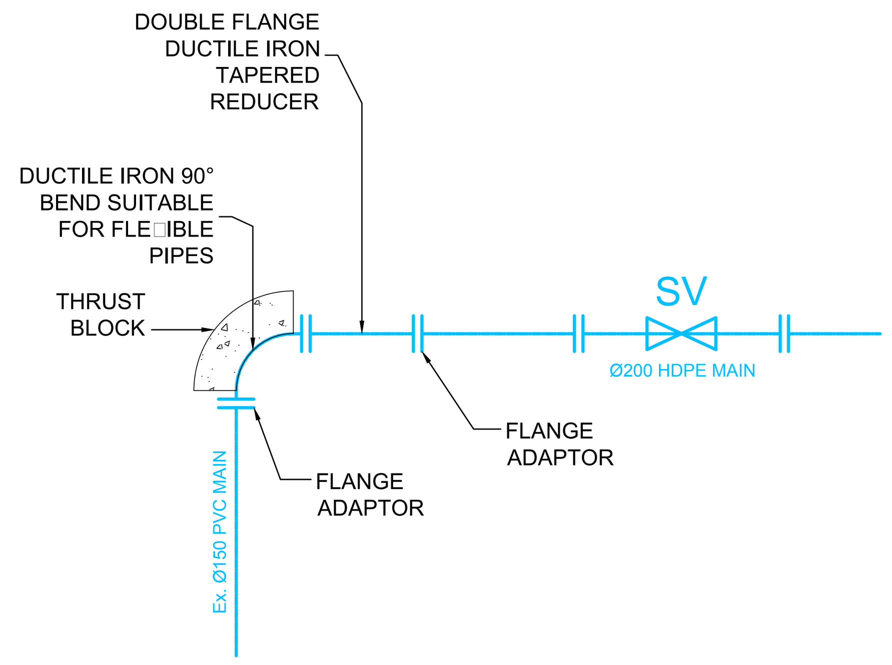
CONCRETE ENCASEMENT DETAIL WHERE MIN. COVER NOT PROVIDED

SCALE 1:10
SCALE 1:20
PROVIDED WHERE COVER TO PIPES: □1.2m IN ROADS
OR PIPES UNDER BUILDINGS: □0.9m IN GARDENS/GRASSED AREAS



SECTION
NOT TO SCALE

BOUNDARY BO□



SCHEMATIC OF E□. PVC MAIN CONNECTION TO NEW HDPE MAIN

N.T.S.

1. THIS DRAWING TO BE READ IN CONJUNCTION WITH RELEVANT ARCHITECTS AND ENGINEERS DRAWINGS.
2. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING. ALL DIMENSIONS TO BE CHECKED ON SITE. ENGINEER TO BE INFORMED IMMEDIATELY OF ANY DISCREPANCIES BEFORE WORK PROCEEDS.
3. THE MINIMUM DEPTH OF COVER FROM THE FINISHED GROUND LEVEL TO THE E□TERNAL CROWN OF THE PIPE SHALL BE 750mm FOR SERVICE CONNECTIONS, 900mm FOR WATER MAINS. GREATER DEPTHS OF COVER AND/OR PIPE STRENGTH AND/OR A HIGHER CLASS OF BEDDING MATERIAL MAY BE RE□UIRED WHERE HIGH TRAFFIC LOADING IS ANTICIPATED. THE MA□IMUM COVER SHOULD SHOULD NOT E□CEED 1200mm WHERE PRACTICABLE.
4. PIPE BEDDING SHALL COMPLY WITH WIS 4-08-02 AND IGN 4-08-01 GRANULAR MATERIAL SHALL BE 14mm TO 5mm GRADED.

BACKFILL

5. CLAUSE 804 MATERIAL IN ACCORDANCE WITH THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS IS TO BE USED AS BACKFILL MATERIAL WHERE THE WATER MAIN IS LOCATED IN ROADS, FOOTPATHS OR WHEN THE NEAREST PART OF THE TRENCH IS WITHIN 1m OF THE PAVED EDGE OF THE ROADWAY. CLAUSE 804 IS TO BE COMPACTED AS PER CLAUSE 802 OF THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS.
6. SELECTED E□CAVATED MATERIAL MAY BE USED IN GREEN FIELD AREAS ABOVE GRANULAR PIPE SURROUND MATERIAL SUBJECT TO THE APPROVAL OF IRISH WATER.
7. IN SOFT GROUND CONDITIONS (CBR□5) THE MATERIAL SHOULD BE E□CAVATED OUT AND DISPOSED OF IN ACCORDANCE WITH THE WASTE MANAGEMENT ACT AND CLAUSE 804 MATERIAL IN ACCORDANCE WITH THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS SHALL REPLACE THE E□CAVATED MATERIAL, WRAPPED IN GEO-TE□TILE WRAPPING. ALTERNATIVELY, SPECIAL PIPE SUPPORT ARRANGEMENTS INCLUDING PILING ETC. MAY BE RE□UIRED WHERE THE DEPTH OF SOFT MATERIAL IS E□CESSIVE. SUCH ARRANGEMENTS SHALL BE SUBJECT TO ASSESSMENT BY IRISH WATER BEFORE ADVANCING WITH THE WORK.
8. PIPES SHALL NOT BE SUPPORTED ON STONES OR ROCKS, OR ANY HARD OBJECT AT ANY POINT ALONG THE TRENCH. ROCK SHALL BE E□CAVATED TO A DEPTH OF 150mm BELOW THE ACTUAL DEPTH OF THE TRENCH WITH THE VOID FILLED WITH CLAUSE 804 MATERIAL IN ACCORDANCE WITH THE NATIONAL ROADS AUTHORITY SPECIFICATION FOR ROAD WORKS. THE GRANULAR MATERIAL SHALL BE LAID ABOVE THIS VOID BACKFILL MATERIAL.
9. SHOULD MINIMUM COVER NOT BE ACHIEVABLE, CONCRETE GRADE C8/10 SHALL BE USED AS BACKFILL MATERIAL.

WARNING MESH

10. MARKER TAPE TO BE 400mm WIDE BLUE POLYETHYLENE MATERIAL IN ACCORDANCE WITH EN 12163, PLASTIC PIPES SHALL HAVE WARNING TAPE INCORPORATED A REINFORCED BAND BRACING WIRE. SERVICE PIPES SHALL HAVE 200mm WIDE MESH TAPE. MARKER TAPE TO BE LAID AT TOP OF PIPE BEDDING LAYER.
11. TRENCH WIDTHS FOR PIPE SI□ES □/□80mm MAY BE □500MM, SUBJECT TO CONSIDERATION BEING GIVEN TO THE TRENCH DEPTH, HEALTH & SAFETY & CONSTRUCTION ACCESS RE□UIREMENTS.
12. WATERMAIN PIPES SHALL BE SUBJECT TO IRISH WATER RE□UIREMENTS:
    (a) DUCTILE IRON PIPES AND FITTINGS COMPLYING WITH I.S. EN 545.
    (b) POLYETHYLENE PIPES AND FITTINGS COMPLYING WITH I.S. EN 12201: 2011.
13. SERVICE PIPES SHALL HAVE A MINIMUM 12mm INTERNAL DIAMETER & SHALL BE ONE OF THE FOLLOWING TYPES, UNLESS OTHERWISE APPROVED:
    (a) ANNEALED COPPER COMPLYING WITH B.S. 2871 PART 1,TABLE Y.
    (b) POLYETHYLENE PIPE TYPE 32 COMPLYING WITH I.S. 134 HEAVY GAUGE.
    (c) POLYETHYLENE PIPE TYPE 50 COMPLYING WITH I.S. 135 FITTINGS & SPECIALS SHALL BE APPROVED BY ENGINEER.

STOPCOCKS

14. STOPCOCKS COMPLYING WITH B.S. 1010 SHALL BE PROVIDED ON EACH SERVICE PIPE. STOPCOCKS SHALL BE LOCATED IN FOOTPATH FRONTING THE PROPERTY BEING SERVED. THE DEPTH OF THE STOPCOCK SPINDLE SHALL NOT E□CEED 200mm.

SLUICE VALVES

15. SLUICE VALVE CHAMBERS SHALL BE COVERED WITH APPROVED HEAVY DUTY METAL COVERS TO I.S. 261 AND B.S. 5834. COVER AND FRAME SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS AND IS SUBJECT TO THE APPROVAL OF IRISH WATER.
16. SLUICE VALVES SHALL BE DOUBLE FLANGED WITH DUCTILE IRON RESILIENT SEAL GATE VALVES, SUITABLE FOR USE IN WATER MAINS. THEY SHALL COMPLY WITH THE RE□UIREMENTS OF I.S. EN 1074 AND THEY SHALL HAVE THE APPROPRIATE CE MARKING.
17. ALL SLUICE VALVES SHALL BE ANTI-CLOCKWISE CLOSING.
18. VALVE CHAMBER TO BE CONSTRUCTED OF PRECAST CONCRETE UNITS OR HIGH DENSITY BLOCK WORK. ALTERNATIVELY, PROPRIETARY PREFABRICATED CHAMBER UNITS MAY ALSO BE USED, SUBJECT TO APPROVAL FROM IRISH WATER.
19. CONCRETE CHAMBERS SHALL BE SURROUNDED BY A MINIMUM OF 150mm COMPACTED CLAUSE 804 MATERIAL AS PER STD-W-13.
20. 200mm ALL AROUND, 100mm DEEP CONCRETE PLINTH WITH PROTECTIVE STAINLESS STEEL METAL BAND AROUND COVERS IN GREEN AREAS.
21. THRUST BLOCKS (NOT SHOWN ON DRAWING) TO BE PROVIDED AS PER STANDARD DRAWING STD-W-28 AT ALL TEES, BENDS, TAPERS, DEAD ENDS AND PIPES AT STEEP SLOPES.
22. ANTI-CORROSION TAPE TO BE PROVIDED AROUND BURIED FLANGES.
23. ALL CONCRETE TO BE IN ACCORDANCE WITH I.S. EN 206.
24. REFER TO IRISH WATER STD-W-14 AND 15 FOR CONSTRUCTION DETAILS.

HYDRANTS

25. HYDRANT CHAMBERS SHALL BE COVERED WITH APPROVED HEAVY DUTY METAL COVERS TO I.S. 261 AND B.S. 5834. COVER AND FRAME SHALL BE SUITABLE FOR ROAD AND TRAFFIC CONDITIONS AND IS SUBJECT TO THE APPROVAL OF IRISH WATER.
26. HYDRANTS SHALL BE DOUBLE FLANGED DRILLED TO PIN 16. THEY SHALL COMPLY WITH BS 750: 2012. THE HYDRANT SHALL INCORPORATE A SCREW DOWN GATE VALVE, UNDERGROUND "GUIDE TO HEAD" TYPE WITH SCREW DOWN CONNECTION OUTLET AND FALSE SPINDLE CAP AND IRON CHAIN.
27. ALL HYDRANTS SHALL BE CLOCKWISE CLOSING.
28. HYDRANT CHAMBER TO BE CONSTRUCTED OF PRECAST CONCRETE UNITS OR HIGH DENSITY BLOCK WORK. ALTERNATIVELY, PROPRIETARY PREFABRICATED CHAMBER UNITS MAY ALSO BE USED, SUBJECT TO APPROVAL FROM IRISH WATER.
29. CONCRETE CHAMBERS SHALL BE SURROUNDED BY A MINIMUM OF 150MM COMPACTED CLAUSE 804 MATERIAL AS PER STD-W-13.
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32. ANTI-CORROSION TAPE TO BE PROVIDED AROUND BURIED FLANGES.
33. ALL CONCRETE TO BE IN ACCORDANCE WITH I.S. EN 206.
34. REFER TO IRISH WATER STD-W-16 TO 19 FOR CONSTRUCTION DETAILS.

AIR VALVES

35. REFER TO IRISH WATER STD-W-20 TO 23 FOR CONSTRUCTION DETAILS.

INDICATOR PLATES & MARKER POSTS

36. REFER TO IRISH WATER STD-W-27 FOR DETAILS OF ALL MARKER POSTS/PLATES.

PRESSURE REDUCING/SUSTAINING VALVE CHAMBER

37. REFER TO IRISH WATER STD-W-24 FOR CONSTRUCTION DETAILS.

BOOSTER PUMP STATION ARRANGEMENT

38. REFER TO IRISH WATER STD-W-25 FOR CONSTRUCTION DETAILS.

METER CHAMBERS

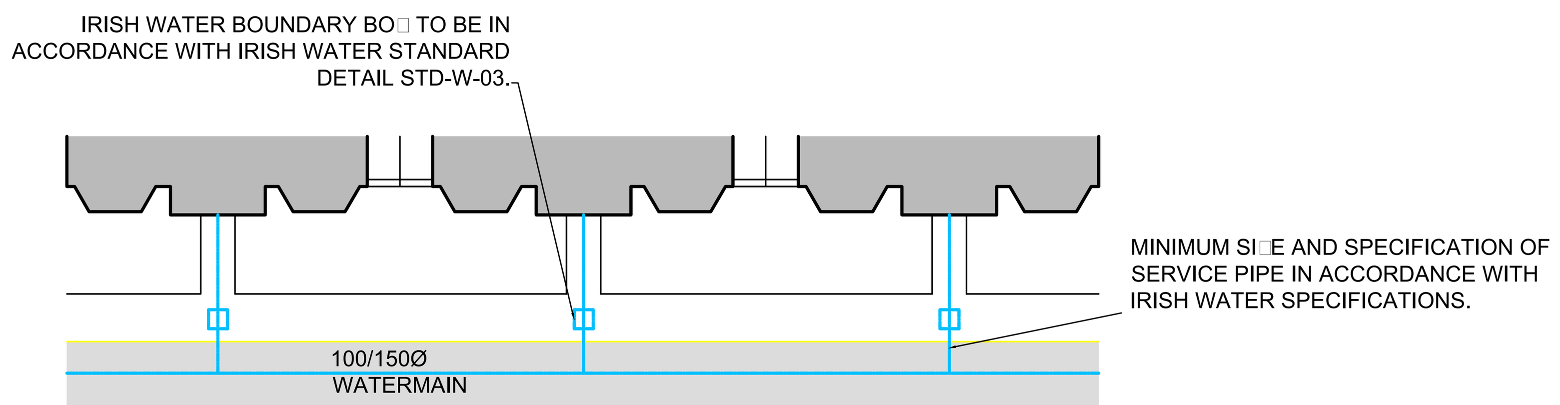
39. REFER TO IRISH WATER STD-W-26 FOR CONSTRUCTION DETAILS. METER SPECIFICATION TO IRISH WATER APPROVAL.

THRUST AND SUPPORT BLOCKS

40. REFER TO IRISH WATER STD-W-28 FOR CONSTRUCTION DETAILS.

OTHER

41. REFER TO IRISH WATER STD-W-29 TO 37 FOR DUCT CHAMBER, SCOUR CHAMBER AND HEAD WALL ARRANGEMENT, DUCT/STREAM/BRIDGE CROSSINGS, SECURITY GATES AND FENCING, PIPE REPAIRS, TELEMETRY AND KIOSK AND LAMP BOLLARD STANDARD CONSTRUCTION DETAILS.



TYPICAL WATER CONNECTION TO INDIVIDUAL UNITS

SCALE A1 - 1:200
SCALE A3 - 1:400

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
B	17.07.19	Second Issue	FG	RD
A	10.07.2019	Issued for Planning	JK	RD

Client: Kegata Ltd.

Project: Residential Development at Roshill, Galway

Title: Standard Watermain Details

Scale @ A1: As Shown

Prepared by: JK | Checked: RD | Date: July 2019

Project Director: Michael McDonnell

Drawing Status: Planning

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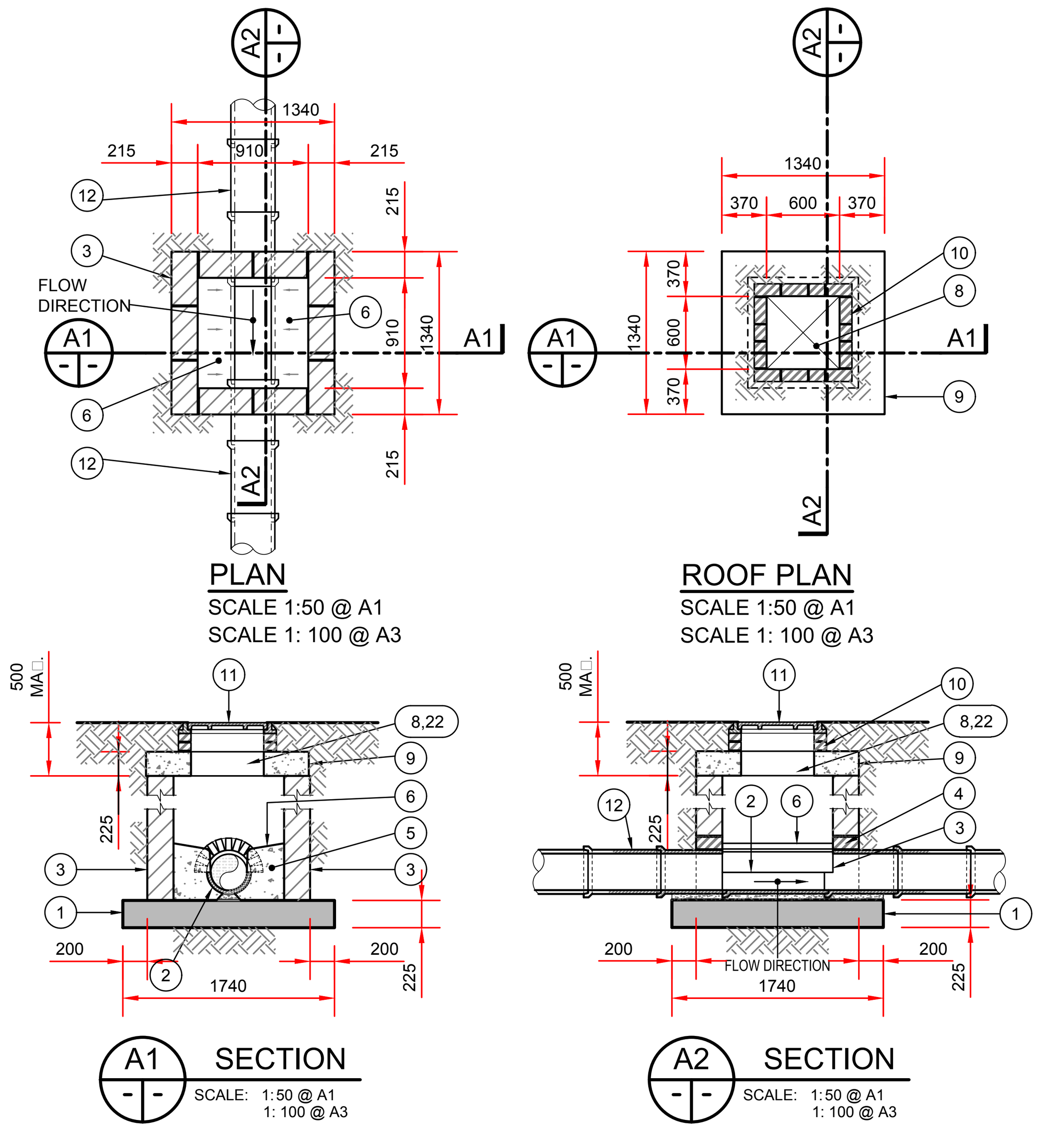
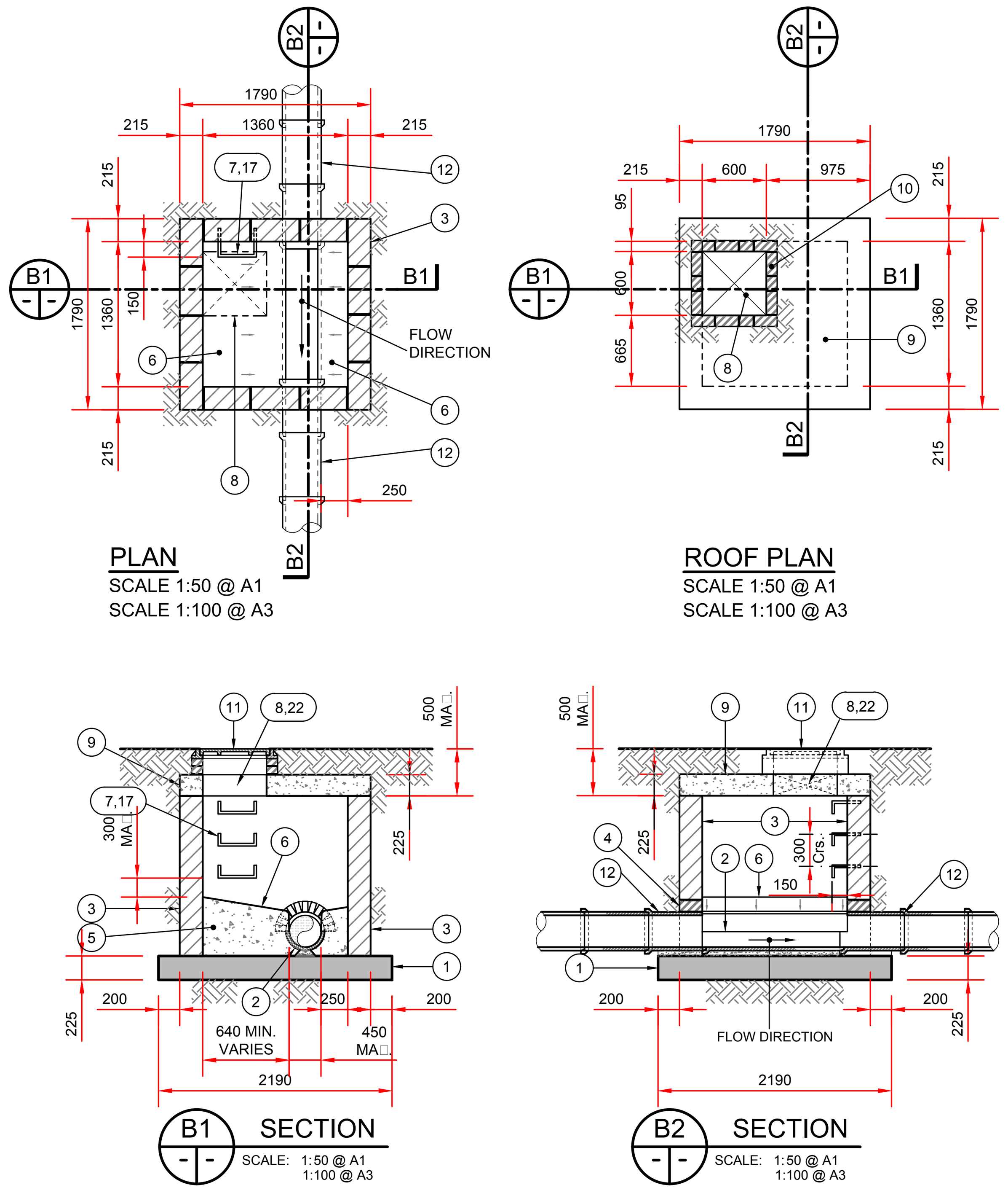
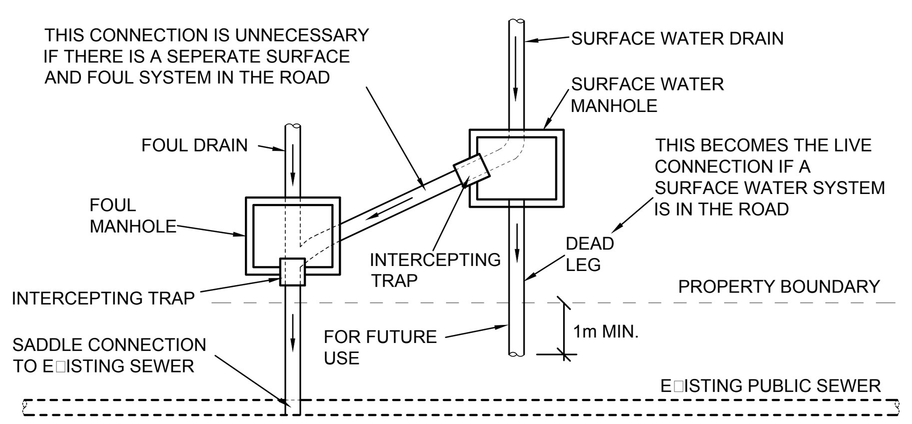
Drawing No.: 10690-2008 | Revision: B



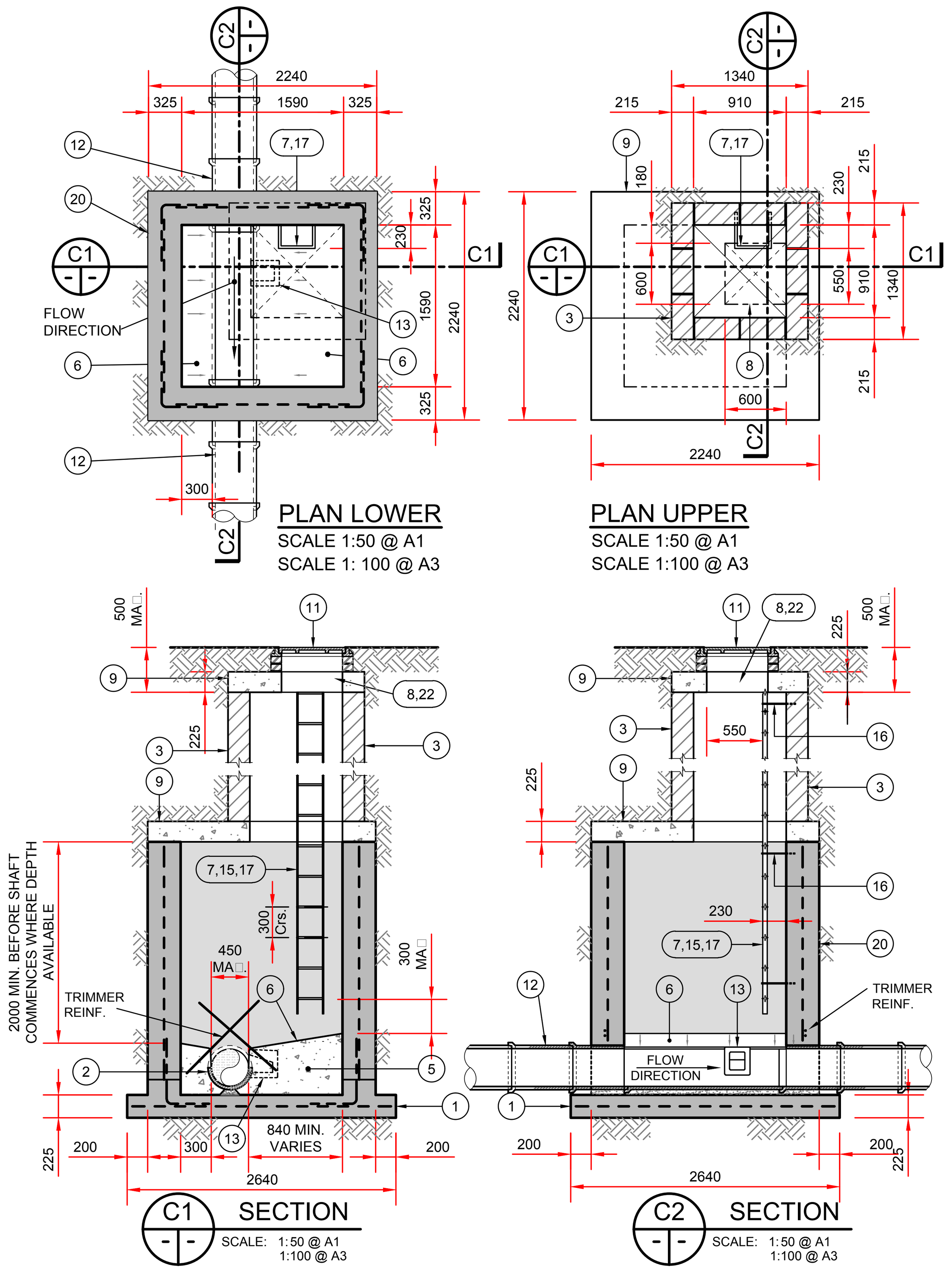
MANHOLE TYPE A
DEPTH TO INVERT □1m



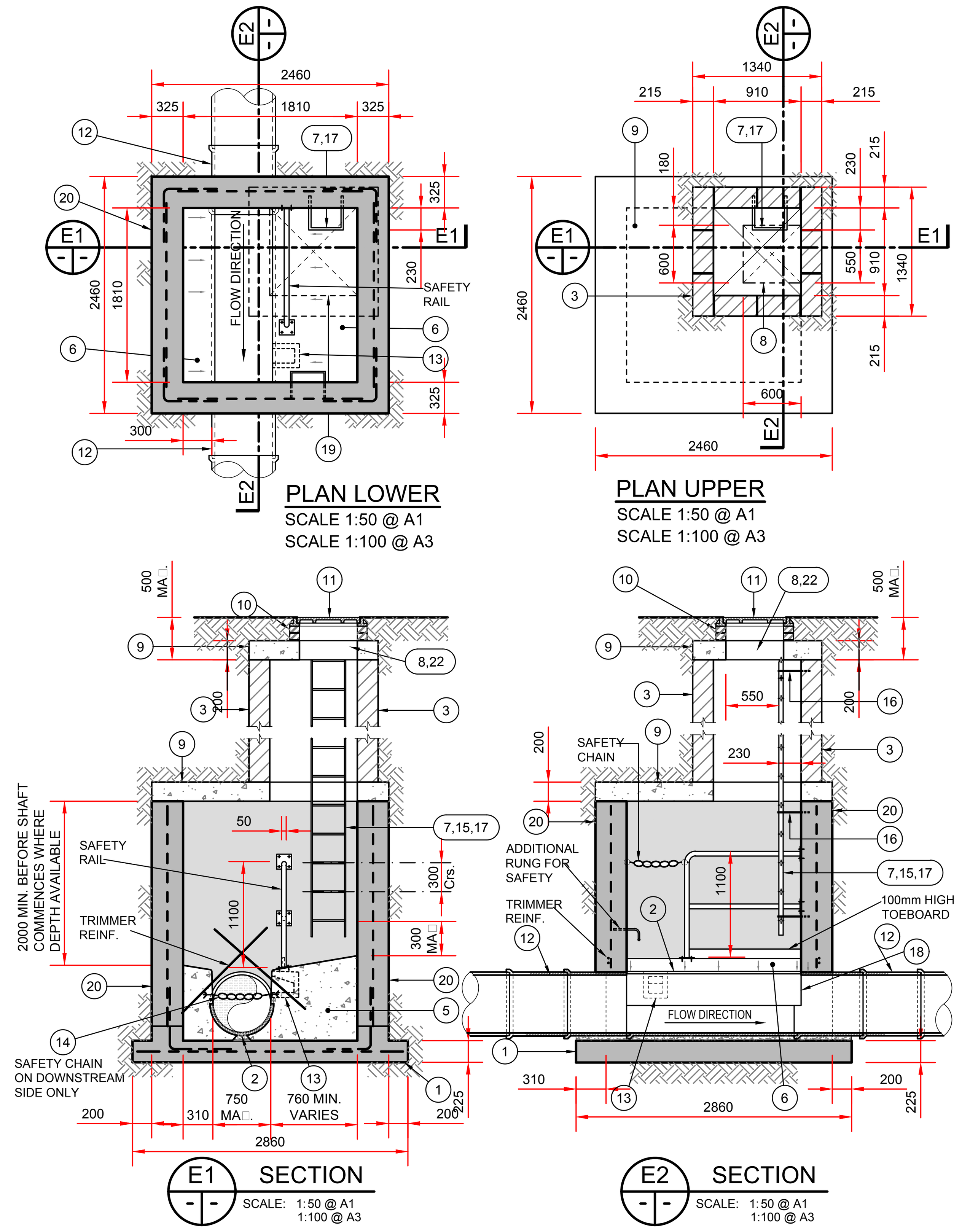
MANHOLE TYPE B
1m ≤ DEPTH TO INVERT □3m



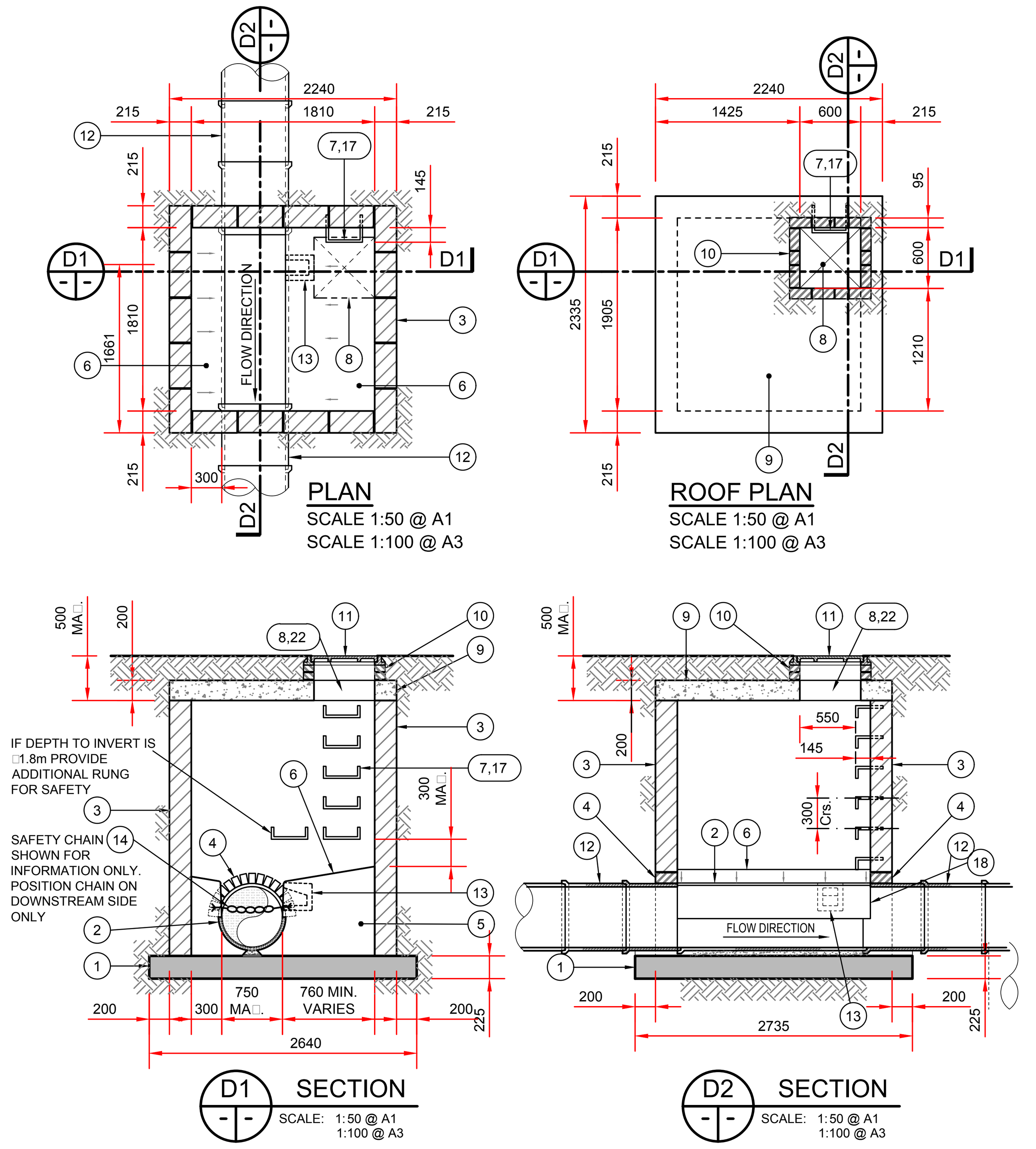
PLAN OF SEPARATE CONNECTION TO COMBINED SEWER
N.T.S.



MANHOLE TYPE C
3m ≤ DEPTH TO INVERT □6m



MANHOLE TYPE E
3m ≤ DEPTH TO INVERT □6m



MANHOLE TYPE D
1m ≤ DEPTH TO INVERT □3m

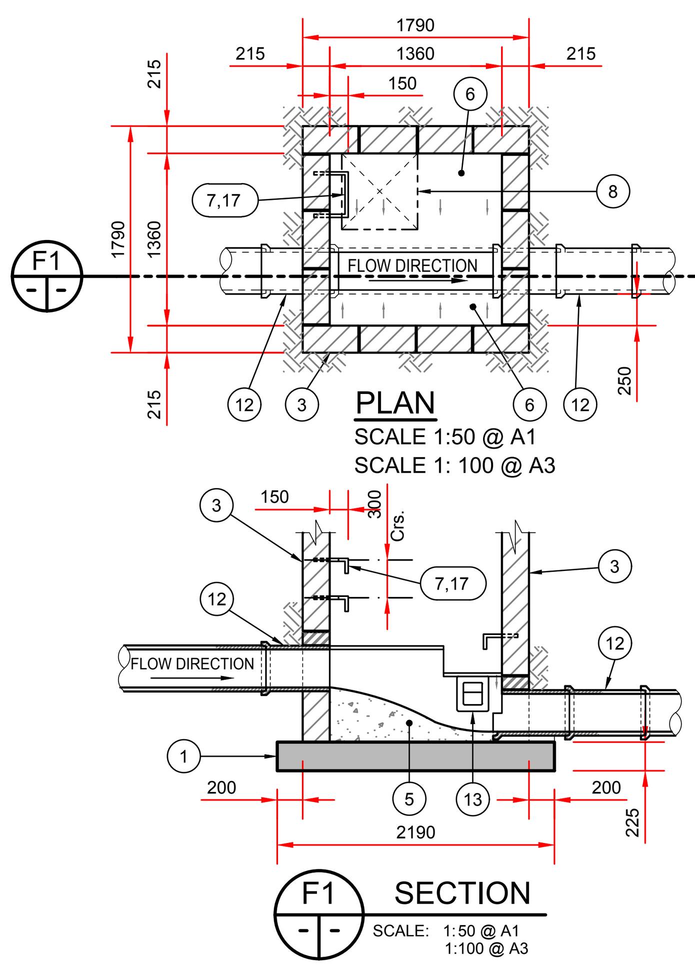
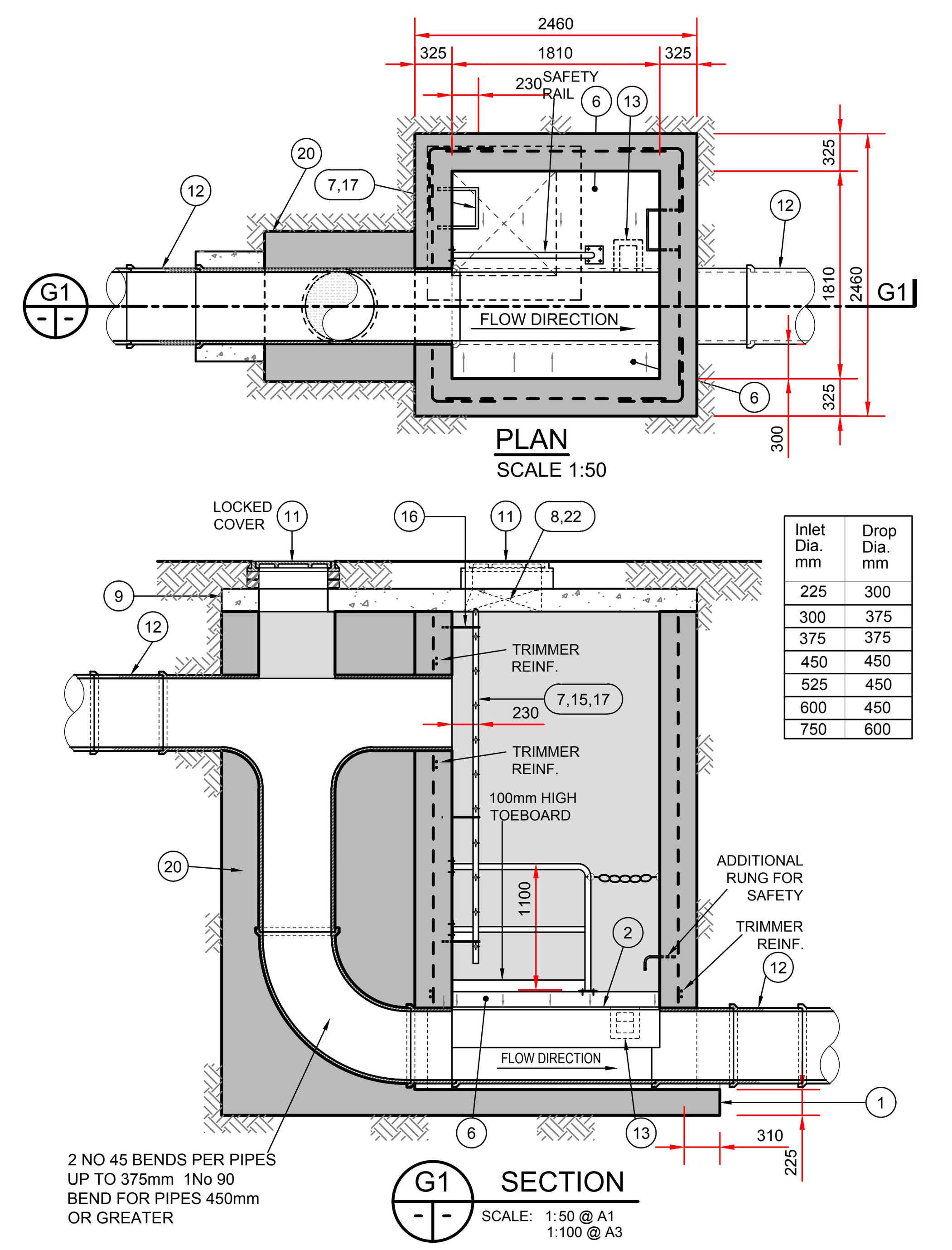


TABLE F

INLET Ø mm A	DEPTH (max) mm H
225	600
300	600
375	750
450	750
525	750
600	750
750	750

WHEN THE DROP H IS GREATER THAN THE MA□ VALUE SHOWN USE BACKDROP MANHOLE

MANHOLE TYPE F
RAMP MANHOLE



Inlet Dia. mm	Drop Dia. mm
225	300
300	375
375	375
450	450
525	450
600	450
750	600

MANHOLE TYPE G
BACKDROP MANHOLE FOR ALL PIPE DIAMETERS
DROP □600 FOR 225 & 300 PIPE DIAMETERS
DROP □750 FOR GREATER PIPE DIAMETERS

NOTES:

1) 225mm THICK C30/37 MASS CONCRETE FOUNDATIONS,

2) PREFORMED HALF CIRCLE CHANNEL PIPES, THE THE PIPELINE MAY, WHERE PRACTICABLE BE LAID THROUGH THE MANHOLE & THE CROWN CUT OUT TO HALF DIAMETER, PROVIDED FLE□IBLE JOINTS ARE SITUATED ON EACH SIDE NO FURTHER THAN 600mm FROM INNER FACE OF THE MANHOLE WALL.

NOTE: WHERE PIPE DIAMETER CHANGES AT A MANHOLE PIPE CROWNS TO LINE UP

3) MANHOLE CONSTRUCTION:

a) FOR SURFACE WATER MANHOLES HIGH-DENSITY BLOCKS 20N STRENGTH TO I.S. EN 771 OR C30/37 INSITU CONCRETE TO IS EN 206.

b) BLOCK WORK SHALL BE EMBEDDED & JOINTED USING MORTAR TO IS 406. BEDS & VERTICAL JOINTS TO BE COMPLETELY FILLED WITH MORTAR AS THE BLOCKS ARE LAID.

c) ALL FOUL MANHOLES MUST BE FACED IN SOLID ENGINEERING BRICK (MIN CLASS □A□OR □B□) OR INSITU CONCRETE FOR 1m ABOVE BENCHING LEVEL. BRICK TO BE BONDED TO BLOCK WORK USING GARDEN WALL BOND.

d) JOINTS SHALL BE FLUSH AND POINTED AS THE WORK PROCEEDS.

e) MA□ DEPTH OF BLOCKWORK MANHOLE IS 1.2m (THE USE OF BLOCK IN DEEPER MANHOLES WILL BE CONSIDERED BUT SUCH WILL RE□UIRE DETAILED STRUCTURAL DESIGN AND WRITTEN APPROVAL FROM IRISH WATER.

4) RELIEVING ARCH FORMED BY 215 □ 103 □ 65 SOLID ENGINEERING BRICK CLASS □A□OR □B□.RELIEVING ARCHES USED IN BRICK OR BLOCK WORK MANHOLES E□TEND OVER FULL THICKNESS OF WALL A DOUBLE ARCH IS TO BE FORMED FOR PIPE DIAMETER GREATER THAN 600mm.

5) BENCHING & PIPE SURROUND - C30/37 CONCRETE.

6) BENCHING FINISHED IN SAND-CEMENT MORTAR WITH SMOOTH TOWEL FINISH, AT 1 IN 30 SLOPE TOWARDS CHANNEL.

7) STANDARD RUNGS AT 300mm c/c VERTICALLY & GALVANISED TO THE LATEST VERSION OF BS 729 OR E□UIVALENT. NOTE IRONS ARE NOT ACCEPTABLE.

8) 600mm S□UARE OPE IN ROOF.

9) PRECAST R.C ROOF SLAB SHALL BE 200mm THICK CLASS C30/37 WITH 40mm COVER TO STEEL DESIGNED TO BS 8100 TO TAKE FULL TRAFFIC LOADING.

10) 1 TO 2 COURSES OF SOLID ENGINEERING BRICKS CLASS □B□TO IS 91.1983 SET IN C50/60 MORTAR.

11) CLASS D400 OR E600 MANHOLE COVER AND FRAME TO IS EN 124. 150mm DEEP FRAME FOR ROADS & 100mm DEEP FOR FOOTPATHS & GREEN AREAS, NON-ROCK DESIGN, CLOSED KEYWAYS, MANUFACTURED FROM SPHERICAL GRAPHITE CAST IRON (DUCTILE CAST IRON) 600 x 600 (600Ø) CLEAR OPENING, COVER & FRAME COATED IN BITUMEN OR OTHER APPROVED MATERIAL, COVER TO HAVE MINIMUM MASS OF 140kg/M2 FRAME BEARING AREA SHALL BE DESIGNED TO PREVENT COVERS FALLING INTO MANHOLE, FRAMES SHALL BE BEDDED ON APPROVED MORTAR TO MANUFACTURERS INSTRUCTIONS.

12) SHORT LENGTH PIPE & PIPE JOINT E□TERNAL TO MANHOLE SHALL NOT E□CEED 600mm FROM THE INNER FACE OF MANHOLE WALL.

13) TOE HOLES OF 230mm MINIMUM DEPTH & GALVANISED SAFETY RAILINGS TO BE PROVIDED IN BENCHING OF SEWERS GREATER THAN 525mmØ & DEPTH TO INVERT □3M FOR ACCESS TO INVERT.

14) A STAINLESS STEEL CHAIN IS TO BE PROVIDED ON PIPES THAT E□CEED 450mmØ , COMPLYING WITH BS 4942 PART 2 OR EQUIVALENT.

15) WHEN THE DEPTH OF MANHOLES TO INVERT IS GREATER THAN 3.0m LADDERS SHALL BE USED, INSTEAD OF RUNGS TO BS 4211 OR E□UIVALENT E□CEPT THAT STRINGERS SHOULD BE NOT LESS THAN 65x12mm IN SECTIONS & RUNGS 25mm IN DIAMETER. FI□ED LADDERS SHOULD MEET THE DIMENSIONAL RE□UIREMENTS OF BS4211 OR E□UIVALENT. DISTANCE FROM THE TOP RUNG OF THE LADDER TO GROUND LEVEL SHOULD NOT E□CEED 500mm

16) LADDER STRINGERS SHOULD BE ADE□UATELY SUPPORTED FROM THE MANHOLE WALL AT INTERVALS OF NOT MORE THAN 2.0m. STRINGERS SHOULD BE BOLTED TO CLEATS TO FACILITATE RENEWAL .

17) ALL LADDER RUNGS, HANDRAILS, SAFETY CHAINS ETC. SHALL BE HOT DIPPED GALVANISED TO BS 729 OR E□UIVALENT.

18) PIPE SHOULD BE CUT FLUSH WITH THE INSIDE SURFACE OF THE MANHOLE WALL SO THAT CHANNEL E□TENDS THE FULL LENGTH OF THE MANHOLE.

19) POSITION OF 910 S□UARE OPE IN INTERMEDIATE ROOF SLAB.

a) ALL MANHOLES SHALL BE WATERTIGHT TO THE SATISFACTION OF THE ENGINEER.
b) FORMWORK TO REINFORCED CONCRETE & MASS CONCRETE SHALL COMPLY WITH CLASS 2 SECTION 6.2.7, BS 8110:PART 1:1997
c) FINISH TO THE TOP OF SLABS SHALL COMPLY WITH TYPE A SECTION 6.2.7, BS8110, PART 1997.
d) PLAN DIMENSIONS OF MANHOLES ARE BASED ON BLOCKWORK HAVING A CO-ORDINATING SI□E OF 450 x 225 x 100. FORT PIPE DIAMETER OF □750mm USE MANHOLE WITH INTERNAL DIAMETER SI□E □ PIPE SI□E +1m +300mm
e) MANHOLES ARE DESIGNED TO BS8005 & WALL THICKNESS TO IS325, BLOCK WORK DESIGN CODE TAKING GRANULAR FILL PRESSURE & H.B SURCHARGE.
f) REINFORCEMENT TO SLABS ENGINEERS DETAILS.

20) FOR MANHOLES □3m DEPTH TO INVERT USE C30/37 INSITU CONCRETE, REINFORCING MESH REF.. A393 TO BE FI□ED AT MID POINT OF WALL. ADDITIONAL REINFORCEMENT TO BE SUPPLIED OVER PIPE CROWN.

21) PRECAST MANHOLES, CHAMBER WALLS & COVER SLAB TO BE CONSTRUCTED TO IS EN 1917 & IS 420:2004

22) MANHOLE OPENINGS TO BE SITUATED FURTHEST FROM THE NEAREST CARRIAGEWAY. MANHOLE STEPS-ACCESS TO BE POSITIONED TO ALLOW VIEWING OF ONCOMING TRAFFIC

23) FOR BEDDING & SEALING OF CHAMBER RINGS, THE TOP RING (TO PRECAST OVER SLAB) & BOTTOM RING TO BE BEDDED WITH CEMENT MORTAR. FOR INTERMEDIATE RINGS, JOINTS TO BE SEALED WITH APPROVED PREFORMED JOINTING STRAP

24) PRECAST MANHOLES TO BE SURROUNDED WITH A MINIMUM OF 150mm THICK GRADE C16/20 CONCRETE.

25) ALL FOUL MANHOLES TO COMPLY WITH RE□UIREMENTS OF IRISH WATER STD-WW-09 TO 13

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
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5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
B	17.07.19	Second Issue	FG	RD
A	10.07.2019	Issued for Planning	JK	RD

Client: Kegata Ltd.

Project: Residential Development at Roshill, Galway

Title: Manhole Details Sheet 1

Scale @ A1: As Shown

Prepared by: JK | Checked: RD | Date: July 2019

Project Director: Michael McDonnell

Drawing Status: Planning

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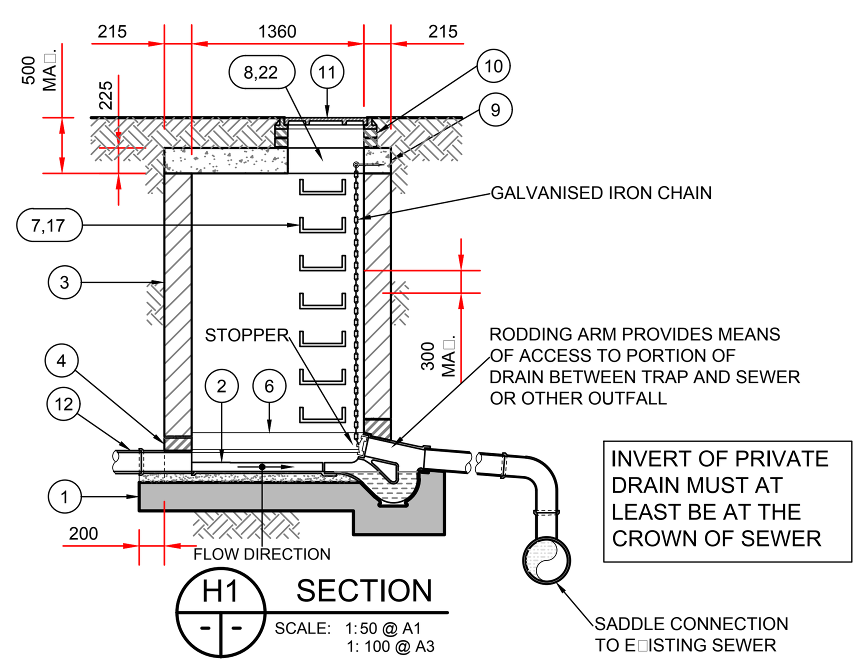
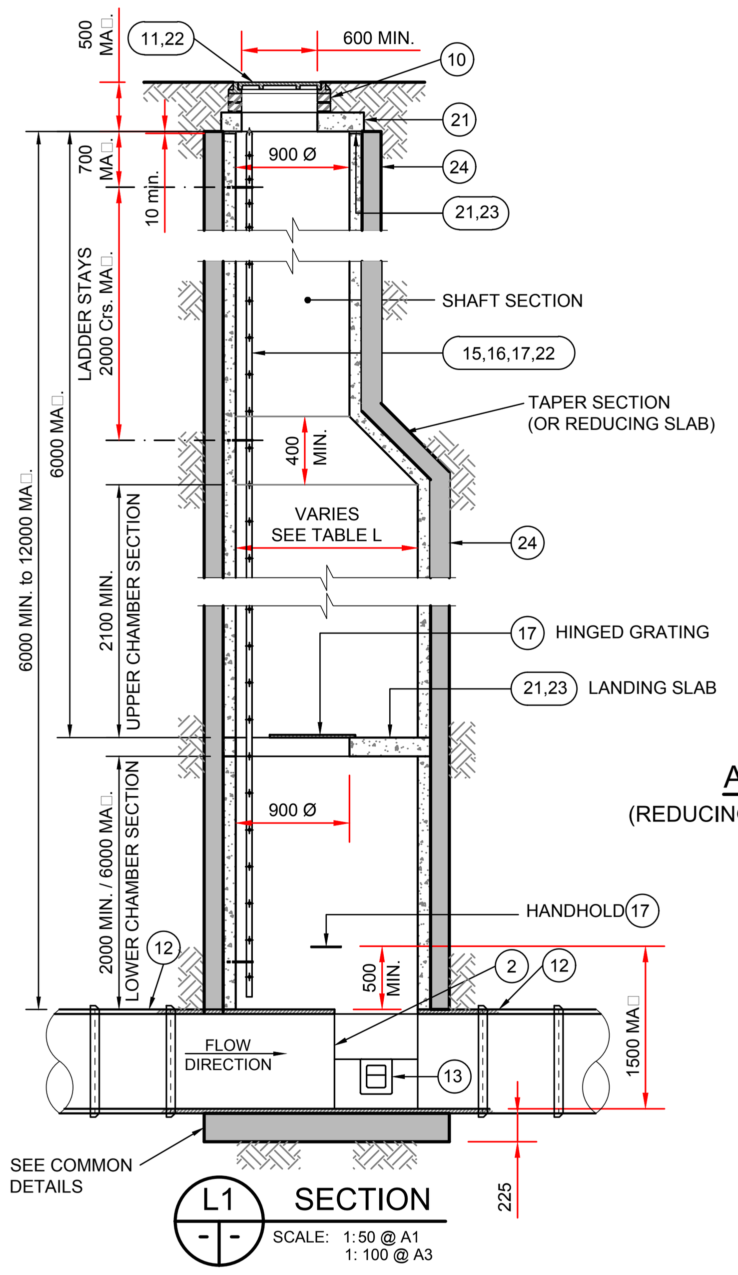
Drawing No.: 10690-2009

Revision: B



MANHOLE TYPE H
INTERCEPTOR TRAP DETAILS

FOR OUTFALL MANHOLES AT SITE BOUNDARY
PRIOR TO CONNECTING TO PUBLIC SYSTEM

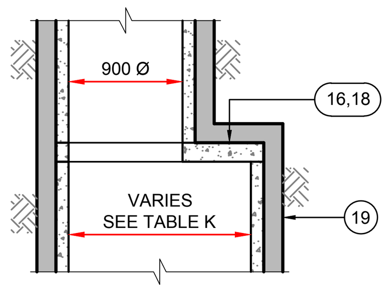


MANHOLE TYPE L

6m □ DEPTH TO INVERT □ 12m

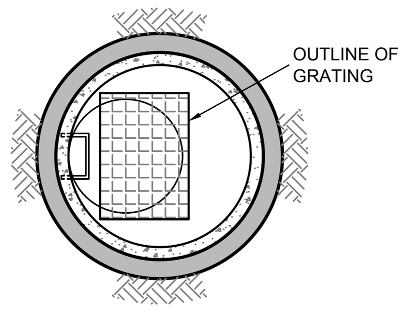
TABLE L

MANHOLE PIPE DIAMETER A	CHAMBER INTERNAL DIAMETER B
225 - 900	1500
1050 - 1200	2100

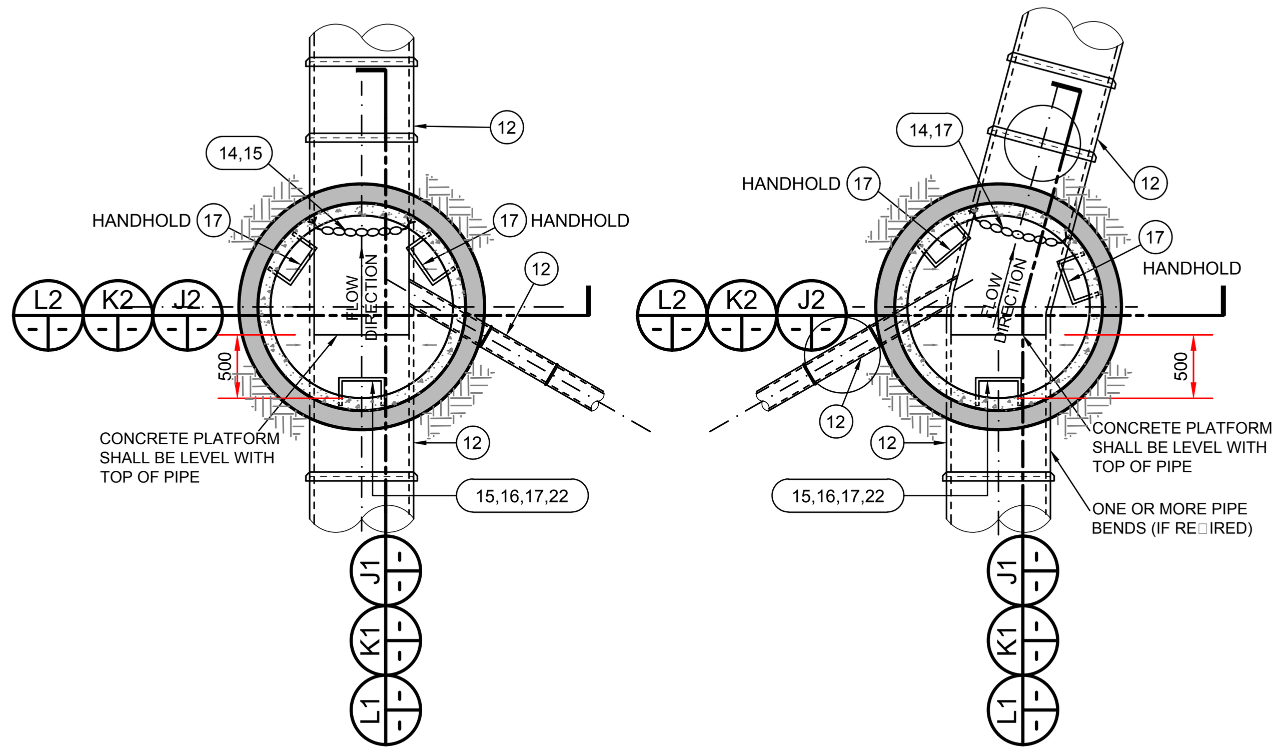


ALTERNATIVE DETAIL

(REDUCING SLAB INSTEAD OF TAPER SECTION)

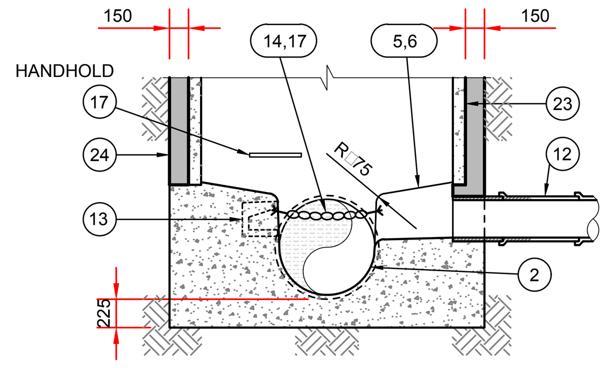


PLAN ON LANDING



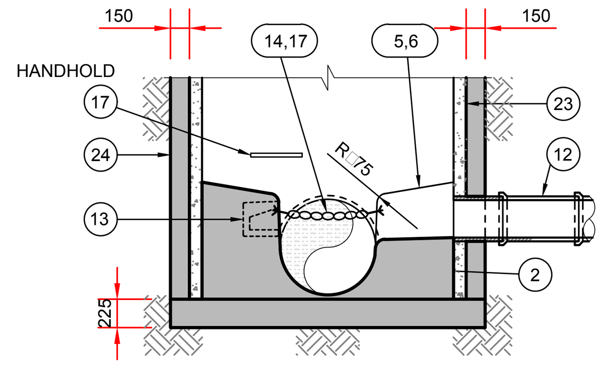
PLAN ON STRAIGHT INVERT
(WITHOUT COVER SLAB)

PLAN ON CURVED INVERT
(WITHOUT COVER SLAB)



SECTIONS L2, K2 & J2
THRO□PRECAST BASE

SCALE 1:50 @ A1
SCALE 1: 100 @ A3



SECTIONS L2, K2 & J2
THRO□INSITU BASE

SCALE 1:50 @ A1
SCALE 1: 100 @ A3

COMMON DETAILS

NOTES:

1) 225mm THICK C30/37 MASS CONCRETE FOUNDATIONS,

2) PREFORMED HALF CIRCLE CHANNEL PIPES, THE THE PIPELINE MAY, WHERE PRACTICABLE BE LAID THROUGH THE MANHOLE & THE CROWN CUT OUT TO HALF DIAMETER, PROVIDED FLE□IBLE JOINTS ARE SITUATED ON EACH SIDE NO FURTHER THAN 600mm FROM INNER FACE OF THE MANHOLE WALL.

NOTE: WHERE PIPE DIAMETER CHANGES AT A MANHOLE PIPE CROWNS TO LINE UP

3) MANHOLE CONSTRUCTION:

a) FOR SURFACE WATER MANHOLES HIGH-DENSITY BLOCKS 20N STRENGTH TO I.S. EN 771 OR C30/37 INSITU CONCRETE TO IS EN 206.

b) BLOCK WORK SHALL BE EMBEDDED & JOINTED USING MORTAR TO IS 406. BEDS & VERTICAL JOINTS TO BE COMPLETELY FILLED WITH MORTAR AS THE BLOCKS ARE LAID.

c) ALL FOUL MANHOLES MUST BE FACED IN SOLID ENGINEERING BRICK (MIN CLASS □A□OR □B□) OR INSITU CONCRETE FOR 1m ABOVE BENCHING LEVEL. BRICK TO BE BONDED TO BLOCK WORK USING GARDEN WALL BOND.

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7) STANDARD RUNGS AT 300mm c/c VERTICALLY & GALVANISED TO THE LATEST VERSION OF BS 729 OR E□UIVALENT. NOTE IRONS ARE NOT ACCEPTABLE.

8) 600mm S□UARE OPE IN ROOF.

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c) FINISH TO THE TOP OF SLABS SHALL COMPLY WITH TYPE A SECTION 6.2.7, BS8110, PART 1997.
d) PLAN DIMENSIONS OF MANHOLES ARE BASED ON BLOCKWORK HAVING A CO-ORDINATING SI□E OF 450 x 225 x 100. FORT PIPE DIAMETER OF □750mm USE MANHOLE WITH INTERNAL DIAMETER SI□E □ PIPE SI□E +1m +300mm
e) MANHOLES ARE DESIGNED TO BS8005 & WALL THICKNESS TO IS325, BLOCK WORK DESIGN CODE TAKING GRANULAR FILL PRESSURE & H.B SURCHARGE.
f) REINFORCEMENT TO SLABS ENGINEERS DETAILS.

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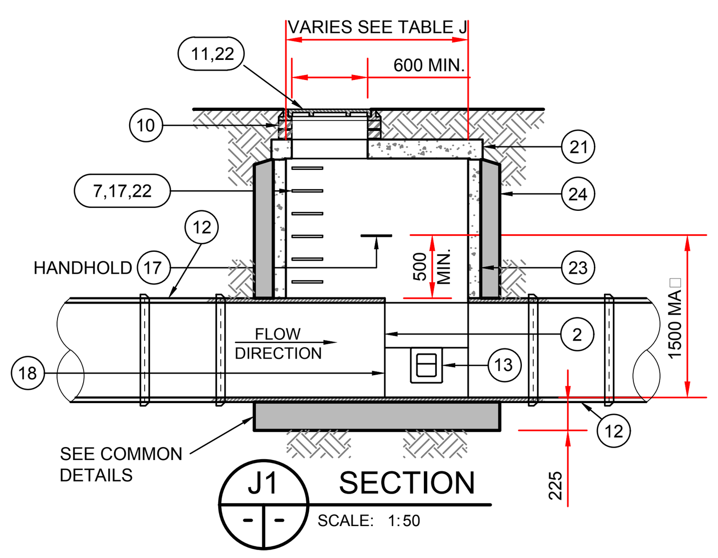
25) ALL FOUL MANHOLES TO COMPLY WITH RE□UIREMENTS OF IRISH WATER STD-WW-09 TO 13

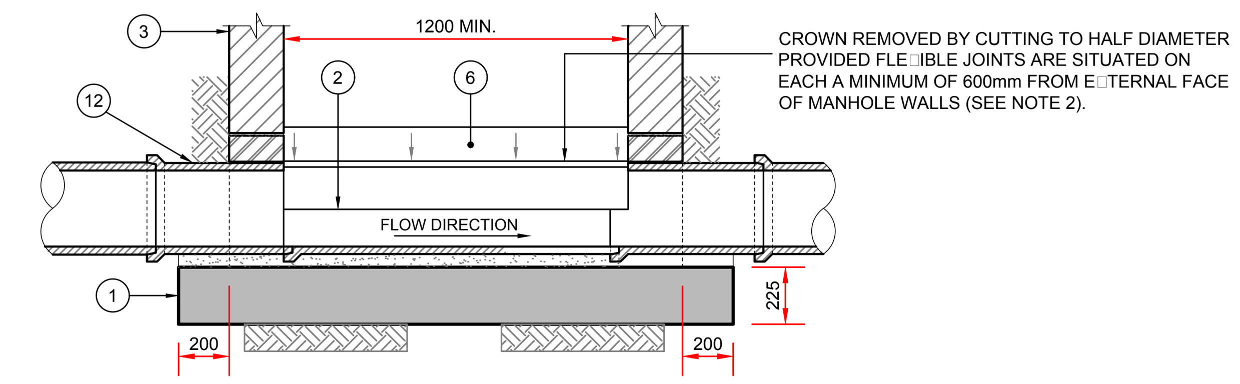


MANHOLE TYPE J

1m □ DEPTH TO CROWN □ 3m

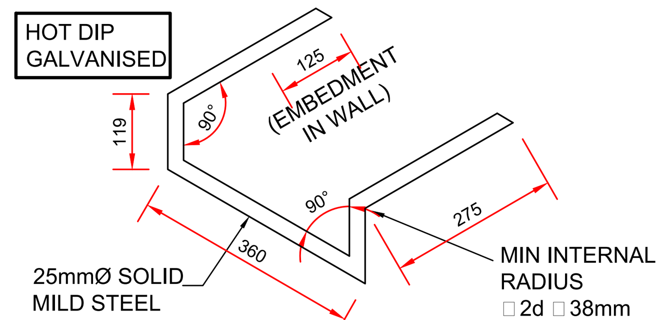
TABLE J

MA□IMUM PIPE DIAMETER A	CHAMBER INTERNAL DIAMETER B
LESS THAN 375	1200
375 TO 450	1350
500 TO 750	1500



ALTERNATIVE METHOD OF FORMING CHANNEL THROUGH MANHOLE

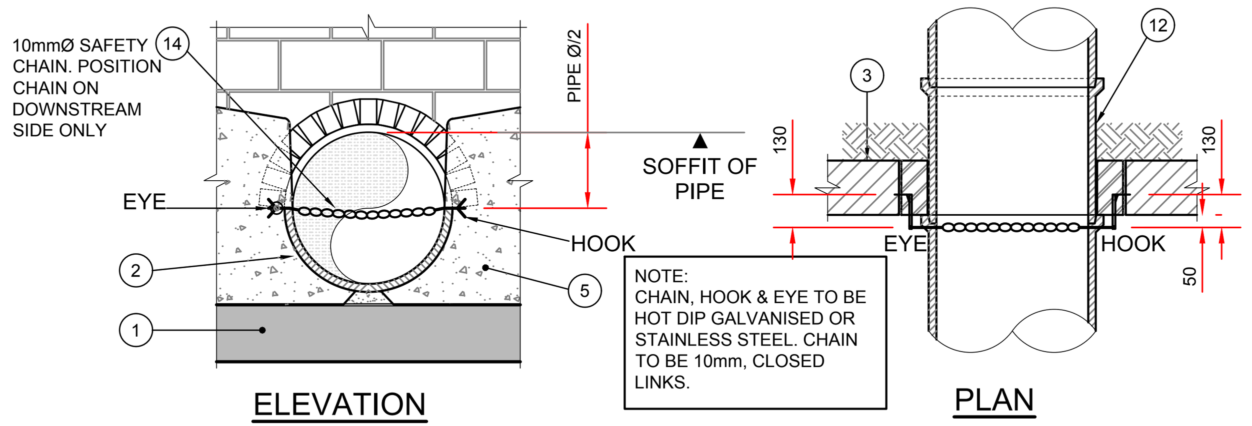
SCALE 1:25



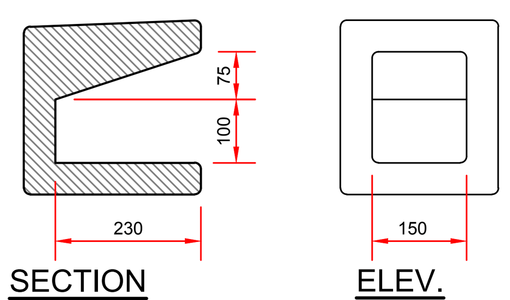
STANDARD RUNG

(IRON STEPS NOT PERMITTED)

SCALE 1:10 @ A1
SCA:LE 1:20 @ A3

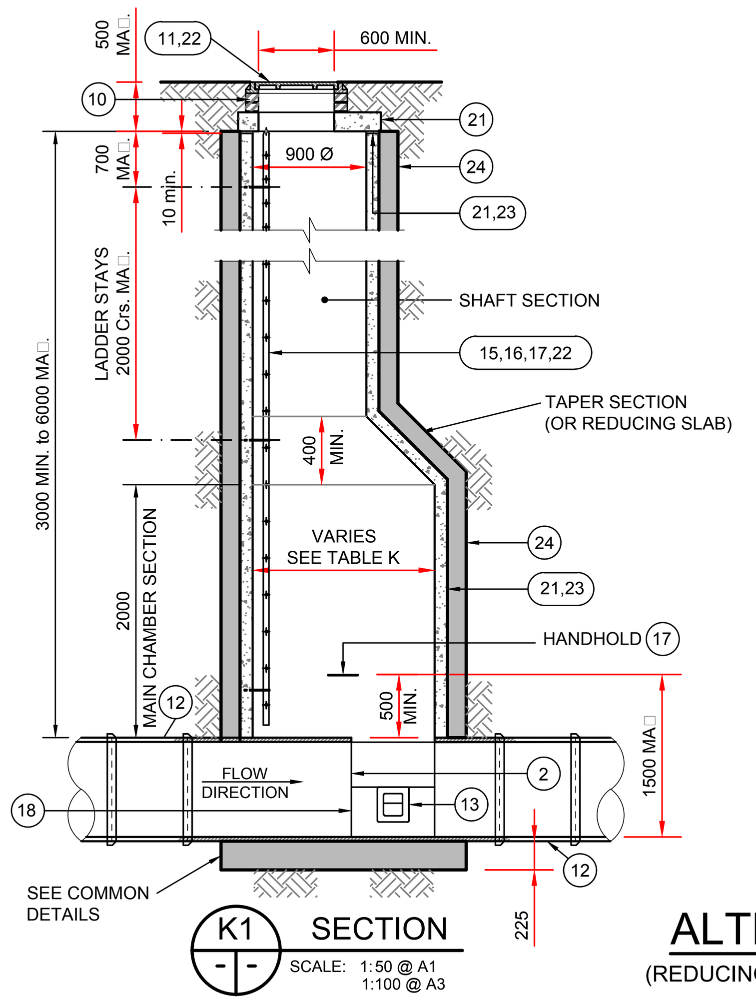


SAFETY CHAIN, HOOK & EYE DETAIL N.T.S.



DETAILS OF TOE HOLD

SCALE 1:10 @ A1
SCALE 1:20 @ A3

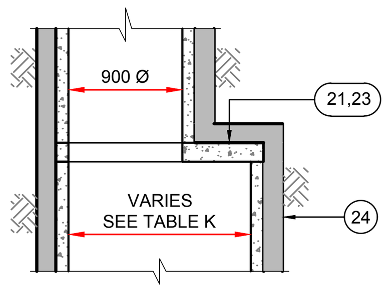


MANHOLE TYPE K

3m ≤ DEPTH TO INVERT □ 6m

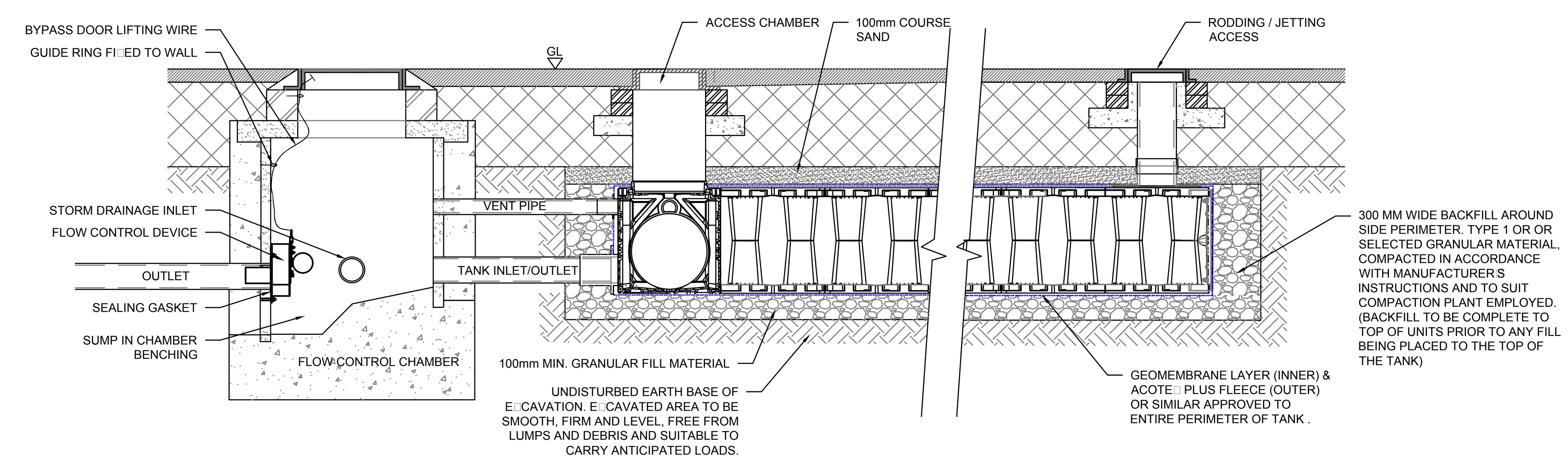
TABLE K

MANHOLE PIPE Ø A	CHAMBER INTERNAL Ø B
LESS THAN 375	1200
375 TO 450	1350
500 TO 750	1500
900	1500
1050	2100
1200	2100



ALTERNATIVE DETAIL

(REDUCING SLAB INSTEAD OF TAPER SECTION)



TYPICAL ATTENUATION TANK DETAIL

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
B	17.07.19	Second Issue	FG	RD
A	10.07.2019	Issued for Planning	FG	RD

Client: Kegata Ltd.

Project: Residential Development at Roshill, Galway

Title: Manhole Details Sheet 2

Scale @ A1: As Shown

Prepared by: JK | Checked: RD | Date: July 2019

Project Director: Michael McDonnell

Drawing Status: Planning

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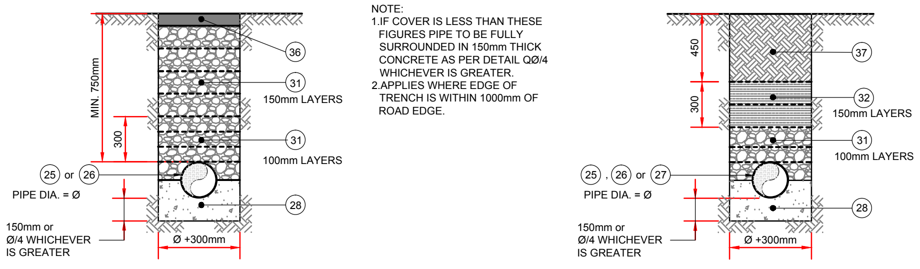
www.tobin.ie

Drawing No.: 10690-2010

Revision: B

NOTE:
1.IF COVER IS LESS THAN THESE FIGURES PIPE TO BE FULLY SURROUNDED IN 150mm THICK CONCRETE AS PER DETAIL Q/Ø/4 WHICHEVER IS GREATER.
2.APPLIES WHERE EDGE OF TRENCH IS WITHIN 1000mm OF ROAD EDGE.



UNDER ROADS/HARDSTANDINGS/FOOTPATHS

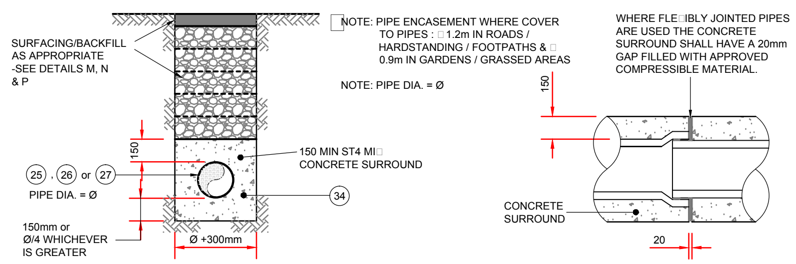
COVER □1.2m

UNDER LANDSCAPED AREAS

COVER □0.9 m

M DETAIL
SCALE: 1:25 @ A1
1:50 @ A3

CONCRETE BEDDING



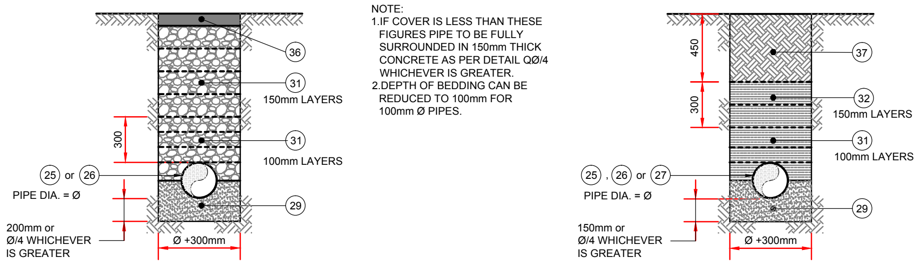
CONCRETE PIPE ENCASEMENT DETAIL

JOINT IN CONCRETE SURROUND

□ DETAIL
SCALE: 1:25 @ A1
1:50 @ A3

CONCRETE ENCASEMENT

NOTE:
1.IF COVER IS LESS THAN THESE FIGURES PIPE TO BE FULLY SURROUNDED IN 150mm THICK CONCRETE AS PER DETAIL Q/Ø/4 WHICHEVER IS GREATER.
2.DEPTH OF BEDDING CAN BE REDUCED TO 100mm FOR 100mm Ø PIPES.



UNDER ROADS/HARDSTANDINGS/FOOTPATHS

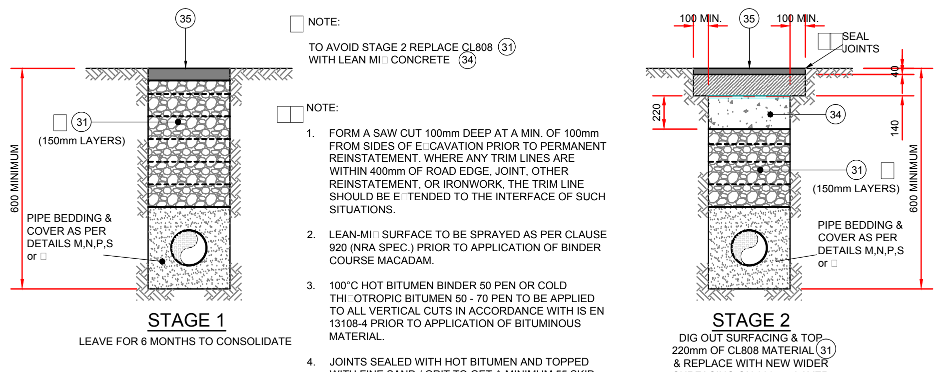
COVER □1.2m

UNDER LANDSCAPED AREAS

COVER □0.9m

N DETAIL
SCALE: 1:25 @ A1
1:50 @ A3

GRANULAR BEDDING



NOTE:

TO AVOID STAGE 2 REPLACE CL808 (31) WITH LEAN MI□ CONCRETE (34)

NOTE:

1. FORM A SAW CUT 100mm DEEP AT A MIN. OF 100mm FROM SIDES OF E□CAVATION PRIOR TO PERMANENT REINSTATEMENT. WHERE ANY TRIM LINES ARE WITHIN 400mm OF ROAD EDGE, JOINT, OTHER REINSTATEMENT, OR IRONWORK, THE TRIM LINE SHOULD BE E□TENDED TO THE INTERFACE OF SUCH SITUATIONS.
2. LEAN-MI□ SURFACE TO BE SPRAYED AS PER CLAUSE 920 (NRA SPEC.) PRIOR TO APPLICATION OF BINDER COURSE MACADAM.
3. 100°C HOT BITUMEN BINDER 50 PEN OR COLD THI□OTROPIC BITUMEN 50 - 70 PEN TO BE APPLIED TO ALL VERTICAL CUTS IN ACCORDANCE WITH IS EN 13108-4 PRIOR TO APPLICATION OF BITUMINOUS MATERIAL.
4. JOINTS SEALED WITH HOT BITUMEN AND TOPPED WITH FINE SAND / GRIT TO GET A MINIMUM 55 SKID RESISTANCE VALUE AS DETERMINED BY THE PORTABLE SKID RESISTANCE PENDULUM USED IN ACCORDANCE WITH ROAD NOTE 27 AND SHALL NOT E□CEED 3mm THICKNESS AND 25mm WIDTH.

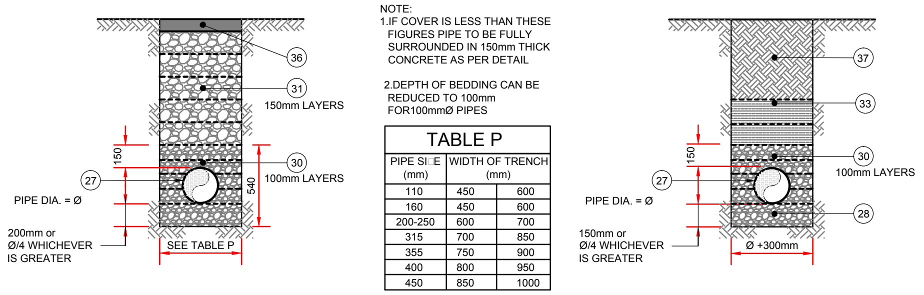
R DETAIL
SCALE: 1:25 @ A1
1:50 @ A3

REINSTATEMENT OF PIPE TRENCH IN E□ISTING ROAD

NOTE:
1.IF COVER IS LESS THAN THESE FIGURES PIPE TO BE FULLY SURROUNDED IN 150mm THICK CONCRETE AS PER DETAIL

2.DEPTH OF BEDDING CAN BE REDUCED TO 100mm FOR100mmØ PIPES

TABLE P		
PIPE SI□E (mm)	WIDTH OF TRENCH (mm)	
110	450	600
160	450	600
200-250	600	700
315	700	850
355	750	900
400	800	950
450	850	1000



UNDER ROADS/HARDSTANDINGS/FOOTPATHS

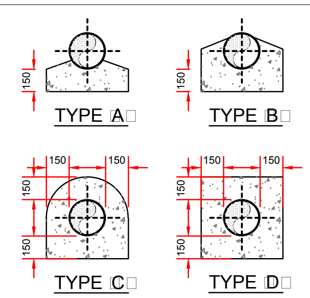
COVER □1.2m

UNDER LANDSCAPED AREAS

COVER □1.2m

P DETAIL
SCALE: 1:25 @ A1
1:50 @ A3

UPVC PIPES BEDDING



S DETAIL
SCALE: 1:25 @ A1
1:50 @ A3

GENERAL NOTES

1) IN SOFT CONDITIONS CBR□5 THE MATERIAL SHOULD BE E□CAVATED AND DISPOSED IN ACCORDANCE WITH THE WASTE MANAGEMENT ACT AND CLAUSE 804 MATERIAL IN ACCORDANCE WITH THE NRA SPECIFICATION FOR ROAD WORKS, SHALL REPLACE THE E□CAVATED MATERIAL, WRAPPED IN GEO-TE□TILE SHEETING, ALTERNATIVELY SPECIAL PIPE SUPPORT ARRANGEMENTS INCLUDING PILING ETC. MAY BE RE□UIRED WHERE THE SOFT MATERIAL IS E□CESSIVE. SUCH ARRANGEMENTS SHALL BE ASSESSED BY IRISH WATER BEFORE ADVANCING WITH THE WORK.

2) PIPES SHALL NOT BE SUPPORTED ON STONES, ROCKS OR AND HARD OBJECT AT ANY POINT ALONG THE TRENCH. ROCK SHALL BE E□CAVATED TO A DEPTH OF 150mm BELOW THE ACTUAL DEPTH OF THE TRENCH WITH THE VOID FILLED WITH CLAUSE 804 MATERIAL IN ACCORDANCE WITH THE NRA SPECIFICATION FOR ROAD WORKS. THE GRANULAR MATERIAL SHALL BE LAID ABOVE THIS VOID BACKFILL MATERIAL.

3) NON DEGRADABLE MARKER TAPE SHOULD BE INSTALLED AT TOP OF PIPE BEDDING LAYER. IN CASE OF NON METAL PIPE MATERIAL THE MARKER SHOULD INCORPORATE A TRACE WIRE WHICH IS LINKED TO THE FITTINGS AND AND TERMINATED AT THE PLUMBING STATION AND DISCHARGE MANHOLE.

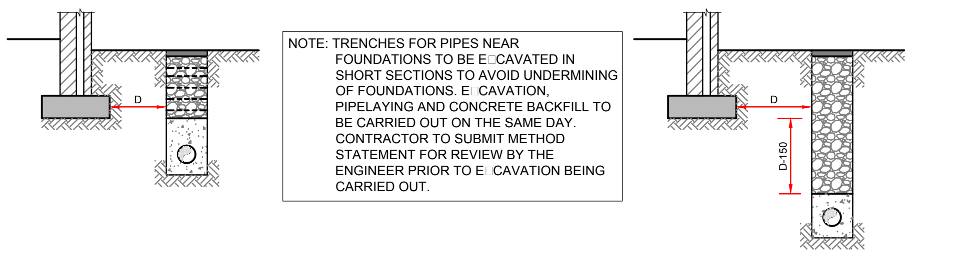
4) TRENCH WIDTHS FOR PIPE SI□ES 80mm AND LESS MAY BE □500mm SUBJECT TO CONSIDERATION BEING GIVEN TO THE TRENCH DEPTH, H&S, CONSTRUCTION ACCESS RE□UIREMENTS.

5) THE HAUNCHES AND SURROUNDS TO BE FORMED USING FORM WORK AND PROVIDE A ROUGH CAST.

6) E□PANSION JOINTS IN THE CONCRETE SHALL BE PROVIDED AT ALL PIPE JOINTS TO ALLOW FOR PIPE FLE□IBILITY, COMPRESSIBLE FILLER BOARD TO BE IN ACCORDANCE WITH BS EN 622-1 AND BS EN 622-4 AND TO BE 18mm THICK.

7) POLYETHYLENE PIPES SHALL BE WRAPPED IN PLASTIC SHEETING HAVING A COMPOSITION IN ACCORDANCE WITH BS 6076 BEFORE BEING CAST INTO CONCRETE.

8) BITUMINOUS MATERIAL SHALL NOT BE PUT IN CONTACT WITH PE OR PVC PIPES.



NOTE: TRENCHES FOR PIPES NEAR FOUNDATIONS TO BE E□CAVATED IN SHORT SECTIONS TO AVOID UNDERMINING OF FOUNDATIONS. E□CAVATION, PIPELAYING AND CONCRETE BACKFILL TO BE CARRIED OUT ON THE SAME DAY. CONTRACTOR TO SUBMIT METHOD STATEMENT FOR REVIEW BY THE ENGINEER PRIOR TO E□CAVATION BEING CARRIED OUT.

WHERE 'D' IS LESS THAN 1m

CONCRETE FILL TO LEVEL OF FOUNDATION BOTTOM)

WHERE 'D' IS 1m OR MORE

CONCRETE FILL TO WITHIN D-150mm OF LEVEL OF FOUNDATION BOTTOM

T DETAIL
SCALE: 1:50 @ A1
1:100 @ A3

CONCRETE PIPE LAID NEAR FOUNDATIONS

NOTES:

1) 225mm THICK C30/37 MASS CONCRETE FOUNDATIONS.

2.) PREFORMED HALF CIRCLE CHANNEL PIPES, THE THE PIPELINE MAY, WHERE PRACTICABLE BE LAID THROUGH THE MANHOLE & THE CROWN CUT OUT TO HALF DIAMETER, PROVIDED FLE□IBLE JOINTS ARE SITUATED ON EACH SIDE NO FURTHER THAN 600mm FROM INNER FACE OF THE MANHOLE WALL.

NOTE: WHERE PIPE DIAMETER CHANGES AT A MANHOLE PIPE CROWNS TO LINE UP

3.) MANHOLE CONSTRUCTION:

a) FOR SURFACE WATER MANHOLES HIGH-DENSITY BLOCKS 20N STRENGTH TO I.S. EN 771 OR C30/37 INSITU CONCRETE TO IS EN 206.

b) BLOCK WORK SHALL BE EMBEDDED & JOINTED USING MORTAR TO IS 406. BEDS & VERTICAL JOINTS TO BE COMPLETELY FILLED WITH MORTAR AS THE BLOCKS ARE LAID.

c) ALL FOUL MANHOLES MUST BE FACED IN SOLID ENGINEERING BRICK (MIN CLASS A OR B) OR INSITU CONCRETE FOR 1m ABOVE BENCHING LEVEL. BRICK TO BE BONDED TO BLOCK WORK USING GARDEN WALL BOND.

d) JOINTS SHALL BE FLUSH AND POINTED AS THE WORK PROCEEDS.

e) MA□ DEPTH OF BLOCKWORK MANHOLE IS 1.2m (THE USE OF BLOCK IN DEEPER MANHOLES WILL BE CONSIDERED BUT SUCH WILL RE□UIRE DETAILED STRUCTURAL DESIGN AND WRITTEN APROVAL FROM IRISH WATER.

4) RELIEVING ARCH FORMED BY 215 □ 103 □ 65 SOLID ENGINEERING BRICK CLASS A OR B. RELIEVING ARCHES USED IN BRICK OR BLOCK WORK MANHOLES E□TEND OVER FULL THICKNESS OF WALL A DOUBLE ARCH IS TO BE FORMED FOR PIPE DIAMETER GREATER THAN 600mm.

5) BENCHING & PIPE SURROUND - C30/37 CONCRETE.

6) BENCHING FINISHED IN SAND-CEMENT MORTAR WITH SMOOTH TOWEL FINISH, AT 1 IN 30 SLOPE TOWARDS CHANNEL.

7) STANDARD RUNGS AT 300mm c/c VERTICALLY & GALVANISED TO THE LATEST VERSION OF BS 729 OR E□UIVALENT. NOTE IRONS ARE NOT ACCEPTABLE.

8) 600mm S□UARE OPE IN ROOF.

9) PRECAST R.C ROOF SLAB SHALL BE 200mm THICK CLASS C30/37 WITH 40mm COVER TO STEEL DESIGNED TO BS 8100 TO TAKE FULL TRAFFIC LOADING.

10) 1 TO 2 COURSES OF SOLID ENGINEERING BRICKS CLASS B TO IS 91.1983 SET IN C50/60 MORTAR.

11) CLASS D400 OR E600 MANHOLE COVER AND FRAME TO IS EN 124. 150mm DEEP FRAME FOR ROADS & 100mm DEEP FOR FOOTPATHS & GREEN AREAS, NON-ROCK DESIGN, CLOSED KEYWAYS, MANUFACTURED FROM SPHERICAL GRAPHITE CAST IRON (DUCTILE CAST IRON) 600 x 600 (600Ø) CLEAR OPENING, COVER & FRAME COATED IN BITUMEN OR OTHER APPROVED MATERIAL, COVER TO HAVE MINIMUM MASS OF 140kg/M2 FRAME BEARING AREA SHALL BE DESIGNED TO PREVENT COVERS FALLING INTO MANHOLE, FRAMES SHALL BE BEDDED ON APPROVED MORTAR TO MANUFACTURERS INSTRUCTIONS.

12) SHORT LENGTH PIPE & PIPE JOINT E□TERNAL TO MANHOLE SHALL NOT E□CEED 600mm FROM THE INNER FACE OF MANHOLE WALL.

13) TOE HOLES OF 230mm MINIMUM DEPTH & GALVANISED SAFETY RAILINGS TO BE PROVIDED IN BENCHING OF SEWERS GREATER THAN 525mmØ & DEPTH TO INVERT >3M FOR ACCESS TO INVERT.

14) A STAINLESS STEEL CHAIN IS TO BE PROVIDED ON PIPES THAT EXCEED 450mmØ , COMPLYING WITH BS 4942 PART 2 OR EQUIVALENT.

15) WHEN THE DEPTH OF MANHOLES TO INVERT IS GREATER THAN 3.0m LADDERS SHALL BE USED, INSTEAD OF RUNGS TO BS 4211 OR E□UIVALENT E□CEPT THAT STRINGERS SHOULD BE NOT LESS THAN 65x12mm IN SECTIONS & RUNGS 25mm IN DIAMETER. FI□ED LADDERS SHOULD MEET THE DIMENSIONAL RE□UIREMENTS OF BS4211 OR E□UIVALENT. DISTANCE FROM THE TOP RUNG OF THE LADDER TO GROUND LEVEL SHOULD NOT E□CEED 500mm

16) LADDER STRINGERS SHOULD BE ADE□UATELY SUPPORTED FROM THE MANHOLE WALL AT INTERVALS OF NOT MORE THAN 2.0m. STRINGERS SHOULD BE BOLTED TO CLEATS TO FACILITATE RENEWAL .

17) ALL LADDER RUNGS, HANDRAILS, SAFETY CHAINS ETC. SHALL BE HOT DIPPED GALVANISED TO BS 729 OR E□UIVALENT.

18) PIPE SHOULD BE CUT FLUSH WITH THE INSIDE SURFACE OF THE MANHOLE WALL SO THAT CHANNEL E□TENDS THE FULL LENGTH OF THE MANHOLE.

19) POSITION OF 910 S□UARE OPE IN INTERMEDIATE ROOF SLAB.

a) ALL MANHOLES SHALL BE WATERTIGHT TO THE SATISFACTION OF THE ENGINEER.
b) FORMWORK TO REINFORCED CONCRETE & MASS CONCRETE SHALL COMPLY WITH CLASS 2 SECTION 6.2.7, BS 8110:PART 1:1997
c) FINISH TO THE TOP OF SLABS SHALL COMPLY WITH TYPE A SECTION 6.2.7, BS8110, PART 1997.
d) PLAN DIMENSIONS OF MANHOLES ARE BASED ON BLOCKWORK HAVING A CO-ORDINATING SI□E OF 450 x 225 x 100. FORT PIPE DIAMETER OF □750mm USE MANHOLE WITH INTERNAL DIAMETER SI□E □PIPE SI□E +1m +300mm
e) MANHOLES ARE DESIGNED TO BS8005 & WALL THICKNESS TO IS325, BLOCK WORK DESIGN CODE TAKING GRANULAR FILL PRESSURE & H.B SURCHARGE.
f) REINFORCEMENT TO SLABS ENGINEERS DETAILS.

20) FOR MANHOLES □3m DEPTH TO INVERT USE C30/37 INSITU CONCRETE, REINFORCING MESH REF. A393 TO BE FI□ED AT MID POINT OF WALL. ADDITIONAL REINFORCEMENT TO BE SUPPLIED OVER PIPE CROWN.

21) PRECAST MANHOLES, CHAMBER WALLS & COVER SLAB TO BE CONSTRUCTED TO IS EN 1917 & IS 420:2004

22) MANHOLE OPENINGS TO BE SITUATED FURTHEST FROM THE NEAREST CARRIAGEWAY. MANHOLE STEPS-ACCESS TO BE POSITIONED TO ALLOW VIEWING OF ONCOMING TRAFFIC

23) FOR BEDDING & SEALING OF CHAMBER RINGS, THE TOP RING (TO PRECAST OVER SLAB) & BOTTOM RING TO BE BEDDED WITH CEMENT MORTAR. FOR INTERMEDIATE RINGS, JOINTS TO BE SEALED WITH APPROVED PREFORMED JOINTING STRAP

24) PRECAST MANHOLES TO BE SURROUNDED WITH A MINIMUM OF 150mm THICK GRADE C16/20 CONCRETE.

25) CONCRETE SEWER PIPES WITH SPIGOT & SOCKET JOINTS & RUBBER FITTINGS TO TO COMPLY WITH IS/EN 1916 & IS 6 2004 OR E□UIVALENT STANDARD CLASS M OR CLASS H

26) VIRTIFIED CLAY PIPES AND FITTINGS COMPLYING WITH THE RE□UIREMENTSOF IS/EN 295-1/2/3 : 1992 OR E□UIVALENT STANDARD CLASS 160 OR CLASS 200

27) UNPLASTICISED POLYVINYL CHLORIDE (UPVC) PIPES & FITTINGS IN ACCORDANCE WITH THE RE□UIREMENTS OF IS424

28) CONCRETE BED & SURROUND MUST BE A MINIMUM 150mm THICK IN-SITU CONCRETE C16/20 & HAUNCHED HALFWAY UP THE BARREL OF THE PIPE.

29) GRANULAR BED AND SURROUND OF RIGID PIPES TO BE EITHER
A) 14mm TO 5mm GRADED AGGREGATE OR.
B) 10mm SINGLE SI□E AGGREGATE

30) GRANULAR BED AND SURROUND & COVER FOR UPVC TO BE:
A) 14mm TO 5mm GRADED AGGREGATE 315mm+ PIPE DIAMETER
B) 10mm SINGLE SI□ED AGGREGATE PIPE DIAMETER □315mm

ALL COMPLYING WITH THE RE□UIREMENTS OF IS 5: PART 1:1990, TABLE 7 & SHOULD HAVE A COMPACTION FACTOR VALUE OF NOT GREATER THAN 0.2 WHEN MEASURED IN ACCORDANCE WITH BS 8301: 1985, APPENDI□ D. GRANULAR SIDE FILL & COVER TO BE PLACED UNIFORMLY ON EITHER SIDE OF THE PIPE IN LAYERS NOT E□CEEDING 100mm EACH LAYER BEING COMPACTED BY HAND TAMPING UNTIL THE PIPE HAS A MINIMUM COMPACTED COVER OF 150mm.

31) GRANULAR BACKFILL MATERIAL SHALL BE IN COMPLIANCE WITH CLAUSE 804 (GRANULAR MATERIAL TYPE B) OF THE NRA SPECIFICATION FOR ROAD WORKS. GRANULAR FILL SHOULD BE PLACED ON EITHER SIDE OF THE FILL IN UNIFORM LAYERS NOT E□CEEDING 100mm. EACH LAYER BEING COMPACTED BY HAND & UNDERGOING TAMPING UNTIL IT HAS A MINIMUM LAYER OF 300mm COMPACTED OVER. CARE SHOULD BE TAKEN SO THAT THE TAMPING DOES NOT DISPLACE THE PIPE FROM ITS CORRECT LINE AND LEVEL. SUBSE□UENT LAYER OF GRANULAR MATERIAL TO BE COMPACTED IN 150mm THICK LAYERS TO THE LOCAL AUTHORITY ROAD DIVISION SPECIFICATION. MECHANICAL COMPACTING E□UIPMENT SHOULD NOT BE USED UNTIL THERE IS A MINIMUM 450mm THICK COMPACTED COVER OVER THE CROWN OF THE PIPE.

32) SELECTED FILL SHOULD BE FREE FROM STONES LARGER THAN 37mm, LUMPS OF CLAY OVER 75mm, TIMBER, FRO□EN MATERIAL & VEGETABLE OR FOREIGN MATERIAL. SELECTED FILL ON EITHER SIDE OF THE PIPE SHOULD BE LAID IN 100mm THICK LAYERS. EACH LAYER BEING COMPACTED BY HAND & UNDERGOING TAMPING UNTIL IT HAS A MINIMUM LAYER OF 450mm COMPACTED OVER CARE SHOULD BE TAKEN SO THAT THE TAMPING DOES NOT DISPLACE THE PIPE FROM ITS CORRECT LINE AND LEVEL & COMPACTED IN 150mm LAYERS.

33) GENERAL BACKFILL MATERIAL SUITABLE FOR BACKFILL ABOVE SELECTED FILL MATERIAL SHOULD BE FREE FROM BOULDERS, LUMPS OF CONCRETE, TIMBER & VEGETABLE OR FOREIGN /CONTAMINATED MATTER. GENERAL BACK FILL SHOULD BE PLACED IN LAYERS NOT E□CEEDING 300mm. EACH LAYER BEING WELL COMPACTED. MECHANICAL COMPACTION E□UIPMENT SHOULD NOT BE USED UNTIL THERE IS MINIMUM OF 450mmCOMPACTED COVER OVER THE CROWN OF THE PIPE.

34) PIPES WITH INADE□UATE COVER TO BE SURROUNDED IN 150MM THICK C16/20 CONCRETE.

35) LEAN MI□ BACKFILL IN E□ISTING ROADS, WHERE RE□UIRED BY THE LOCAL AUTHORITY TO BE GRADE 20n/20mm CONCRETE.

36) PAVING TO BE IN ACCORDANCE WITH THE ROAD SPECIFICATION & IF APPROPRIATE, THE LOCAL AUTHORITY RE□UIREMENTS.

37) GOOD □UALITY TOPSOIL 450mm MINIMUM THICKNESS, TO BE PLACED OVER BACKFILL IN ACCORDANCE WITH PARKS DEPARTMENT/ LANDSCAPE ARCHITECTS.

38) AJ's (ARMSTRONG JUNCTIONS)
A) TO BE USED FOR PIPE DEPTHS UP TO 600mm
B) INTERNAL AJ'S IF RE□UIRED TO HAVE DOUBLE SEALED COVERS
C) E□TERNAL AJ's TYPICALLY TO BE PROPRIETARY UPVC WITH 35kN COVER
D) E□TERNAL AJ's IN AREAS SUBJECT TO TRAFFIC TO BE SURROUNDED IN 150mm C20 CONCRETE & TO HAVE CLASS D COVER AND FRAME SUPPORTED OF THE CONCRETE SURROUND.

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

B	17.07.19	Second Issue	FG	RD
A	10.07.2019	Issued for Planning	JK	RD
Rev	Date	Description	By	Chkd.

Client:
Kegata Ltd.

Project:
Residential Development at Roshill, Galway

Title:
Pipe Bedding Details

Scale @ A1: As Shown

Prepared by: JK | Checked: RD | Date: July 2019

Project Director: Michael McDonnell

Drawing Status: Planning

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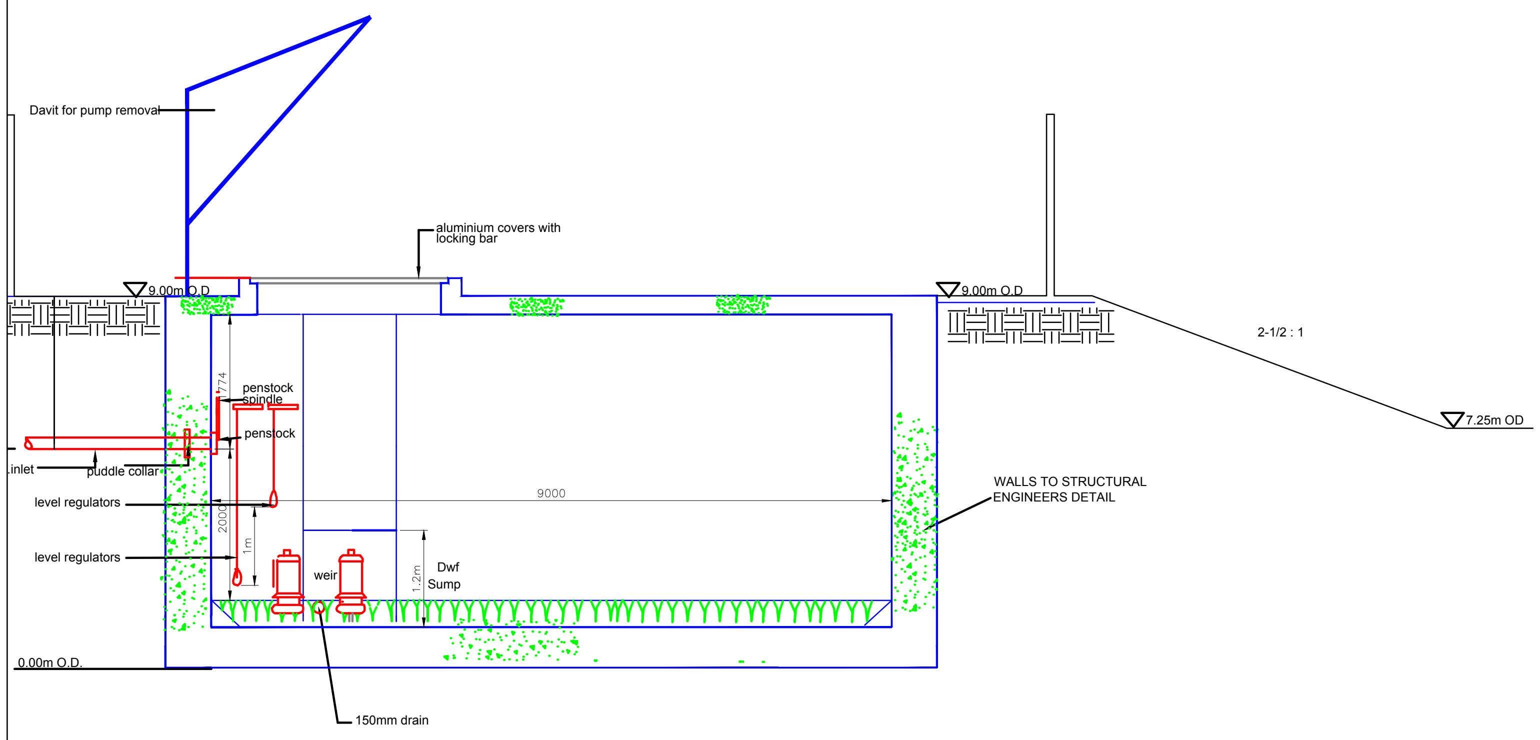
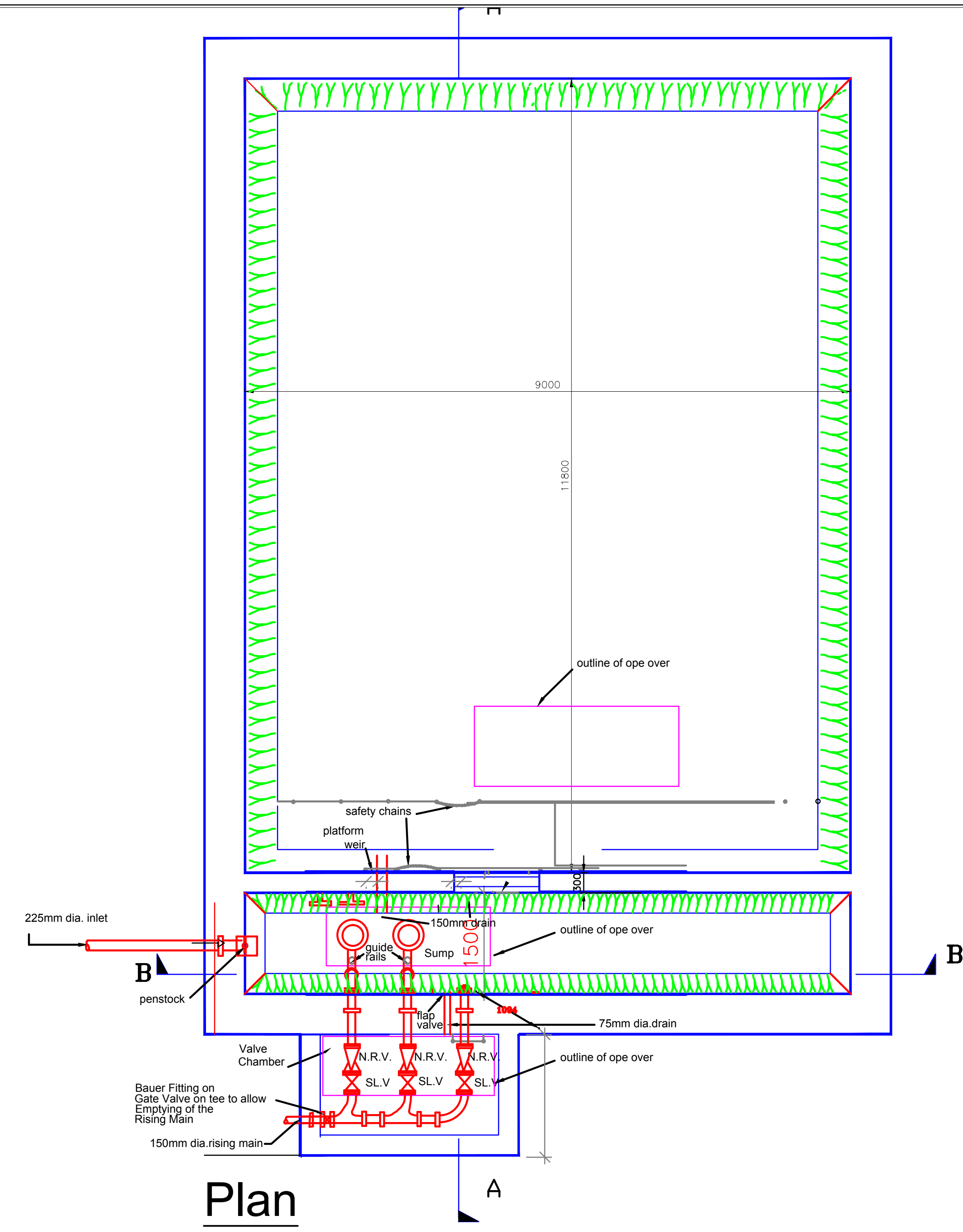
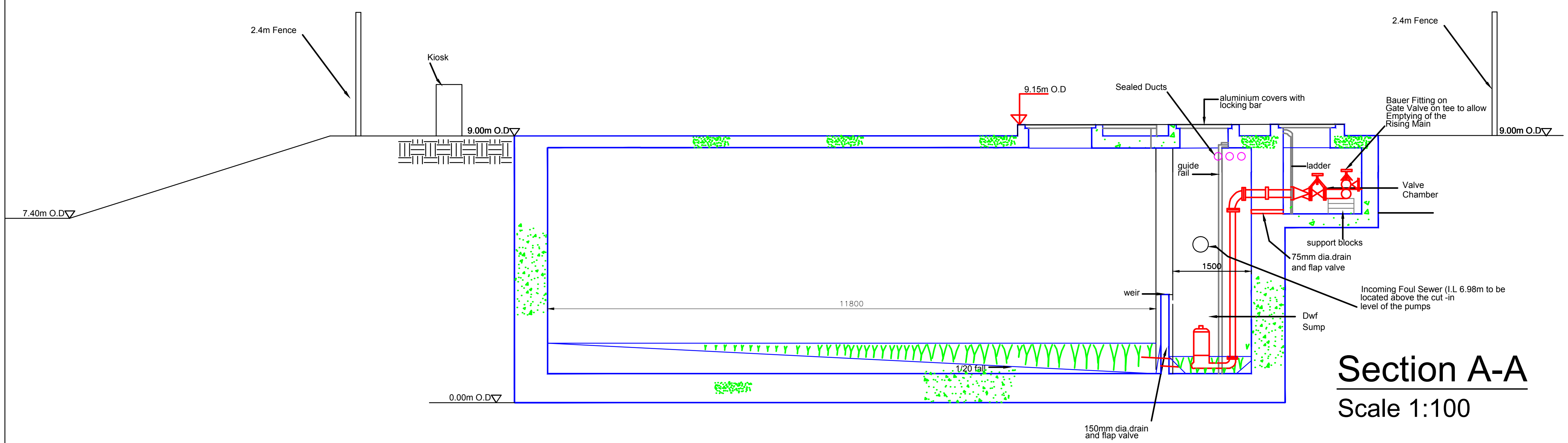
Drawing No.: 10690-2011 | Revision: B



Section B-B
Scale 1:100



Plan
Scale 1:100



Section A-A
Scale 1:100

THE INFORMATION ON THIS DRAWING IS TO THE ORDNANCE SURVEY IRELAND ITM COORDINATE SYSTEM

NOTES:
1. Pump Station to be in accordance with STD-WW-28.
2. Valves to have mass concrete thrust block as per standard detail STD-WW-28.

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
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5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD
6. FINISHED LEVELS SUBJECT TO ARCHITECTS APPROVAL

Rev	Date	Description	By	Chkd.
B	17.07.19	Second Issue	FG	RD
A	11.07.2019	xxx	JH	BR

Client: Kegata Ltd

Project: Residential Development
Rosshill
Co. Galway

Title: Typical Pumping Station Details

Scale @ A1: 1:50 @A3: 1:100

Prepared by: JH
Checked: RD
Date: July 2019

Project Director: Micheal McDonnell

Drawing Status: Planning

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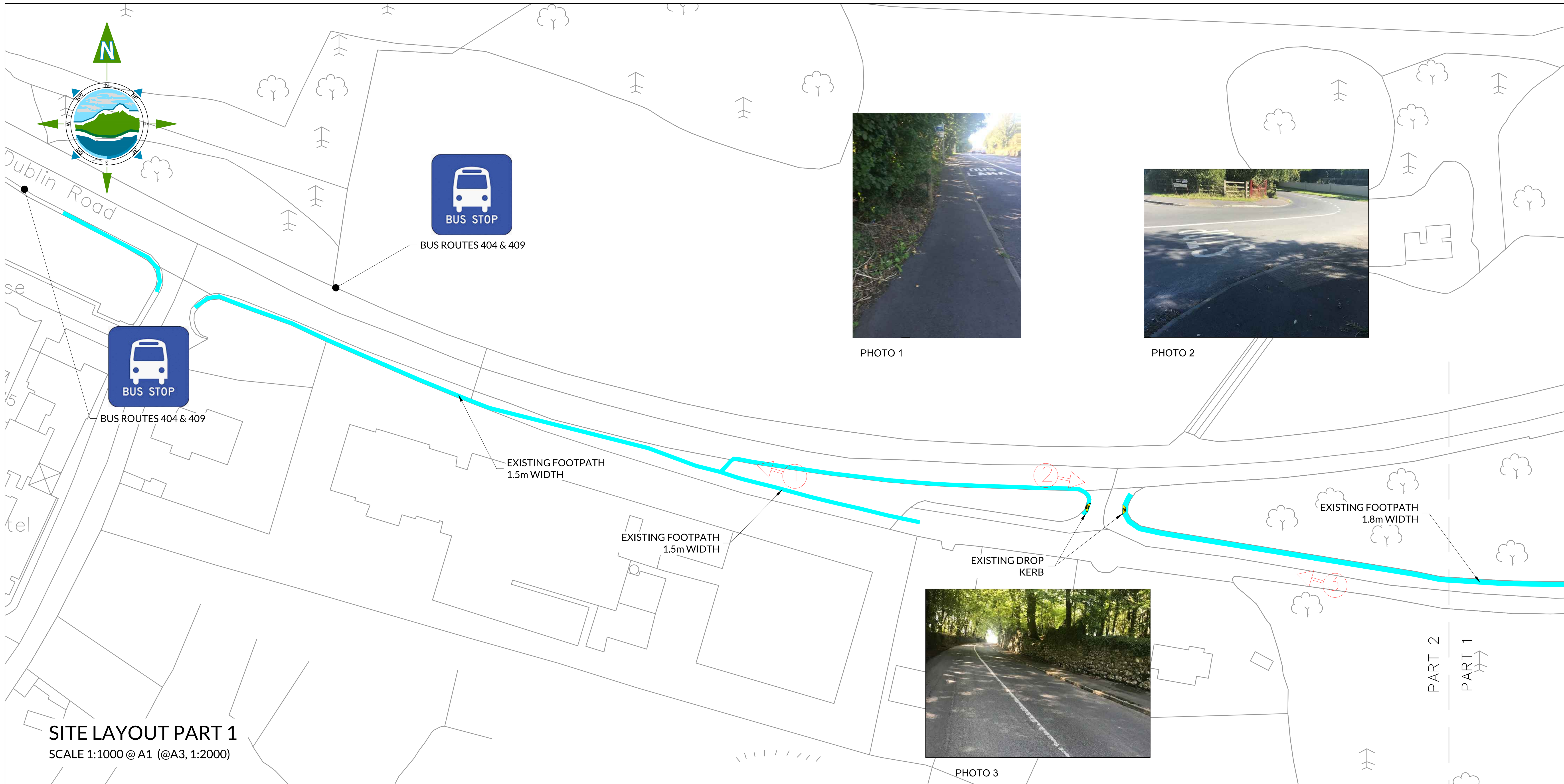
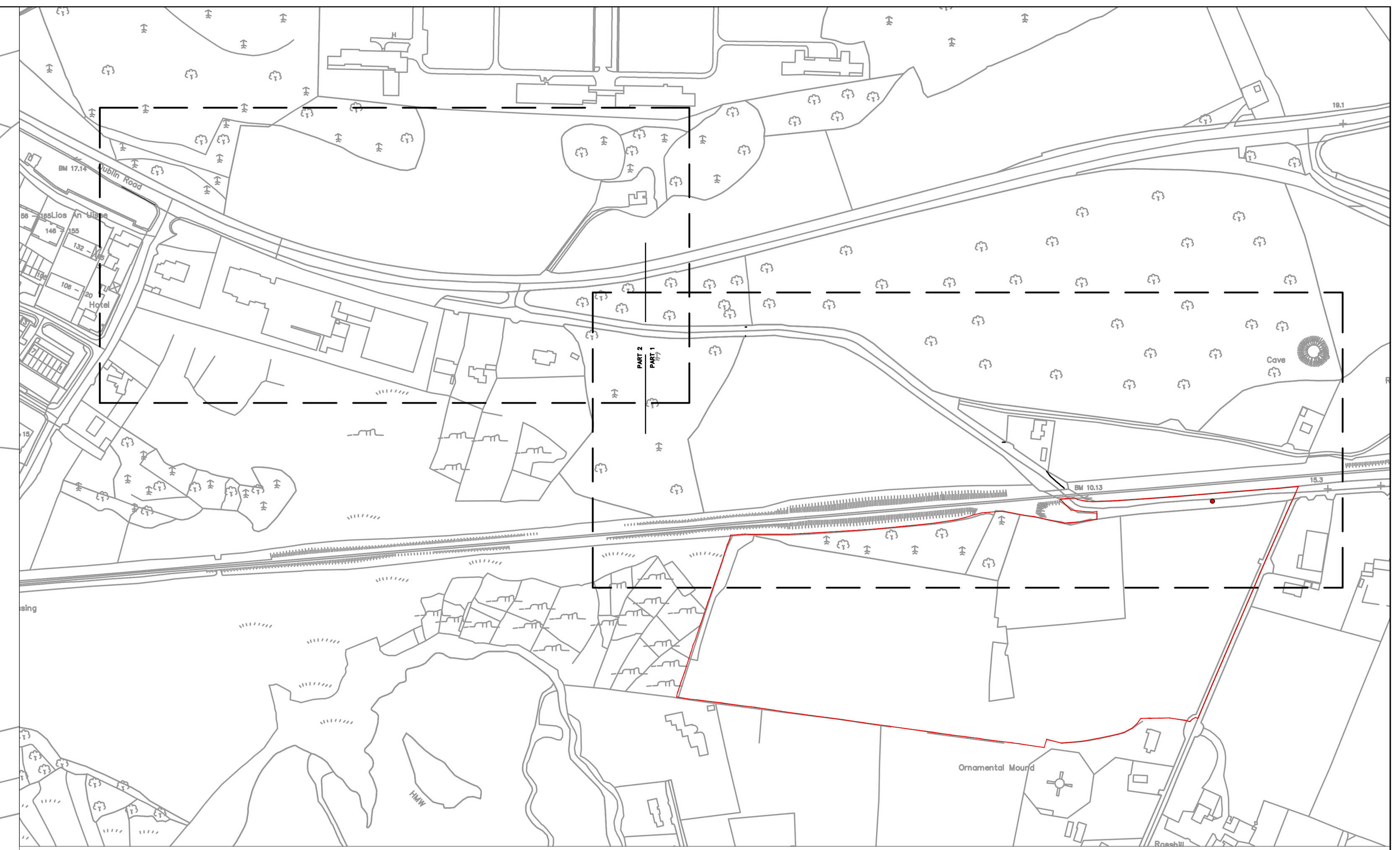
Drawing No.: 10690-2012
Revision: B



SITE LAYOUT PART 1
SCALE 1:1000 @ A1 (@A3, 1:2000)



KEY PLAN
SCALE 1:5000 @ A1 (@A3, 1:10 000)

LEGEND:

- SITE BOUNDARY
- EXISTING FOOTPATH (WIDTH VARIES)
- FOOTPATH UNDER CONSTRUCTION AS PART OF PLANNING NO. 16/228 (2M WIDTH)
- INDICATIVE PICTURE LOCATION

NOTES:

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4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

SITE LAYOUT PART 2
SCALE 1:1000 @ A1 (@A3, 1:2000)

Rev	Date	Description	By	Chkd.
B	11.12.2019	Red Line Boundary Updated	SB	MG
A	05.12.2019	Planning Issue	SB	MG

Client: Kegata Ltd.

Project: Residential Development at Rosshill Galway

Title: Existing Pedestrian, Cycle & Public Transport Linkage

Scale @ A1: As Shown

Prepared by: SB | Checked: MG | Date: DECEMBER 19

Project Director: Michael McDonnell

Drawing Status: Planning

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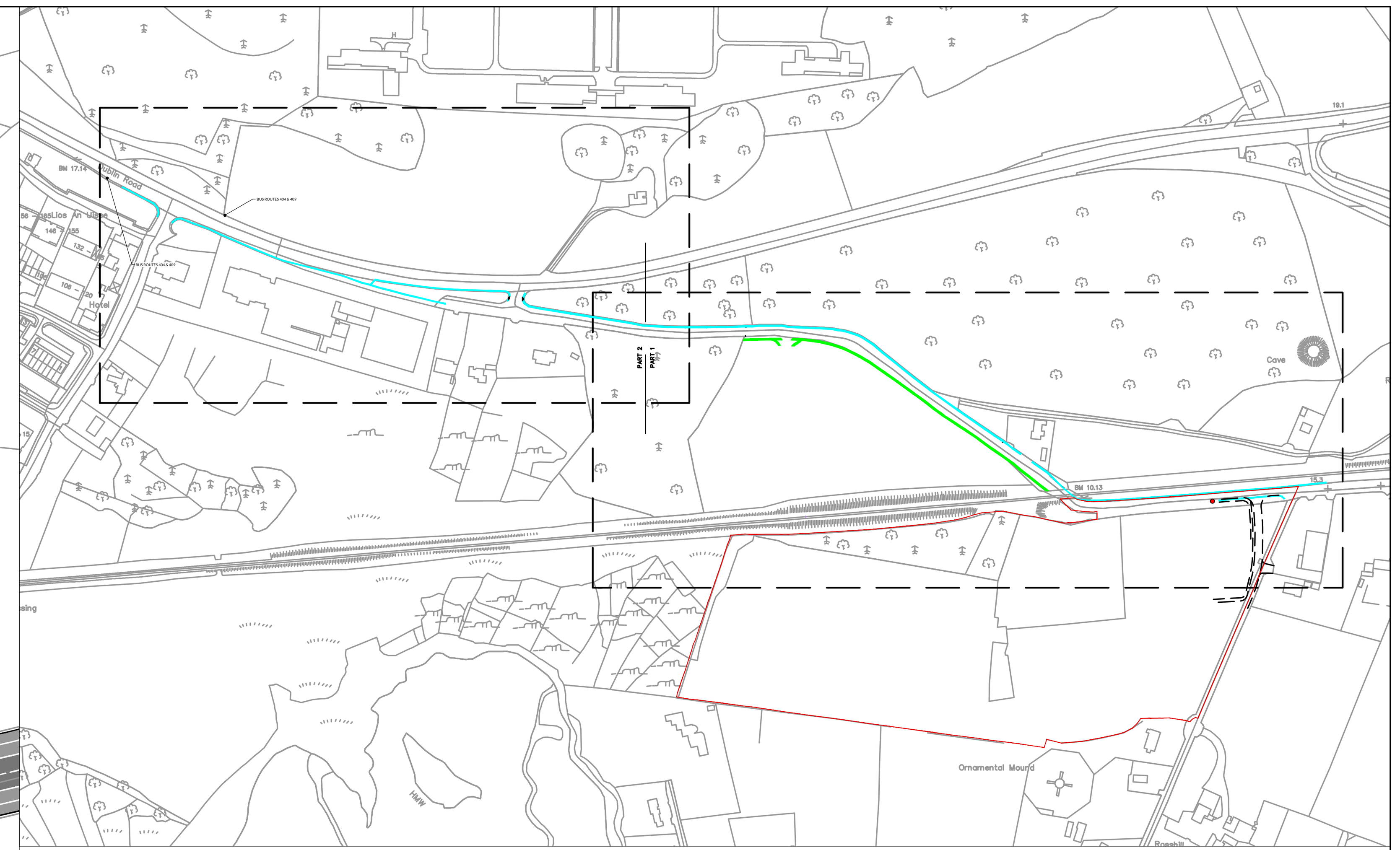
Drawing No.: 10690-2013 | Revision: B

SITE LAYOUT PART 1

SCALE 1:1000 @ A1 (@A3, 1:2000)



KEY PLAN

SCALE 1:5000 @ A1 (@A3, 1:10 000)

LEGEND:

- SITE BOUNDARY
- EXISTING FOOTPATH (WIDTH VARIES)
- PROPOSED FOOTPATH (2M WIDTH)
- FOOTPATH UNDER CONSTRUCTION AS PART OF PLANNING NO. 16/228 (2M WIDTH)
- PROPOSED ROAD REALIGNMENT WORKS PROPOSED AS PART OF THIS APPLICATION
- INDICATIVE PICTURE LOCATION

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SITE LAYOUT PART 2

SCALE 1:1000 @ A1 (@A3, 1:2000)

Rev	Date	Description	By	Chkd.
B	11.12.20019	Red Line Boundary Updated		
A	05.12.2019	Planning Issue	SB	MG

Client:
Kegata Ltd.

Project:
Residential Development
at Rosshill
Galway

Title:
Proposed Pedestrian,
Cycle & Public Transport
Linkage

Scale @ A1: As Shown

Prepared by: SB | Checked: MG | Date: DECEMBER 19

Project Director: Michael McDonnell

Drawing Status: Planning

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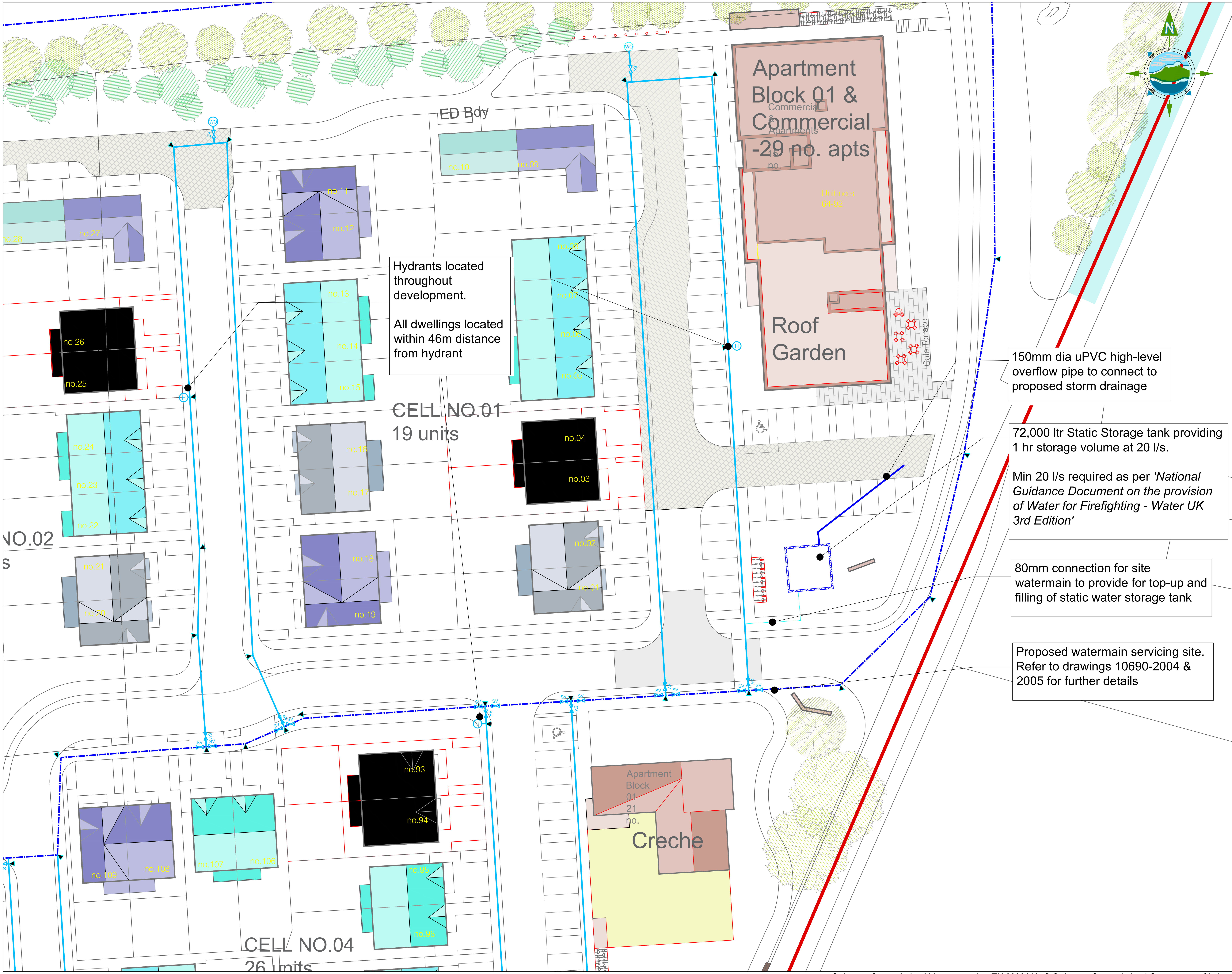
Drawing No.: 10690-2014 | Revision: B



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Rev	Date	Description	By	Chkd.
A	12.12.19	Issue for Planning	JH	RD

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Fire Fighting Requirements

Scale @ A1: 1:500

Prepared by: JH | Checked: RD | Date: Dec 2019

Project Director: M. McD.

Drawing Status: Plannning

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Drawing No.: 10690-2015

Revision: A

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Rev	Date	Description	By	Chkd.
A	16.12.2019	Planning Issue	JK	RD

Large Car (2006)	
Overall Length	5.079m
Overall Width	1.872m
Overall Body Height	1.525m
Min Body Ground Clearance	0.310m
Max Track Width	1.831m
Lock-to-lock time	4.00s
Curb to Curb Turning Radius	5.900m

Client:

Kegata Ltd

Project:

Residential Development at Roshill Galway

Title:

Autotrack Analysis Large Car

Scale @ A0: 1:500

Prepared by:	Checked:	Date:
JK	RD	Dec 2019

Project Director: Michael McDonnell

Drawing Status: Planning

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Drawing No.: 10690-2016

Revision: A

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Rev	Date	Description	By	Chkd.
A	16.12.2019	Planning Issue	JK	RD

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Autotrack Analysis Refuse Vehicle

Scale @ A0: 1:500

Prepared by: JK | Checked: RD | Date: Dec 2019

Project Director: Michael McDonnell

Drawing Status: Planning

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Rev	Date	Description	By	Chkd.
A	16.12.2019	Planning Issue	JK	RD

Client:

Kegata Ltd

Project:

Residential Development at Roshill Galway

Title:

Autotrack Analysis Fire Tender

Scale @ A0: 1:500

Prepared by: JK | Checked: RD | Date: Dec 2019

Project Director: Michael McDonnell

Drawing Status: Planning

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Drawing No.: 10690-2018 Revision: A

Planning and Environmental Consultants

Construction and Environmental Management Plan (CEMP)

Strategic Housing Development, Rosshill

DOCUMENT DETAILS

Client:	**Kegata Ltd.**
Project Title:	**Strategic Housing Development, Rosshill**
Project Number:	**181058-a**
Document Title:	**Construction and Environmental Management Plan (CEMP)**
Document File Name:	**CEMP F – 2019.12.12 – 181058-a**
Prepared By:	**MKO Tuam Road Galway Ireland H91 VW84**

Planning and Environmental Consultants

Rev	Status	Date	Author(s)	Approved By
01	Draft	15/10/2019	EG	OC
02	Final	12/12/2019	EG	OC

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Appendix 1 Site Drainage Plan

1. INTRODUCTION

1.1 General Introduction

This Construction and Environmental Management Plan (CEMP) has been developed by McCarthy Keville O' Sullivan Ltd. (MKO) on behalf of Kegata Limited, which intends to apply to An Bord Pleanála (ABP) under the Planning and Development Act 2000 (as amended by the Residential Tenancies Act 2016) for a strategic housing scheme located in the townlands of Roscam, Merlin Park and Murrough to the south east of Galway City. The application is being made under the Strategic Housing Provisions of the Planning and Development (Housing) and Residential Tenancies Act, 2016. The CEMP will require further updating and final agreement with the various stakeholders should the project secure Planning Permission, in line with all conditions which apply and in order to identify, assess and satisfy the contract performance criteria. The final CEMP will also require updating by the selected contractor.

This report provides the environmental management framework to be adhered to during the pre-commencement, construction and operational phases of the proposed development and it incorporates the mitigating principles to ensure that the work is carried out in a way that minimises the potential for any environmental impacts to occur. This report has been prepared in accordance with the mitigation measures and commitments made in the Environmental Impact Assessment Report and other planning submissions for the development.

This CEMP identifies for the incoming Contractor, the key planning and environmental considerations that must be adhered to and delivered during site construction. This report is intended as a single, amalgamated document that can be used during the future phases of the project, as a single consolidated point of reference relating to all construction, , environmental and drainage requirements for the Planning Authority, developer and contractors alike.

1.2 Scope of Construction and Environmental Management Plan

This report is presented as a guidance document for the management of construction activities and waste materials generated during the works and following completion. It outlines clearly the mitigation measures that are required to be adhered to in order to manage activities and waste materials in an appropriate manner. The report is divided into six sections, as outlined below.

Section 1 provides a brief introduction as to the scope of the report.

Section 2 outlines the site and project details and an overview of the proposed works along with detailing the targets and objectives of this plan.

Section 3 sets out details of the environmental management plan for the site as well as the environmental controls on site in particular noise and dust controls and the protection of water quality. A construction and demolition waste management plan is also provided.

Section 4 sets out a fully detailed implementation plan for the environmental management of the proposed project outlining the roles and responsibilities of the project team as well as an emergency response procedure in terms of site health and safety and environmental protection.

Section 5 consists of a summary table of all mitigation proposals to be adhered to during the implementation of the proposed project, categorised into two separate headings, 1) pre-commencement measures; 2) construction-phase measures.

Section 6 provides details of the compliance review process to ensure all commitments set out in this document are being adhered to by means of audit and inspection.

2. SITE AND PROJECT DETAILS

2.1 Site Location

The site area comprises approximately 10ha of land located within the townlands of Roscam, Merlin Park and Murrough, Galway City. The proposed site is located within the eastern suburbs of Galway, approximately 4 kilometres from the city centre. A site location map is presented in Figure 2.1 with the site location highlighted in red.

2.2 Description of the Proposed Development

Planning permission is sought by Kegata Limited for a 7-year permission for development on a site which extends to 10.0693 ha in the townlands of Roscam, Merlin Park and Murrough in Galway City. The proposed development will consist of the following:

1. *Construction of 342 no. residential units comprising:*
    - *36no. Four Bed Semi-Detached Houses*
    - *2 no. Four Bed Detached Houses*
    - *68 no. Three Bed Semi-Detached Houses*
    - *63 no. Three Bed Terrace*
    - *6 no. Two Bed Terrace*
    - *5 no. Three Bed Long Semi-Detached Houses*
    - *5 no. Four Bed Long Semi-Detached Houses*
    - *38 no. One Bed Apartments*
    - *119 no. Two Bed Apartments*

2.3 Targets and Objectives

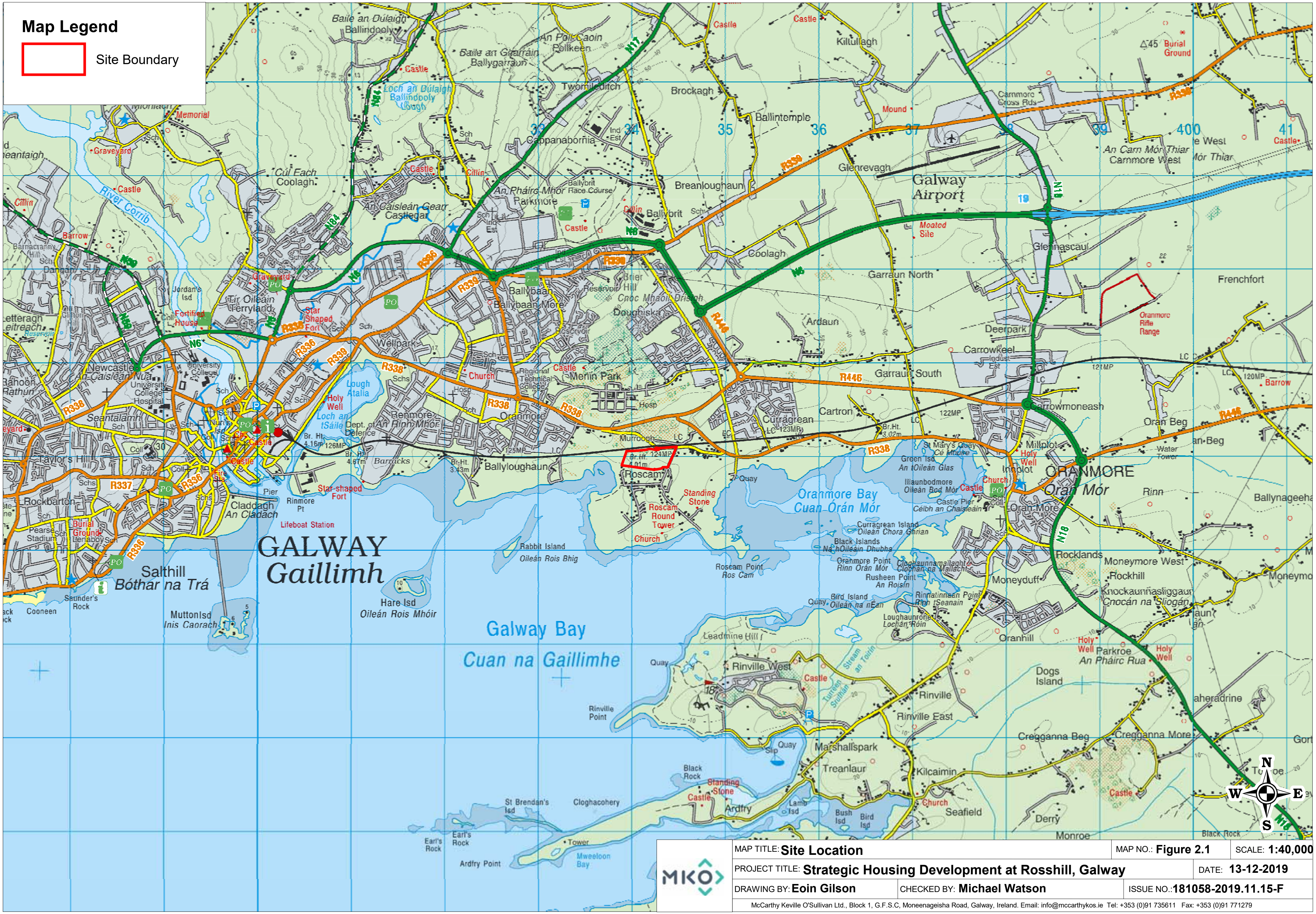
The key site targets are as follows;

- Ensure construction works and activities are completed in accordance with mitigation and best practice approach as presented in the Natura Impact Statement (NIS) and associated planning documentation;
- Ensure construction works and activities are completed in accordance with all planning conditions for the development;
- Ensure construction works and activities have minimal impact/disturbance to local landowners and the local community;
- Ensure construction works and activities have minimal impact on the Natural Environment;
- Adopt a sustainable approach to construction; and,
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows;

- Using recycled materials if possible, including material generated during the proposed demolition of existing ruins e.g. excavated soil, stone and clean inert material;
- Ensure sustainable sources for materials supply where possible;
- Avoidance of any pollution incident or near miss as a result of working around or close to existing watercourses and having emergency measures in place;
- Avoidance of vandalism;
- Keeping all watercourses free from obstruction and debris;
- Keep impact of construction to a minimum on the local environment, watercourses and wildlife;
- Correct fuel storage and refuelling procedures to be followed;

- Good waste management and house-keeping to be implemented;
- Air and noise pollution prevention to be implemented; and,
- Monitoring of the works and any adverse effects that it may have on the environment.
- Construction Methods and designs will be altered where it is found there is an adverse effect on the environment;
- Comply with all relevant water quality legislation;
- Ensure a properly designed, constructed and maintained drainage system appropriate to the requirements of the site is kept in place at all times.



MAP TITLE: Site Location	MAP NO.: Figure 2.1
SCALE: 1:40,000	
PROJECT TITLE: Strategic Housing Development at Rosshill, Galway	DATE: 13-12-2019
DRAWING BY: Eoin Gilson	CHECKED BY: Michael Watson
ISSUE NO.: 181058-2019.11.15-F	

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2.4 Construction Methodologies Overview

2.4.1 Introduction

An experienced main contractor will be appointed for the civil works for the construction phase. The main contractor for the works will be required to comply with this CEMP and any revisions made to this document. An overview of the proposed Construction Methodologies is provided below under the following main headings:

- Site Enabling Works
- Temporary Site Compound
- Perimeter Hoarding
- Demolition of ruins and concrete storage area
- Site Excavation
- Site Roads
- Services and Utilities
- House Construction
- Landscaping Works

2.4.2 Site Enabling Works

The site will be accessed from the east of the site off the Rosshill Road at the proposed vehicular access location. Prior to the commencement of any construction, this site entrance will need to be fully established with security gates. A parking area for construction worker's vehicles will be provided within the confines of the site. There will be no parking permitted for any vehicles associated with the project on the public road during the construction phase of the development.

2.4.3 Temporary Site Compound

A temporary construction compound is proposed for the construction phase of the proposed development, located inside the development footprint. The proposed temporary compound area incorporates temporary site offices, staff facilities and car-parking areas.

A dedicated waste management area will be located within the compound, with waste to be sorted and collected from site by permitted collectors.

Temporary toilets located at the site offices and welfare facilities will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewater being tankered off site by permitted waste collector to wastewater treatment plants. Power will be supplied by a diesel generator, located within the compound or via a temporary power supply if available. The construction compound will be used for temporary storage of some construction materials, prior to their delivery to the required area of the site.

2.4.4 Perimeter Hoarding

Perimeter hoarding will be provided around the site to provide a barrier against unauthorised access from the public areas. A controlled access point in the form of a gated main site entrance will be kept locked outside of normal working hours.

The hoarding will be well maintained and painted or covered with graphics portraying project information. Due to the nature of the works and the construction traffic using the site entrance, appropriate signage will be provided along the footpath and site entrance to alert pedestrians to the traffic exiting/entering the site. Likewise, appropriate signage will be installed within and outside the site to alert drivers of the pedestrians crossing ahead.

2.4.5 Demolition of Existing Buildings

There are a total of three ruined masonry outbuildings on the proposed site all of which are in various stages of disrepair.

Standard best practice construction methodologies will be adhered to during the demolition process. All buildings will be demolished by means of mechanical excavator. Where possible, the stone from the buildings will be reused on-site for infilling and landscaping works. The management of waste materials generated during the demolition phase is detailed in Section 3 of this document. All buildings to be demolished are detailed in Drawing no. 3008.

2.4.6 Site Excavation

Soil stripping and temporary stockpiling of soils and subsoils will be required around the site as the proposed development progresses. Where these works occur, the following will apply:

- The area where excavations are planned will be surveyed and all existing services will be identified.
- All relevant bodies i.e. ESB, Gas Networks Ireland, Eir, Galway City Council etc. will be contacted and all drawings for all existing services sought.
- All plant operators and general operatives will be inducted and informed as to the location of any services.
- All plant operators and general operatives will be inducted and informed as to the identification of invasive species.
- A tracked 360-degree excavator will be used to strip the topsoil, and a dumper will be used to move the excavated materials to the temporary stockpile location.
- All excavated material will be reused for future landscaping works or for backfill of excavations.
- All stockpiles will be damped down or covered in a sheet of polythene, as required, which will prevent the creation of nuisance dust, and will also prevent sediment runoff in times of heavy precipitation.

2.4.7 Site Roads

The construction methodology for the proposed access road is outlined as follows:

- Excavation will take place until a competent stratum is reached.
- The competent stratum will be overlain with up to 500mm of granular fill.
- A layer of geogrid/geotextile may be required at the surface of the competent stratum.
- A final hard surface layer will be placed over the excavated road to provide a road profile to accommodate construction traffic.
- Prior to completion of the construction works on site, the finished asphalt road surface will be applied.

2.4.8 Services and Utilities

The proposed on-site foul sewers will discharge by gravity to a pumping station to the northwest of the site, and the foul waste will discharge from this pumping station via pumped rising main to the adjacent public (Irish Water) foul sewer network.

It is proposed that the development will drain via gravity to 12 no. soakaways proposed on site. Water draining to soakaways will pass through silt traps and hydrocarbon interceptors prior to reaching each soakaway. No surface water from roofs or paved surfaces will be discharge from the site, other than via the soakaways to ground.

The site drainage details are included in Appendix 1.

The installation of services and connections to the residential units will be carried out as follows:

- The area where excavations are planned will be surveyed and all existing services will be identified.
- All relevant bodies i.e. ESB, Gas Networks Ireland, Eir, Galway City Council etc. will be contacted and all drawings for all existing services sought.
- A traffic management plan will be produced if required for connection works to the existing service network.
- A road opening licence will be obtained where required for connection to existing services.
- All plant operators and general operatives will be inducted and informed as to the location of any services.
- A tracked 360-degree excavator or similar will be used to excavate the trench to the required dimensions.
- All excavated material will be removed to an authorised waste recovery facility or, if suitable, stock piled and reused for backfilling and landscaping where appropriate.
- Once the trench has been excavated the ducting/pipework will then be placed in the trench as per specification.
- Once the service ducts/pipework has been installed couplers will be fitted as required and capped to prevent any dirt etc. entering the ducts/pipes.
- The as built location of the ducting/pipework will be surveyed using a total station/GPS.
- Backfill material will be carefully placed so as not to displace the ducting/pipework within the trench.
- The appropriate warning/marker tape will be installed above the ducts/pipes at the appropriate depths.
- The surface will be reinstated as per original specification or to the requirements of the site layout/Local Authority as appropriate.

2.4.9 Existing Underground Services

Any underground services encountered during the works will be surveyed for level and where possible will be left in place. If there is a requirement to move the service, then the appropriate body (ESB, Gas Networks Ireland, etc.) will be contacted, and the appropriate procedure put in place. Back fill around any utility services will be with dead sand/pea shingle where appropriate. All works will be in compliance with required specifications.

2.4.10 House Construction

The housing units will be constructed by the following methodology:

- The area where excavations are foundations are to be installed will be surveyed and all existing services will be identified.
- All relevant bodies i.e. ESB, Gas Networks Ireland, Eir, Galway City Council etc. will be contacted and all drawings for all existing services sought.
- The area of each building will be marked out using ranging rods or wooden posts and the soil and overburden stripped and removed to nearby storage area for later use in landscaping.
- All plant operators and general operatives will be inducted and informed as to the location of any services.
- A tracked 360-degree excavator or similar will be used to excavate the area down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it;
- The block work walls will be built up from the foundation (including a DPC) and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;

- The block work will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the buildings for this operation;
- Any concrete flooring slabs will be lifted into position using an adequately sized mobile crane;
- The timber roof trusses will then be lifted into position using a teleporter or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.
- Windows, electrics, plumbing and all other building components and services will be installed in as timely a manner as is possible.
- Each building will be inspected and certified by the project design engineer at the appropriate stages of construction.

2.4.11 Landscaping Works

Prior to completion of works on the development site, the landscaping works will be carried out. The finishes include areas of amenity grassland and tree planting. This work will be carried out before the completion of each phase in order to ensure that the development will be aesthetically pleasing place for residents to live. These works will involve the use of plant and machinery in order to carry out tasks such as earth moving. Materials which have been stockpiled for the task will be used as much as possible, and material will only be imported where it is required. Solid barriers will be erected around the site boundary for the duration of the construction works.

2.4.12 Construction Works Sequence

The sequencing of construction phase works has is summarised Table 2-1. This provides a schedule of the expected sequence of operations for the works to be completed during the construction phase.

Table 2-1 Sequence of Operations for the Construction Phase

No.	Waste Materials Arising
1	Foundations excavation and formation level establishment
2.	Foundations: formwork and steel reinforcement installation
3.	Masonry Blockwork: including insulation installation
4.	Carpentry 1st fix: timber roof structure and coverings
5.	Window/Door installation
6.	Plastering (external)
7.	Painting (external)
8.	Internal services (electrical and plumbing)
9.	Plastering (internal)
10.	Floor: Sand and cement screed
11.	Services connection: electrical, sewage, telecoms.
12.	Painting (internal)
13.	Tiling: Floors, walls etc.
14.	Carpentry 2nd fix: doors, flooring etc.
15.	Landscaping
16.	Road finishes: Tarmacadam roads and parking areas

3. ENVIRONMENTAL MANAGEMENT

3.1 Site Drainage

Prior to the commencement of any construction activities, the necessary mitigation measures will be put in place to ensure the protection of surface water during the works. Surface waters will be managed, allowing water to percolate naturally to ground.

Particular emphasis will also be placed on hazardous materials entering the surface water management system as well as spills or leaks of fuel oils. Section 4 provides an Emergency Response Plan for dealing with spillages which may result in adverse environmental effects.

The excavation phase of the development has the potential to encounter sub-surface and ground water during the works. However, the Flood Risk Assessment (FRA) completed by Tobins Engineers reported that the site is well drained therefore the potential for the requirement to manage a large volume of groundwater as part of excavation dewatering is minimal. In the event of encountering groundwaters during excavation, it will be pumped from the excavation to temporary on-site drainage system prior to discharge overland through vegetation. This will ensure any suspended silt or sediment is captured through the use of a silt bag on the pump outlet and a series of silt traps as required prior to discharge.

In general, the site of the proposed development is well drained, with a gently sloping topography which is likely to reflect the direction of groundwater flow at the site. No watercourses are present on the development site, Small stream channels can be seen along the Roshill beach which emerges ~ 100m west of the western boundary of the site. It is likely that runoff from these streams is flowing along the field boundaries and discharging to the Galway Bay at this point.

It is proposed that the development will drain via gravity to 12 no. soakaways proposed on site. Water draining to soakaways will pass through silt traps and hydrocarbon interceptors prior to reaching each soakaway. No surface water from roofs or paved surfaces will be discharge from the site, other than via the soakaways to ground.

Water supply to the site will be via connection to the adjacent public (Irish Water) watermain.

The proposed on-site foul sewers will discharge by gravity to a pumping station to the northwest of the site, and the foul waste will discharge from this pumping station via pumped rising main to the adjacent public (Irish Water) foul sewer network.

3.2 Cement Based Products Control Measures

The complete washing out of concrete trucks will not be permitted at the site. Suppliers will be directed back to their own facility to complete the washout process. However, a washout area for chute cleaning will be provided at various locations in close proximity to the concrete pour locations.

The following mitigation measures are proposed to avoid release of cement leachate from the site:

- No batching of wet-cement products will occur on site;
- Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Where possible pre-cast elements for culverts and concrete works will be used;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;

- Where concrete is delivered on site, only chute cleaning will be permitted, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed.
- Use weather forecasting to plan dry days for pouring concrete;
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event;

3.3 Refuelling, Fuel and Hazardous Materials Storage

The following measures are proposed to avoid release of hydrocarbons at the site:

- Minimal refuelling or maintenance of construction vehicles or plant will take place on site. Off-site refuelling should occur at a controlled fuelling station;
- On-site refuelling will take place by direct refuelling from the delivery truck or using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site and will be towed around the site as required. The fuel bowser will be parked on a level area in the construction compound when not in use. Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- Fuels volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately for the volume of fuel stored. volume for the time period of the construction. The bunded area will be roofed to prevent the ingress of rainwater;
- The plant used should be regularly inspected for leaks and fitness for purpose; and,
- Spill kits will be available to deal with and accidental spillage in and outside the refuelling area. Spill control measures are outlined in the section that follows.

3.4 Spill Control Measures

It is not proposed to store any large volumes of oils/fuels for the purpose of refuelling on the site. A bunded fuel tank will be stored at the temporary construction compound which will be used for smaller plant and equipment i.e. site dumpers and teleporters. This will be stored on an impermeable surface and will be equipped with spill kit. Onsite plant (excavator) will be refuelled by an external contractor who will call to site as required. Road vehicles will not be refuelled at the site.

In the event of minor spills and leaks from road vehicles and the onsite excavator the following steps provide the procedure to be followed in the event of any significant spill or leak.

- Stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.
- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, cover or bund off any vulnerable areas where appropriate such as drains or watercourses.
- If possible, clean up as much as possible using the spill control materials.
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- Notify the applicant immediately giving information on the location, type and extent of the spill so that they can take appropriate action and further investigate the incident to ensure it has been contained adequately.
- External consultants will inspect the site and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The applicant will notify the appropriate regulatory body such as Galway Council if deemed necessary

3.5 Dust Control

Construction dust can be generated from many on-site activities such as excavation and backfilling. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, *i.e.* soil, sand, etc and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Construction traffic movements also have the potential to generate dust as they travel along the haul route. The measures below will also prevent construction debris arising on the public road network.

Proposed measures to control dust include:

- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions;
- The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by Site Management for cleanliness, and cleaned as necessary;
- Material handling systems and material storage areas will be designed and laid out to minimise exposure to wind;
- Water misting or bowsers will operate on-site as required to mitigate dust in dry weather conditions;
- The transport of soils or other material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles where necessary;
- All construction related traffic will have speed restrictions on un-surfaced roads to 15 kph;
- Daily inspection of construction sites to examine dust measures and their effectiveness.
- When necessary, sections of the haul route will be swept using a truck mounted vacuum sweeper; and,
- All vehicles leaving the construction areas of the site will pass through a wheel cleansing area prior to entering the local road network.

3.6 Noise & Vibration Control

The operation of plant and machinery, including construction vehicles, is a source of potential noise impacts During the works, any plant introduced to the site will not be excessively noisy. Exhaust and silencer systems on plant will be maintained in a satisfactory condition and operating correctly at all times. Defective silencers will be immediately replaced.

Proposed measures to control noise include:

- Diesel generators will be enclosed in sound proofed containers to minimise the potential for noise impacts;
- Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All construction plant and equipment to be used on-site will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations;
- Plant with the potential of generating noise or vibration will be placed as far away from sensitive properties as permitted by site constraints.
- Regular maintenance of plant will be carried out in order to minimise noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works;
- Compressors will be of the “sound reduced” models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machines, which are used intermittently, will be shut down during those periods when they are not in use;

- Training will be provided by the Site Management to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation; and,
- Local areas of the haul route will be condition monitored and maintained if necessary.

It is recommended that drivers of heavy goods vehicles (HGVs) associated with the development extend due care and courtesy to other road users. Excessive use of and unnecessary engine racing will be avoided.

The proposed construction working hours are as follows:

08:00 – 19:00 Monday to Friday

08:00 – 14:00 Saturday

Closed Sunday

3.7 Invasive Species Management

A baseline invasive species survey will be carried out at the site to identify the presence and location of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations, 2011 (S.I. 477 of 2011) by a suitably qualified ecologist prior to the commencement of construction. The non-native invasive species, Spanish Bluebell (*Hyacinthoides hispanica)* was recorded growing at one location close to the southern boundary of the development site. The following specific mitigation measures for Spanish bluebell are as follows:

- All construction staff will be briefed on the identification of invasive species including Spanish bluebell and made aware of the location of Spanish bluebell.
- All machinery, materials and topsoil will be verified as being clean of invasive species in advance on entering the site.
- Where disturbance of the species is unavoidable the following measures will be taken for the removal of Spanish bluebell from the development site:
    - Plants will be dug up after they have flowered with their leaves intact;
    - Plants will be left to dry until the bulbs are completely dead;
    - Once bulbs are completely dead, the material can be composted

3.8 Traffic Management Proposals

3.8.1 Construction Traffic Access and Management

During construction, the appointed contractor will be required to prepare a Construction Traffic Management Plan.

Below is a list of the proposed traffic management measures to be adopted during the construction works. Please note that this is not an exhaustive list, and it will be the appointed contractor's responsibility to further develop the traffic management measures which will be set out within their Construction Phase Traffic Management Plan.

- Warning signs / Advanced warning signs will be installed at appropriate locations in advance of the construction access locations;
- Construction and delivery vehicles will be instructed to use only the approved and agreed means of access; and movement of construction vehicles will be restricted to these designated routes;
- Appropriate vehicles will be used to minimise environmental impacts from transporting construction material, for example the use of dust covers on HGVs carrying dust producing material;

- Speed limits of construction vehicles to be managed by appropriate signage, to promote low vehicular speeds;
- No vehicle will be allowed to stop or park on the access road to the proposed development site.
- Ample parking will be provided within the site to cater for the staff and visitors during the construction phases of the proposed development.
- On site wheel washing will be undertaken for construction vehicles to remove any debris prior to leaving the site, to remove any potential debris on the local roads if it is deemed necessary;
- All vehicles will be suitably serviced and maintained to avoid any leaks or spillage of oil, petrol or diesel. All scheduled maintenance will not be carried out on the public highway; and
- A detailed haulage plan will be put in place to ensure minimal impact on the surrounding road network

3.9 Environmental Management Implementation

The Site Supervisor/Construction Manager will have overall responsibility for the organisation and execution of the construction phase of the development in accordance with the provisions of this CEMP. A series of daily checks of all works and the implementation of the mitigation measures set out throughout this document will be maintained. The findings of these daily checks will be documented by the site manager and will inform the overall site audit and inspection procedure as set out in Section 4.

3.10 Construction & Demolition Waste Management Plan

This section of the CEMP provides a Construction and Demolition Waste Management Plan (CDWMP) which outlines the best practice procedures during the demolition of the existing building on site and the construction phase of the project. The CDWMP will outline the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage. Disposal of waste will be seen as a last resort.

3.10.1 Legislation

The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

The Act requires that any waste related activity has to have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the proposed development to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits. It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.

The Department of the Environment provides a document entitled, 'Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.

3.10.2 Preliminary Plan

The Department of the Environment guidelines state that, at the design stage of the project, only a preliminary WMP is required,

> *"Formal production and presentation of the Plan may be at a later stage but a clear 'waste management philosophy' needs to be adopted...at the initial conceptual stage of the Project..."'*

This preliminary WMP has a number of key objectives as outlined below:

- To set out management prescriptions that adhere to a waste management hierarchy
- To outline the roles and responsibilities of the Waste Manager
- Prevention and minimisation of waste at the construction stage of the proposed development.

3.10.3 Waste Management Hierarchy

The waste management hierarchy sets out the most efficient way of managing waste in the following order:

Prevention and Minimisation:

The primary aim of the WMP will be to prevent and thereby reduce the amount of waste generated at each stage of the project. The prevention and minimisation of waste of this development will be developed by implementing effective on-site materials management in terms of both material acquisition and storage on site.

Reuse of Waste:

Reusing as much of the waste generated on site as possible will reduce the quantities of waste that will have to be transported off site to recovery facilities or landfill. Site management will be required to encourage the appropriate reuse of materials where possible as well as identify re-use opportunities to achieve ultimate goal of waste reduction.

Recycling of Waste:

There are a number of established markets available for the beneficial use of construction waste such as using waste concrete as fill for new roads. A designated Waste Storage Area (WSA) will be maintained on site which will cater for segregation and recycling of various waste streams.

At all times during the implementation of the WMP, disposal of waste to landfill will be considered only as a last resort.

3.10.4 Demolition Waste Management

The demolition phase of the proposed development will involve the removal of two stone ruins and an existing agricultural storage area from within the site.

Prior to the commencement of any demolition, excavation or construction works at the site works at the site a full audit of waste that will be generated on site will be carried out. For the purposes of this CEMP a list of expected waste types that may be generated has been drawn up and the European Waste Catalogue Codes pertaining to each waste type is included in Table 3.1. The lists have been prepared following a visit to the proposed development site and inspection of the existing buildings but do not constitute a full waste audit.

Table 3-1 Expected waste types arising from the Demolition Phase

Materials Type	Example	EWC Code
Soil & Stones	Overburden, soil, subsoil	17 05 04
Concrete	Surfacing, flooring material	17 01 01
Mixture of inert material	Sand, stones, plaster, rock	17 01 07
Metals	Disused Agricultural Fencing	17 04 07

3.10.4.1 Waste Arising from Demolition Activities

The majority of the waste generated by the demolition phase will consist of concrete rubble from the silage storage area and stones from the existing wall structures of the ruins. The remaining volume of waste material will be segregated according to type into individual skips pending removal by authorised waste collection contractors. The actual waste categories that will be subject to segregation during the demolition phase will be determined by the expected volumes of specific waste categories which will be assessed by the Waste Manager prior to any demolition works. Where a category of waste forms a smaller quantity, this will be disposed of in a general waste skip along with other categories of waste the volume of which does not warrant individual segregation This general waste material will be transferred to a Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be further sorted into individual waste streams for recycling, recovery or disposal. It is anticipated that the majority of materials will be re-used at the site for landscaping and site restoration purposes.

3.10.5 Excavation Waste Management Plan

The excavation phase of the proposed development will require the removal and management of the materials from the foundation excavations. It is anticipated that some of the material will be re-used on site for landscaping, backfilling and general restoration of excavated areas.

All excavated material which is not required for future landscaping works or for backfill of excavations will be removed to an authorised waste recovery facility. This will also apply to material which is not suitable for reuse on site.

3.10.6 Construction Phase Waste Management Plan

The first significant quantity of waste to be generated during the construction phase of the project will be the excavation for the associated foundations. This will generate a significant quantity of soil and subsoil material as a result of the excavation. Although a quantity of this material will be used for landscaping, backfilling and general restoration of excavated areas, it is anticipated that a quantity of this material will be exported off site by a licenced haulier to an authorised waste facility.

Waste generated post excavation on site will be managed in the WSA where the various waste components will be segregated into a number of waste categories in accordance with a general waste segregation policy and placed into individual skips. The categories for segregation will include, timber, metal, cardboard and plastics. This material will be removed by authorised waste collection contractors for recycling and recovery at various licensed facilities. The remaining volume of waste material which cannot be allocated to any of these four waste streams will be disposed of in a general waste skip. This waste material will be transferred to a Materials Recovery Facility by a fully licensed waste contractor where the waste will be further sorted into individual waste streams for recycling, recovery or disposal. This general waste will be subject to constant monitoring by site management to ensure that potential reusable and recyclable material is not being disposed of therein. The on-site canteen will include waste receptacles for dry recyclables and food waste which should eliminate the potential of any waste produced within the canteen being sent to landfill. The expected wastes arising from the works including the individual European Waste Catalogue (EWC) codes are outlined in Table 3.2.

Table 3-2 Expected waste types arising during the construction phase

Materials type	Example	EWC Code
Cables	Electrical wiring	17 04 11
Concrete	Surfacing, flooring material	17 01 01
Insulation	Cavity & Floor Insulation	17 06 04

Materials type	Example	EWC Code
Tiles and ceramics	Wall and floor tiles	17 02 03
Bituminous materials	Torch on felt roof coverings	17 03 01
Metals	Rebar, reinforced steel joists, lead	17 04 07
Mixture of inert material	Sand, stones, plaster, rock	17 01 07
Plastic	PVC frames, electrical fittings	17 02 03
Soil & Stones	Overburden, soil, subsoil	17 05 04
Gypsum materials	Roof tiles/slabs	17 08 02
Wood	Frames and doors,	17 02 01
Canteen Waste	Miscellaneous waste from site staff	20 01 08

The potential for re-use of materials on the site during the works will be minimal however clean inert concrete, rubble and stones may have a re-use potential for landscaping and site restoration. However, considering the major excavation works on the site have been completed, the quantity of such material being generated will be minimal and is likely to be reused locally.

3.10.7 Waste Arisings and Proposals for Minimisation, Reuse and Recycling of Construction Waste

Construction waste will arise on the project mainly from excavation and unavoidable construction waste including material surpluses and damaged materials and packaging waste.

Appropriate measures should be taken to ensure excess waste is not generated during construction, including;

- Ordering of materials should be on an 'as needed' basis to prevent over supply to site. Co-ordination is required with suppliers enabling them to take/buy back surplus stock.
- Purchase of materials pre-cut to length to avoid excess scrap waste generated on site.
- Request that suppliers use least amount of packaging possible on materials delivered to the site.
- Ensuring correct storage and handling of goods to avoid unnecessary damage that would result in their disposal
- Ensuring correct sequencing of operations.
- Use reclaimed materials in the construction works.

Hazardous waste will be kept separate from all other construction waste to prevent contamination and removed appropriately.

3.10.8 Waste Arising from Construction Activities

The expected waste volumes generated on site are unlikely to be large enough to warrant source segregation or a dedicated waste storage area. Wastes will generally comprise soils and subsoils which will be removed by truck to an authorised waste recovery facility.

3.10.9 Reuse

Many construction materials can be reused a number of times before they have to be disposed of:

- Concrete can be reused as aggregate for roads cable trench backfilling material.
- Plastic packaging etc. can be used to cover materials on site or reused for the delivery of other materials.

3.10.10 Recycling

If a certain type of construction material cannot be reused on site then recycling is the most suitable option.

All waste that is produced during the construction phase including dry recyclables will be sent directly for subsequent segregation at a remote facility. The low volume of such material that is anticipated to be generated at the proposed development is the justification for adopting this method of waste management.

3.10.11 Wastewater

The removal and disposal of wastewater from site welfare facilities, will be carried out by a fully permitted waste collector holding valid Waste Collection Permits as issued under the Waste Management (Collection Permit) Regulations, 2007. Information on the appointed permitted contractor and evidence of a maintenance contract having been submitted to the Planning Authority prior to any construction works taking place.

3.10.12 Implementation

3.10.12.1 Roles and Responsibilities for Waste Management

Prior to the commencement of the proposed development a Waste Manager will be appointed by the project team. The role of Waste Manager is likely to be fulfilled by the Site Manager given the scale of the development and will be responsible for the implementation of the objectives of this plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the proposed development adheres to the management plan. The waste manager will also be required to conducted regular waste audits in the WSA and throughout the site to ensure that the waste management plan is operating effectively.

3.10.12.2 Training

It is important for the Construction Waste Manager to communicate effectively with colleagues in relation to the aims and objectives of the WMP. All employees working on site during the construction phases of the project will be trained in materials management and thereby, should be able to:

- Distinguish reusable materials from those suitable for recycling;
- Ensure maximum segregation at source;
- Co-operate with site manager on the best locations for stockpiling reusable materials;
- Separate materials for recovery; and
- Identify and liaise with waste contractors and waste facility operators.

3.10.12.3 Record Keeping

The WMP will provide systems that will enable all arisings, movements and treatments of construction waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

The fully licensed waste contractor employed to remove waste from the site will be required to provide documented records for all waste dispatches leaving the site of the proposed development. Each record will contain the following:

- Consignment Reference Number
- Material Type(s) and EWC Code(s)
- Company Name and Address of Site of Origin
- Trade Name and Collection Permit Ref. of Waste Carrier
- Trade Name and Licence Ref. of Destination Facility
- Date and Time of Waste Dispatch
- Registration no. of Waste Carrier vehicle
- Weight of Material
- Signature of Confirmation of Dispatch detail
- Date and Time of Waste Arrival at Destination
- Weight of Material
- Site Address of Destination Facility

3.10.13 Waste Management Plan Conclusion

The WMP will be properly adhered to by all staff involved in the project which will be outlined within the induction process for all site personnel. The waste hierarchy should always be employed when designing the plan to ensure that the least possible amount of waste is produced during the construction phase. Reuse of certain types of construction wastes will cut down on the cost and requirement of raw materials therefore further minimising waste levels.

This preliminary WMP has been prepared to outline the main objectives that are to be adhered to for the preparation of a more detailed WMP to be completed after the planning phase of the proposed development.

4. ENVIRONMENTAL MANAGEMENT IMPLEMENTATION

4.1 Construction Manager/Site Supervisor

The Construction Manager/Site Supervisor will have overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project environmental requirements. The duties and responsibilities of the Site Supervisor/Construction Manager will include:

- Ensure that all works are completed safely and with minimal environmental risk;
- Approve and implement the CEMP and supporting environmental documentation, and ensure that all environmental standards are achieved during the construction phase of the project;
- Take advice from the Site Environmental Manager on legislation, codes of practice, guidance notes and good environmental working practice relevant to their work;
- Ensure compliance through audits and management site visits;
- Ensure timely notification of environmental incidents; and,
- Ensure that all construction activities are planned and performed such that minimal risk to the environment is introduced.

4.2 Environmental Manager

The main contractor appointed to carry out the works on site will be required to provide a level of supervision on site in the form of an Environmental Manager who will also fulfil the role of Waste Manager. Due to the scale of activity proposed for the site, this role can be adopted by a Site Manager/Foreman as part of their duties. In general, this Environmental Manager will maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. The Environmental Manager will act as the regulatory interface on environmental matters by reporting directly to the client and liaising with Galway City Council and other statutory bodies as required. The Site Environmental Manager will report to the Site Supervisor/Construction Manager. The duties of the appointed Environmental Manager are summarised as follows:

- Maintain and update as required the Construction Phase CEMP and supporting environmental documentation and review/approval of contractor method statements;
- Undertake inspections and reviews to ensure the works are carried out in compliance with the CEMP;
- Monitor the implementation of the CEMP, particularly all proposed/required Environmental Monitoring;
- Generate environmental reports as required to show environmental data trends and incidents and ensure environmental records are maintained throughout the construction period;
- Advise site management/contractor/sub-contractors on:
    - Prevention of environmental pollution and improvement to existing working methods;
    - Changes in legislation and legal requirements affecting the environment;
    - Suitability and use of plant, equipment and materials to prevent pollution;
    - Environmentally sound methods of working and systems to identify environmental hazards;
- Ensure proper mitigation measures are initiated and adhered to during the construction phase;
- Liaise with Project Team and present the findings of site audits/inspections that are completed;
- Ensure adequate arrangements are in place for site personnel to identify potential environmental incidents;

- Ensure that details of environmental incidents are communicated in a timely manner to the relevant regulatory authorities, initially by phone and followed up as soon as is practicable by email;
- Support the investigation of incidents of significant, potential or actual environmental damage, and ensure corrective actions are carried out, recommend means to prevent recurrence and communicate incident findings to relevant parties;
- Identify environmental training requirements and arrange relevant training for all levels of site-based staff/workers; and
- Fulfil the role of Waste Manager and implement the objectives of the Waste Management Plan as set out in Section 3 above.
- Coordinate the Emergency Response in terms of site health and safety and environmental protection as outlined in the section below

4.3 Emergency Response

The Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the contractor/PSCS and suppliers as the proposed project progresses. Where sub-contractors that are contracted on site are governed by their own emergency response procedure a bridging arrangement will be adopted to allow for inclusion of the sub-contractor's ERP within this document.

This is a working document that requires updating throughout the various stages of the project.

4.3.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Site Manager will lead the emergency response which makes him responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Figure 4.1. In a situation where the Site Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the next person in the chain of command outlined in Figure 4.1. This will be updated throughout the various stages of the project.

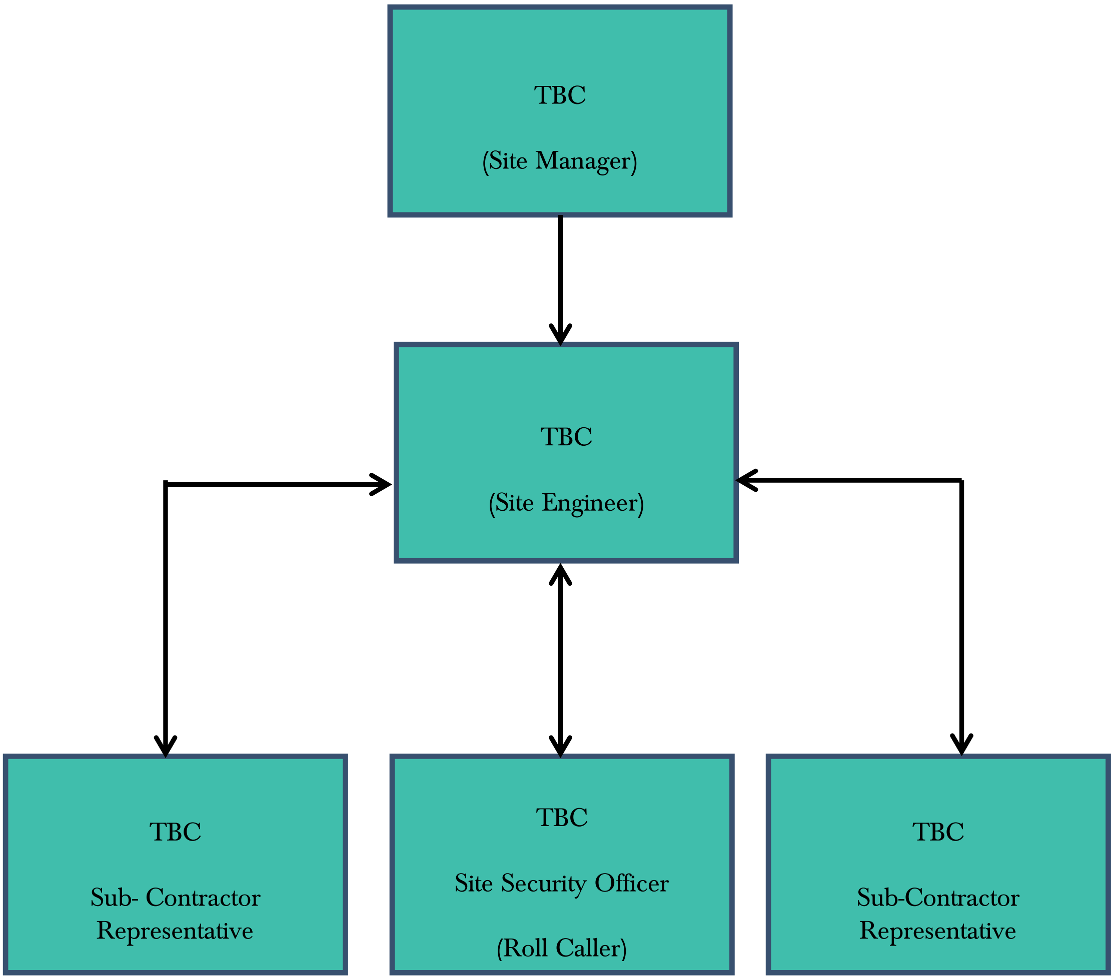


Figure 4-1 Emergency Response Procedure Chain of Command

4.3.2 Initial Steps

In order to establish the type and scale of potential emergencies that may occur, the following hazards have been identified as being potential situations that may require an emergency response in the event of an occurrence.

Table 4-1 Hazards associated with potential emergency situations

Hazard	Emergency Situation
Construction Vehicles: Dump trucks, tractors, excavators, cranes etc.	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/Portable Tools.	Entanglement, amputation or electrical shock associated with portable tools.
Contact with services.	Electrical shock or gas leak associated with an accidental breach of underground services.
Fire	Injury to operative through exposure to fire.
Sickness	Illness unrelated to site activities of an operative e.g. heart attack, loss of consciousness, seizure.

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in Table 4.1 the Site Manager will carry out the following:

- Establish the scale of the emergency situation and identify the number of personnel, if any, have been injured or are at risk of injury.
- Where necessary, sound the emergency siren/fog horn that activates an emergency evacuation on the site.
- Make safe the area if possible and ensure that there no identifiable risk exists with regard to dealing with the situation e.g. if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.
- Contact the required emergency services or delegate the task to someone if he is unable to do so. If delegating the task, ensure that they follow the procedures for contacting the emergency services as set out in Section 4.4.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g. cordon off an area where an incident associated with electrical issues has occurred.
- Contact any regulatory body or service provider as required e.g. ESB Networks the numbers for which as provided in Section 4.4.2.
- Contact the next of kin of any injured personnel where appropriate. The procedure for this is outlined in Section 4.4.3.

4.3.3 Spill Control Measures

Every effort will be made to prevent an environmental incident during the construction and operational phase of the proposed project. Oil/Fuel spillages are one of the main environmental risks that will exist on the proposed site which will require an emergency response procedure. The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. The following steps provide the procedure to be followed in the event of such an incident.

- Stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.
- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, cover or bund off any vulnerable areas where appropriate such as drains, watercourses or sensitive habitats.
- If possible, clean up as much as possible using the spill control materials.
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- Notify the Environmental Manager immediately giving information on the location, type and extent of the spill so that they can take appropriate action.
- The Environmental Manager will inspect the site and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The Environmental Manager will notify the appropriate regulatory body such as Galway City Council, The Department of Communications, Climate Action and Environment and the Department of Housing, Planning and Local Government , if deemed necessary.

Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be investigated in accordance with the following steps.

- The Environmental Manager must be immediately notified.

- If necessary, the Environmental Manager will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures used to follow the incident. The form will also include any recommendations made to avoid reoccurrence of the incident.
- If the incident has impacted on an ecologically sensitive receptor, such as a sensitive habitat, protected species or designated conservation site (pSPA or cSAC), the Environmental Manager will liaise with a Project Ecologist.
- If the incident has impacted on a sensitive receptor such as an archaeological feature the Environmental Manager will liaise with a Project Archaeologist.
- A record of all environmental incidents will be kept on file by the Environmental Manager and the Main Contractor. These records will be made available to the relevant authorities such as Galway City Council, DCCAE and DHPLG if required.

The Environmental Manager will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative construction methods or environmental sampling, and will advise the Main Contractor as appropriate.

4.4 Contacting the Emergency Services

4.4.1 Emergency Communications Procedure

In the event of requiring the assistance of the emergency services the following steps should be taken:

Stay calm. It's important to take a deep breath and not get excited. Any situation that requires 999/112 is, by definition, an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.

Know the location of the emergency and the number you are calling from. This may be asked and answered a couple of times but don't get frustrated. Even though many emergency call centres have enhanced capabilities meaning they are able to see your location on the computer screen they are still required to confirm the information. If for some reason you are disconnected, at least emergency crews will know where to go and how to call you back.

Wait for the call-taker to ask questions, then answer clearly and calmly. If you are in danger of assault, the dispatcher or call-taker will still need you to answer quietly, mostly "yes" and "no" questions.

If you reach a recording, listen to what it says. If the recording says your call cannot be completed, hang up and try again. If the recording says all call takers are busy, WAIT. When the next call-taker or dispatcher is available to take the call, it will transfer you.

Let the call-taker guide the conversation. He or she is typing the information into a computer and may seem to be taking forever. There's a good chance, however, that emergency services are already being sent while you are still on the line.

Follow all directions. In some cases, the call-taker will give you directions. Listen carefully, follow each step exactly, and ask for clarification if you don't understand.

Keep your eyes open. You may be asked to describe victims, suspects, vehicles, or other parts of the scene.

Do not hang up the call until directed to do so by the call taker.

4.4.2 Contact Details

A list of emergency contacts is presented in Table 4.2. A copy of these contacts will be included in the Site Safety Manual and in the site offices and the various site welfare facilities

Table 4-2 Emergency Contacts

Contact	Telephone no.
Emergency Services – Ambulance, Fire, Gardaí	999/112
Doctor – Roscam Medical Centre	091 779 860
Hospital –University Hospital Galway	091 524 222
ESB Emergency Services	1850 372 999
Gas Networks Ireland	1850 20 50 50
Gardaí – Oranmore Garda Station	091 388 030
Health and Safety Coordinator - Health & Safety Services	TBC
Health and Safety Authority	1890 289 389
Project Supervisor Construction Stage (PSCS): TBC	TBC
Project Supervisor Design Stage (PSDS): TBC	TBC
Client – Kegata Ltd.	TBC

4.4.3 Procedure for Personnel Tracking

All operatives on site without any exception will have to undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.

In the event of a site operative becoming involved in an emergency situation where serious injury has occurred, and hospitalisation has taken place, it will be the responsibility of the Site Manager or next in command if unavailable to contact the next of kin to inform them of the situation that exists.

4.4.4 Induction Checklist

Table 4.3 provides a list of items highlighted in this ERP which must be included or obtained during the mandatory site induction of all personnel that will work on the site. This will be updated throughout the various stages of the project.

Table 4-3 Emergency Response Plan Items Applicable to the Site Induction process

ERP Items to be included in Site Induction	**Status**
All personnel will be made aware of the evacuation procedure during site induction.	
Due to the location of the site it may be necessary to liaise with and assist the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.	
All operatives on site without any exception will have undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.	

5. MITIGATION PROPOSALS

The Mitigation Measures are presented in the following pages. Any conditions attached to a grant of planning permission will be incorporated into the audit list including an addition or regulatory amendment or standard changes prior to or during construction.

By presenting the mitigation proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during the future phases of the project. The tabular format in which the below information is presented, can be further expanded upon during the course of future project phases to provide a reporting template for site compliance audits.

Table 4-4 Mitigation Measures

Mitigation Measure	Reference	Mitigation Measure	Audit Result	Action Required
Pre-Commencement Phase				
1	CEMP Section 2,	All site activities will be provided for in a Construction Environmental Management Plan, prepared prior to the commencement of any operations onsite. The CEMP will set out all measures to be adhered to during the pre-commencement, construction and operational phases of the proposed development.		
2	CEMP Section 4	The main contractor will be required to engage a Construction Manager that will also fulfil the role of Environmental Manager (EM), and to monitor all site works and to ensure that methodologies and mitigation are followed throughout construction to avoid negatively impacting on the receiving environment.		
Construction Phase				
		Construction Management		
3	CEMP Section 3	Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. No batching of wet-cement products will occur on site.		
4	CEMP Section 3	No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;		
		Fuel and Oil Control		
5	CEMP Section 3	> All plant and machinery will be serviced before being mobilised to site. > No refueling of machinery or overnight parking of machinery is permitted in areas adjacent to watercourses or on-site drainage infrastructure. > On-site refueling will only take place at distances greater than 50 metres from nearest water courses or site drainage infrastructure.		

		• On-site refueling of machinery will be carried out using an oil company vehicle sourced from a local supplier. Only dedicated trained and competent personnel will carry out refueling operations. A spill kit and drip tray shall be on site at all times and available for all refueling operations. Equipment shall not be left unattended during refueling. • Spill kits shall be available in each item of plant required. • Care will be taken at all times to avoid contamination of the environment with contaminants other than hydrocarbons, such as uncured concrete or other chemicals. The plant refuelling procedures described above shall be detailed in the contractor's method statements.		
		Surface Water Mitigation		
6	CEMP Section 3, EIAR Chapter 7	• Works shall not take place at periods of high rainfall, and shall be scaled back or suspended if heavy rain is forecast; • Machinery deliveries shall be arranged using existing structures along the existing road; • Any excess construction material shall be immediately removed from the area and sent to an authorized waste recovery facility; • Spill kits shall be available in each item of plant required; • Discharge onto ground will be via a silt bag which will filter any remaining sediment from the pumped water. The entire discharge area from silt bags will be enclosed by a perimeter of double silt fencing; • Prior to the commencement of earthwork silt fencing will be placed down-gradient of the construction areas where drains or drainage pathways are present		
		Air Quality and Dust Control		
7	CEMP Section 3	▪ The site track will be regularly inspected by site management for cleanliness and cleaned as necessary. ▪ The transport of crushed stone or other material, which has significant potential to cause dust, will be undertaken in tarpaulin-covered vehicles where necessary.		

		▪ When necessary, sections of approach roads to the site will be swept using a street cleaner and / or damped down with water.		
		Noise		
8	CEMP Section 3	▪ Diesel generators will be enclosed in sound proofed containers to minimise the potential for noise impacts. ▪ Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All construction plant and equipment to be used on-site will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations 1998, and any subsequent amendments. ▪ Regular maintenance of plant will be carried out in order to minimise noise emissions. ▪ All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works. ▪ Compressors will be of the “sound reduced” models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers. ▪ Machines, which are used intermittently, will be shut down during those periods when they are not in use. ▪ Training will be provided by the site management to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation.		
		Environmental Management		
9	NIS	▪ Access pathways through the woodland will be constructed using a minimalist intervention approach to ensure the preservation of woodland		

		trees. The path will be constructed using a non-dig method using a combination of timber sleepers, cellweb system and gravel to ensure increased access to the root protection areas of the trees occurs in a manner not detrimental to the trees. The pathway will be constructed in a meandering manner so as to avoid the felling of existing trees.		

6. COMPLIANCE AND REVIEW

6.1 Site Inspections and Environmental Audits

Routine inspections of activities will be carried out on a daily and weekly basis by the Site Environmental Manager/Construction Manager as appointed by the applicant to ensure all controls to prevent environmental impact, relevant to the construction activities taking place at the time, are in place.

Environmental inspections will ensure that the works are undertaken in compliance with this CEMP. Environmental site inspections will be carried out by suitably trained staff.

6.2 Environmental Compliance

The following definitions shall apply in relation to the classification of Environmental Occurrences during the infilling works:

Environmental Near Miss: An occurrence which if not controlled or due to its nature could lead to an Environmental Incident.

Environmental Incident: Any occurrence which has potential, due to its scale and nature, to migrate from source and have an environmental impact beyond the site boundary.

Environmental Non-Compliance: Non-fulfilment of a requirement and includes any deviations from established procedures, programs and other arrangements related to the CDMP.

6.3 Corrective Action Procedure

A corrective action is implemented to rectify an environmental issue on-site. Corrective actions will be implemented by the Construction Manager, as advised by the Site Environmental manager. Corrective actions may be required as a result of the following;

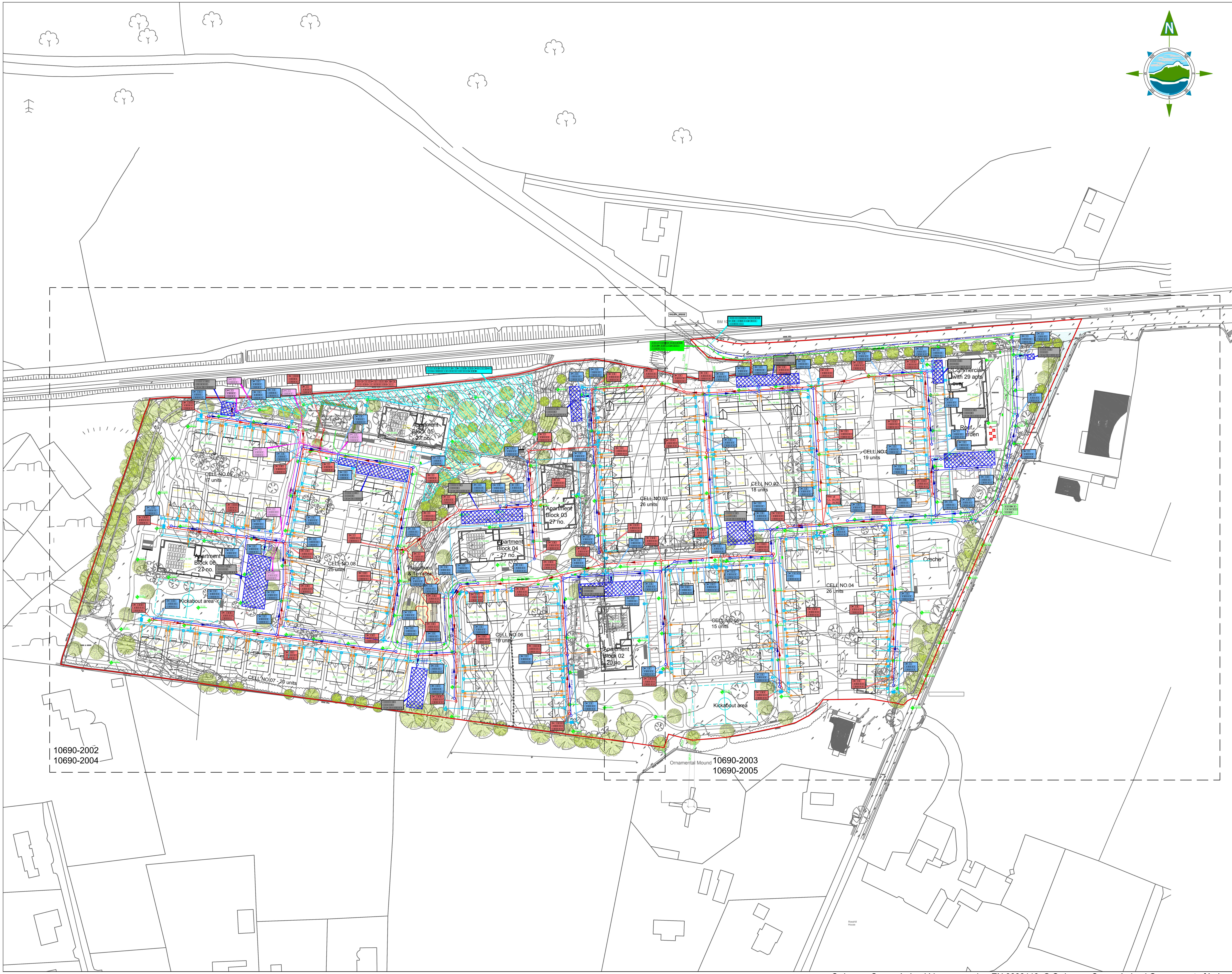
- Environmental Audits;
- Environmental Inspections and Reviews;
- Environmental Incidents; and,
- Environmental Complaints.

A Corrective Action Notice will be used to communicate the details of the action required to the main contractor. A Corrective Action Notice is a form that describes the cause and effect of an environmental problem on site and the recommended corrective action that is required. The Corrective Action Notice, when completed, will include details of close out and follow up actions.

If an environmental problem occurs on site that requires immediate attention direct communications between the Construction Manager and the Site Environmental manager will be conducted. This in turn will be passed down to the site staff involved. A Corrective Action Notice will be completed at a later date.

APPENDIX 1

SITE DRAINAGE PLAN



LEGEND

- Site Boundary
- Proposed Ø 150mm HDPE Rising Main
- Proposed Foul Sewer and Manhole
- Proposed Inspection Chamber and Connection
- Proposed Storm Sewer and Manhole
- Proposed Soakpit
- Proposed Overflow Network and Manhole
- Proposed Storm overflow Retention Swale
- Proposed Petrol Interceptor
- Proposed Level
- Finished Floor Level
- Proposed Ø 200mm PE100 SDR 17 Water Supply Pipe
- Proposed Ø 150mm PE100 SDR 17 Water Supply Pipe
- Proposed Ø 25/32mm PE80 SDR 17 House Connection and Water Meter
- Proposed Sluice Valve
- Proposed Fire Hydrant
- Proposed Bulk Meter
- Proposed Air Valve
- Proposed Scour Valve Chamber
- Proposed Thrust Block
- Proposed Wash Out Hydrant

NOTES:

1. FIGURED DIMENSIONS ONLY TO BE TAKEN FROM THIS DRAWING.
2. ALL DRAWINGS TO BE CHECKED BY THE CONTRACTOR ON SITE
3. ENGINEER/EMPLOYERS REPRESENTATIVE, AS APPROPRIATE, TO BE INFORMED BY THE CONTRACTOR OF ANY DISCREPANCIES BEFORE ANY WORK COMMENCES
4. THE CONTRACTOR SHALL UNDERTAKE A THOROUGH CHECK FOR THE ACTUAL LOCATION OF ALL SERVICES/UTILITIES, ABOVE AND BELOW GROUND, BEFORE ANY WORK COMMENCES
5. ALL LEVELS SHOWN RELATE TO ORDNANCE SURVEY DATUM AT MALIN HEAD

Rev	Date	Description	By	Chkd.
F	03/12/19	Revised after IW Comments	RD	BH
E	02/12/19	Revised after IW Comments	RD	BH
D	02.12.2019	Minor Revisions to Layout IW Comments Addressed	RD	BH
C	05.11.2019	Revised Architect Layout	JK	RD
B	17.07.19	New Backgorund	FG	RD
A	10.07.19	First Issue	JK	BH

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Proposed Drainage and Watermain Layout Key Plan

Scale @ A1: 1:1000 A3: 1:2000

Prepared by:	Checked:	Date:
JK	BH	July 2019

Project Director: M. McD.

Drawing Status: Plannning

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Drawing No.: 10690-2001 Revision: F

Individual wastewater connection to each dwelling will be as per Standard Detail STD-WW-02.

The inspection chamber will be in compliance with STD-WW-03 and STD-WW-13 and will be located within 1m of each site boundary.

Pipe materials shall comply with section 3.13. of the Code of Practice.
Pipe materials will be Unplasticised PVC for the main sewers as per Section 3.13.3 of the Code of Practice.

Manholes will conform to standard details STD-WW-09, STD-WW-10, STD-WW-11 and / or STD-WW-12 as appropriate.

Separation distances from foul sewers to structures and other utilities will comply with Section 3.5 of the Code of Practice.

Refer to STD-W-12A, STD-WW-06, STD-WW-06A & 3.26 of the code of practice for Planting Restrictions of Water and Waste Water. Root protection to be ReRoot 2000 OR Similar, if re uired

Refer to detail STD-W-11 for typical services layout distances & STD-WW-05 for wastewater typical services layout, and 3.21 Wastewater Code of Practice

Scour valve on an offline pipe to be agreed by local authority. See section 3.16.4 and 3.21 of the Water Code of Practice. Connection to Stormwater

Refer to section 3.5.16 of the waste water code of practice for unavoidable services crossover

Manhole covers located in grass areas to have 200mm all round concrete plinth and 100mm deep formed C20/25 concrete, 20mm aggregate, bedded in Clause 804 material

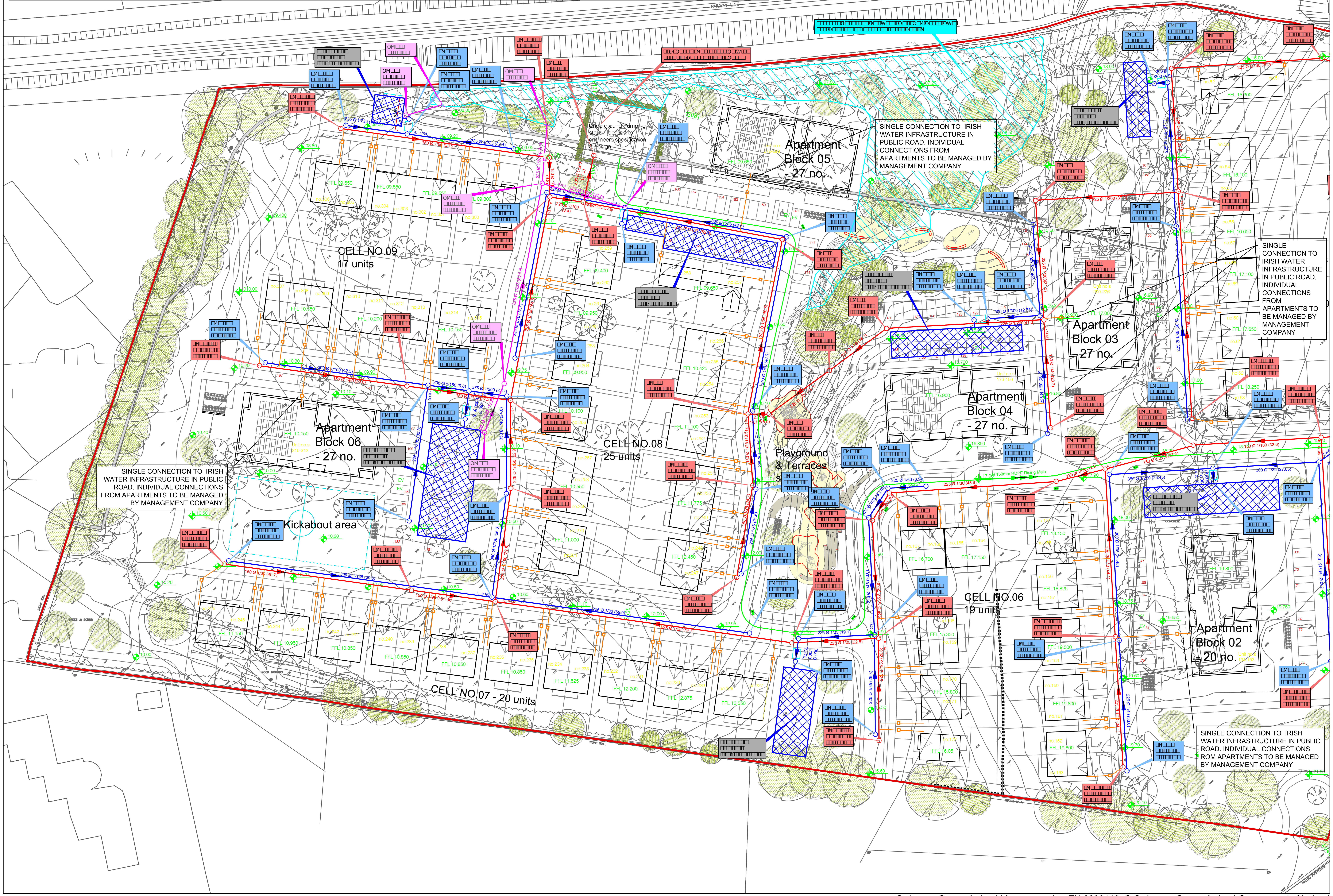
Refer to 3.5.13 of the Code of Practice for staggered systems details

Refer to section 3.14 of the Waste Water Code of Practice for Rising Main pipe materials

External face of proposed manhole chamber to be a minimum of 0.5m from kerb line and external face of sewers are a minimum of 1m from kerb line. See section 3.5.15 of Wastewater Code of Practice

Invert level of existing storm and foul manholes
at connection point on the main road to be checked and confirmed prior to commencement of any works on site.

ALL WORKS WILL BE CARRIED OUT IN ACCORDANCE WITH THE IRISH WATER CODES OF PRACTICE AND IRISH WATER DETAILS



LEGEND

- Site Boundary
- Proposed Ø 150mm HDPE Rising Main
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- Proposed Inspection Chamber and Connection
- Proposed Storm Sewer and Manhole
- Proposed Soakpit
- Proposed Overflow Network and Manhole
- Proposed Storm overflow Retention Swale
- Proposed Petrol Interceptor
- Proposed Level
- Finished Floor Level
- Rising Main marker post

NOTES:

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Rev	Date	Description	By	Chkd.
D	02.12.2019	Minor revisions to Layout IW Comments Addressed	RD	BH
C	05.11.2019	Revised Architect Layout	JK	RD
B	17.07.19	New Background	FG	RD
A	10.07.19	First Issue	JK	BH

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Proposed Drainage Layout Part 1

Scale @ A1: 1:500 A3: 1:1000

Prepared by:	Checked:	Date:
JK	BH	July 2019

Project Director: M. McD.

Drawing Status: Plannning

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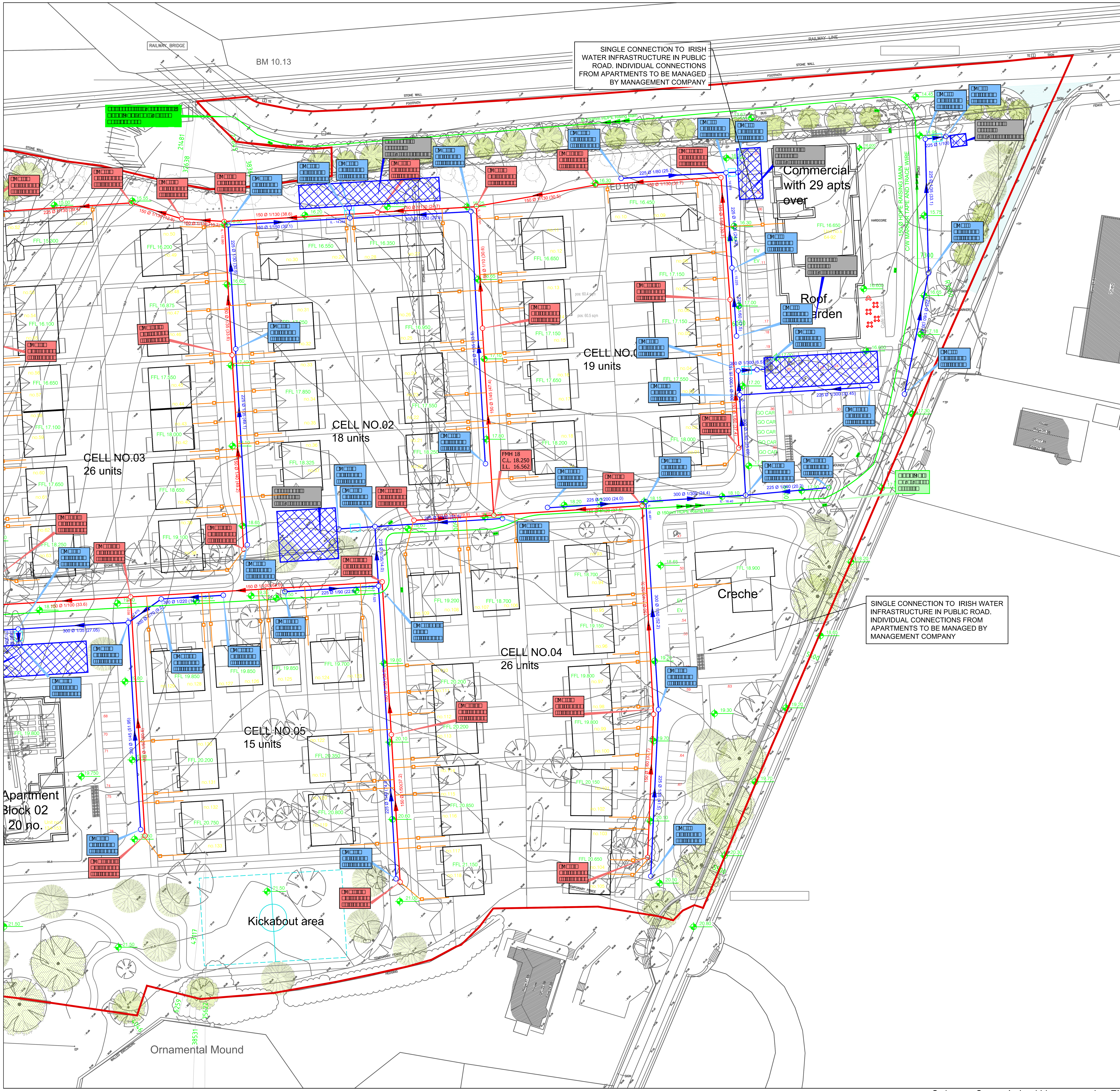
Drawing No.: 10690-2002 Revision: D



Individual wastewater connection to each dwelling will be as per Standard Detail STD-WW-02.

The inspection chamber will be in compliance with STD-WW-03 and STD-WW-13 and will be located within 1m of each site boundary.

Pipe materials shall comply with section 3.13. of the Code of Practice. Pipe materials will be Unplasticised PVC for the main sewers as per Section 3.13.3 of the Code of Practice.

Manholes will conform to standard details STD-WW-09, STD-WW-10, STD-WW-11 and / or STD-WW-12 as appropriate.

Separation distances from foul sewers to structures and other utilities will comply with Section 3.5 of the Code of Practice.

Refer to STD-W-12A, STD-WW-06, STD-WW-06A & 3.26 of the code of practice for Planting Restrictions of Water and Waste Water. Root protection to be ReRoot 2000 OR Similar, if required

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Refer to section 3.14 of the Waste Water Code of Practice for Rising Main pipe materials

External face of proposed manhole chamber to be a minimum of 0.5m from kerb line and external face of sewers are a minimum of 1m from kerb line. See section 3.5.15 of Wastewater Code of Practice

Invert level of existing storm and foul manholes at connection point on the main road to be checked and confirmed prior to commencement of any works on site.

ALL WORKS WILL BE CARRIED OUT IN ACCORDANCE WITH THE IRISH WATER CODES OF PRACTICE AND IRISH WATER DETAILS

LEGEND

- Site Boundary
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Rev	Date	Description	By	Chkd.
D	02.12.19	Minor revisions to layout Irish Water commetns addressed	RD	BH
C	05.11.2019	Revised Architect Layout	JK	RD
B	17.07.19	New Background	FG	RD
A	10.07.19	First Issue	JK	BH

Client: Kegata Ltd

Project: Residential Development at Roshill Galway

Title: Proposed Drainage Layout Part 2

Scale @ A1: 1:500 A3: 1:1000

Prepared by:	Checked:	Date:
JK	BH	July 2019

Project Director: M. McD.

Drawing Status: Planning

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Drawing No.: 10690-2003 Revision: D

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BUILT ON KNOWLEDGE

Kegata Ltd.

Residential Development, Rosshill, Galway

Report on Civil Works
Planning Stage

Residential Development, Rosshill, Galway

Report on Civil Works Planning Stage

Document Control Sheet	
Document Reference	10690/TR02
Report Status	PLANNING
Report Date	June 2019
Current Revision	B
Client:	Alber Homes Ltd
Client Address:	1st Floor, Fairgreen House, Fairgreen Rd, Galway, H91 AXK8
Project Number	10690

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Revision	Description	Author:	Date	Reviewed By:	Date	Authorised by:	Date
D01	Draft Planning Issue	RD	02/07/2019	BH	03/07/2019	RD	03/07/2019
D02	Draft Planning Issue	RD	16/07/2019	BH	16/07/2019	BH	16/07/2019
D03	Update after IW CoF Received	RD	01/08/2019	BH	01/08/2019	BH	01/08/2019
A	Planning Issue	RD	05/12/2019	BH	05/12/2019	BH	05/12/2019
B	Planning Issue – Minor Revision	RD	12/12/2019	BH	12/12/2019	BH	13/12/2019

TOBIN Consulting Engineers

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Table of Figures

1 INTRODUCTION

TOBIN Consulting Engineers were appointed in May 2019 to provide engineering consultancy services for the proposed residential development at Rosshill, in Galway City (Figure 1.1 & Figure 1.2).

This report has been prepared to detail the Civil Works Planning submission element of a residential development at Rosshill, Co. Galway. It should be read in conjunction with the foul and storm design drawings as outlined and noted herein.

This report details the foul and storm drainage design and the water main details for the development. The residential development consists of 342no. units comprising 185no. houses and 157no. apartments, including a ground-floor community space, office, cafe and retail unit. A two-storey childcare facility. The provision of public realm landscaping including shared public open space and play areas, public art, public lighting, resident and visitor parking including car rental bays, electric vehicle charging points and bike rental spaces. Pedestrian, cyclist and vehicular links throughout the development. Access road and junction improvements at Rosshill Road/Old Dublin Road.

It is proposed that the wastewater will flow via gravity to a pumping station to the north west of the site and discharge via rising main to an existing IW pumping station located at Merlin Park. The gravity sewers have been sized sufficiently to cater for future possible development to the south of the site. This report outlines the P.E.'s and wastewater flow rate. Details of storm design and water main are also presented within the report.

Figure 1.1 – Site Location

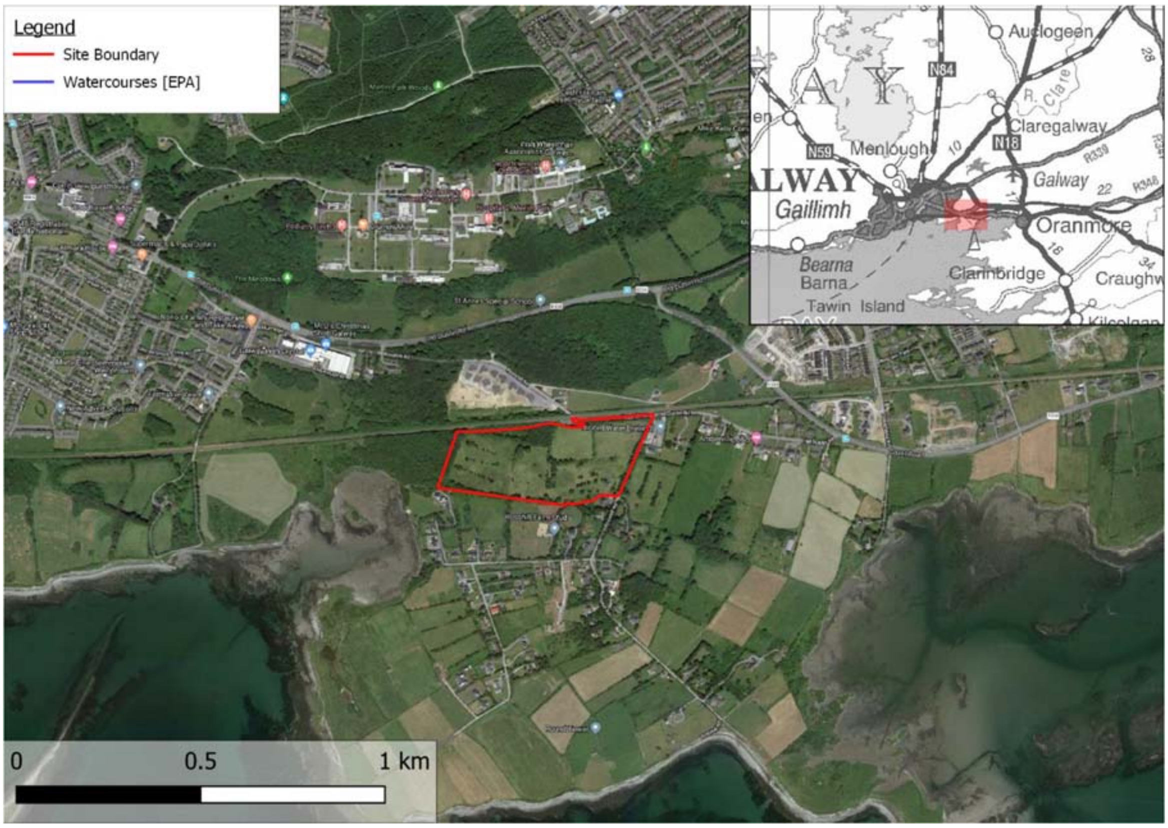

Figure 1.2 - Proposed Site Layout

1.1 Wastewater Drainage System Overview

Details of the Foul Sewer can be found in Appendix B of this document and on Drawing No. 10690-2002 & 10690-2003. It is proposed that all pipes will be thermoplastic structured wall pipes. The maximum pipe diameter is to be 225mm, with a maximum and minimum gradient of 1/20 and 1/200. All velocities at said gradients fall within the limits of 0.75 and 3m/sec as set out in "Recommendations for Site Development Works" as published by the Department of Environment.

1.2 Storm Drainage System Overview

The storm water drainage design has been designed to cater for all surface water runoff from all hard surfaces in the proposed development including roadways, roofs etc. All stormwater generated on site from roadways and roofs will discharge via Oil/Petrol Interceptor to one of 12 no. proposed soakaways which are strategically situated throughout the site. The stormwater will soak away through the underlying fractured rock/boulders. The soakaways shall be constructed of a cellular storage unit providing 95% porosity or stone filled soakaway providing 40% void ratio. These will also attenuate storm water during and post storm events prior to infiltrating through the underlying fractured rock/boulders.

The north west corner of the development is prone to occasional pluvial flooding and therefore there is additional storage provided by means of an open attenuation in the form of a swale. This area, as noted in the FRA, will remain at lower ground level (existing) which is circa 7.0 – 7.5m OD with building and roads in the vicinity being filled and constructed to 9.0m OD – 9.5m OD.

All soakaways are designed to accommodate a 1 in 100 year storm event throughout the site. The networks to the west of the site are designed to accommodate the 1 in 100 year storm event with an overflow being provided which will allow any additional volume of storm water to convey to the naturally forming swale to the north of the site. This will allow for a 1 in 1000 year storm event to be catered for as noted in the FRA.

Details of the soakaways are shown in Appendix C and located on Drawings.

The maximum pipe diameter is to be 450mm, with a maximum and minimum gradient of 1/35 and 1/300. All velocities at said gradients fall within the limits of 0.75 and 3m/sec as set out in "Recommendations for Site Development Works" as published by the Department of Environment.

2 WASTEWATER DRAINAGE DESIGN

2.1 Introduction

The pipework for the drainage system has been designed to provide for six times the dry weather flow in accordance with the Recommendations for Site Development Works as published by the Department of the Environment and Local Government and to Irish Water Code of practice and standard details. The design calculations are displayed in Appendix A. The input reference no., manhole upstream, manhole downstream, length of pipe, population equivalent, size, invert upstream (A), invert downstream (B), resulting gradient, flow rate and capacity of each foul sewer pipe within the network are tabulated in the design calculations.

2.2 Loading rates

An average rate of 2.7 P.E. per dwelling has been taken for the development to account for the varying unit occupancies. The occupancy per dwelling figures have been obtained from the Irish Water Codes of Practice as per Wastewater Code of Practice, Appendix C – Gravity Sewer Design Requirements, section 1.2.1 Housing Density & Occupancy.

150 ltr per head per day has been taken into account for the sewer design as per Irish Water Code of Practice for Wastewater Infrastructure - section 3.6 Hydraulic Design for Gravity Sewers. The foul sewer design has been designed using Microdrainage 2017.1.2 designing software. Results can be found in Appendix B.

A peak flow rate of 6 time the dry weather flow was obtained from as per Wastewater Code of Practice, Appendix C – Gravity Sewer Design Requirements, section 1.2.5. Domestic Wastewater Peaking Factors.

2.3 Wastewater Discharge

It is proposed to discharge via gravity to a pumping station located in the North-West of the site and then discharge via rising main to the existing Merlin Park pumping station. Merlin Park pumping station is currently on Irish Water Capital Infrastructure list of proposed upgrade works – Refer to Section 9.7 *Water Services* of the Galway City Development Plan 2017-2023.

Irish Water have confirmed that the proposed phase 1 and phase 2 of the development can be accommodated under the current arrangement at Merlin Park with the remaining phases being accommodated once the completion of the capital works on the Merlin Park pumping station have been carried out by 2024. Extensive consultations were held with Irish Water, in a collaborative manner, to arrive at a solution that satisfies both the achievable delivery of the houses (in phases) from the developer with that of the realistic delivery of the required infrastructure at Merlin Park.

It is understood that the proposed upgrade works at Merlin Park pumping station are now at design stage and Irish Water have stated that the timeline for completion of these works, 2024, allows for a planning application process. Refer to the Letter of Feasibility from Irish Water in Appendix G for further details.

The rising main will transverse through the site located within the roads and connect to a previously laid rising main on the Rosshill road previously constructed during the construction of the adjacent development. The Contractor has taken a collaborative approach and has agreed with the developer constructing the adjacent development to the north (Pl Ref: 16/228), in consultation with Irish Water, for the developer to lay a rising main and water main within trench to allow for the proposed development. This negates the need for an additional section of trench to be excavated on Rosshill road for this development.

2.4 Pumping Station

A typical detail of the pumping station can be found in Appendix F. The pumping station will be designed in accordance with the requirements set out in the Irish Water specification for wastewater systems IW-CDS-5030-03. The pumping station will be 15m from the boundary of the nearest dwelling as shown on drg. no. 10690-2002

From IW-CDS-5030-03, storage required for pumping station = 24 hr storage for total flow at 600l/dwelling/day

Therefore:

342 x 600 = 205,200 litres/day

An allowance has been made in the calculations for the creche and commercial units equating to the equivalent of 10no. housing units.

Where 10 no. x 600 = 6,000 litres/day

205,200 + 6,000 = 211,200 litres/day

24 hour storage required

Therefore, tank volume required = 211.2 m3 for 24 hour storage

As noted on the Irish Water Confirmation of Feasibility (refer to Appendix G), the pumping station will be required cater for any future development to the south of the proposed lands. This can be achieved by the installation of additional modular storage connected to the existing tank storage and per discussions with Irish Water.

The pumping station layout is illustrated on the site drawing and includes a 4.0m wide pull in area to allow for an occasional tanker or service vehicles to be parked outside the pumping station. It is estimated that tanker movements to the site would be minimal and subject to the operational efficiencies of the pumping station. However, it would be anticipated that no more than 2 - 4 tanker visits would be required per annum.

3 STORMWATER DRAINAGE DESIGN

3.1 Introduction

Storm water drainage design calculations are shown in Appendix B of this report. Detailed design calculations are based on the 100 year return period plus an additional 10% for climate change. As the north west section of the site has shown to be susceptible to occasional pluvial flooding in extreme events, the storm networks on the western section have been designed to a 1 in 1000 year flood event.

This entails that the soakaway being designed to cater for runoff from to 1 in 100 year storm event with excess water generated from a greater storm event conveying, via an overflow arrangement, to the naturally formed and retained swale located along the northern boundary. The swale retains the existing ground level which is approximately 7.2m OD to the formed road level of 9.0m – 9.5m OD.

The soakaways catering for the 1 in 100 year event will retain a combined volume of 343m3 of water (1 in 100 year event) with all additional overflow storm water for up to a 1 in 1000 year event being conveyed to the open swale which will have a capacity of approximately 3,670m3.

The pipe ref. No., manhole No. upstream, manhole No. downstream, length of pipe, ground level at manhole upstream, ground level at manhole downstream, impermeable area for each pipe section, invert level upstream, invert level downstream, gradient, capacity and rate of flow for each pipe section are detailed. Prior to discharge to the soakaways, it is proposed to install oil separators/silt traps at the inlet, thus reducing the amount of debris etc. entering the soakaways. Surface water from hard surfaces in the proposed development including roadways and roofs, as shown on Dwg. No. 10690-2001 & 2003, will flow by gravity to the soakaways. Results of the storm water calculations can be found in Appendix B.

3.2 Soakaway Design

The soakaways are designed to hold water for the largest storage required over a 48 hour storm period with rainfall depths taken for the 100 year return period for sliding durations obtained from Met Eireann. The stormwater discharges to groundwater.

Results of the calculations can be found in Appendix C and details of the soakaways unit are shown on drawings.

4 WATERMAIN

The Watermain has been designed in accordance with Irish Water Code of Practice and standard details.

The water supply required for the proposed development shall be via a 200mm dia watermain as per Irish Water requirements. Similar to the arrangement for the foul rising main, agreements were made with the developer constructing the adjacent residential development and in consultation with Irish Water to install the 200mm watermain within the Rosshill road to the extent of their development (i.e. 200mm watermain was previously constructed during construction of the adjacent development). This will allow the proposed development to be able to connect up to the 200mm watermain on the north side of the railway bridge instead of needing to excavate a new trench up to the R338 (old Dublin Road). Refer to Irish Water Confirmation of Feasibility letter in Appendix G noting the proposed connection location to the 200mm dia watermain just north of the railway bridge.

The watermain arrangement is shown on drawing No. 10690-2004 and 10690-2005. It is proposed to serve to site using a 200mm dia 'spine' watermain down to the main junction in the proposed development. All other branch mains from the 200mm will be 100mm PE. In accordance with Local authority standards, a water meter and Logging Device (Larson Type) are proposed at the connection into the proposed site. A sluice valve, strainer and 200mm Ø by-pass arrangement is also proposed to allow for possible disconnection of water meters by the Local Authority.

5 FIRE FIGHTING FLOWS

In order to meet required fire flow requirements, it is proposed to install a static storage capacity within the site. This is being provided as Irish Water will not guarantee available fire flow within the hydrants located on site. It is proposed to provide an underground storage tank capable of supplying 20 l/s of flow for a 1 hour period. This equates to a minimum volume required for the site of 72,000 litres.

20 l/s is derived from the 'National Guidance Document on the provisions of water for Firefighting – Water UK 3rd Edition'. The tank is located within the grassed area and easily accessible by fire tenders and tankers should they need access. A top up supply for the 150mm dia water main will be provided and a high level overflow will connect back to the main storm drainage for the site.

It is noted that in addition to the static storage tank, a significant volumes of water will still be available from hydrants located throughout the development. Any specific requirements as requested by the local fire authority when applying for the Fire Certification will be incorporated at the detail design stage.

6 CONCLUSION

The Report should be read in conjunction with the associated Drawings, layouts and specifications.

The proposed finish levels of the site generally fall from the south east corner to the north west corner making it ideal for gravity flows without needing to undertake excessive depths. The foul network as detailed herein and as shown on the drainage drawings adequately conveys foul waste to the proposed pumping station located in the north west of the site.

The proposed pumping station located to the north east of the site shall collect the foul waste for the entire development. From this point, the foul waste will be pumped to the existing Merlin Park pumping station. Works underway on the adjacent development to the north included the installation of a foul rising main to the extent of their site. This results in the connection location from the proposed development being required just south of the railway bridge instead of at the Merlin Park pumping station. This will result in an overall reduction in trenches of approximately 1.0km which would otherwise cause disruption.

As noted on the Irish Water Confirmation of Feasibility (refer to Appendix G), the pumping station will be required cater for any future development to the south of the proposed lands. This can be achieved by the installation of additional modular storage connected to the existing tank storage.

However, Irish Water also note in their Code of Practice that for developments in excess of 275 no. properties it may be possible to reduce the requirement for providing 24 hr/storage. Should this go ahead, the reduction in the volume could then be applied requiring little if any additional storage being required to the pumping station at a future stage. The preferred option will be agreed and finalised with Irish Water at detailed design stage.

As per the foul rising main, the 200mm watermain has previously been laid by the adjacent developer which will serve the proposed development with the connection point being located just south of the railway bridge. Irish Water have confirmed feasibility to connect to this 200mm dia water main just south of the railway bridge (refer to Confirmation of Feasibility letter – Appendix G). This will result in the overall reduction in trenching of approximately 540m.

Irish Water have vetted the proposed foul and watermain design for the development and have confirmed acceptance of the design. Refer to the 'Statement of Design Acceptance' in Appendix H

Storm water accumulating within the site is adequately being managed by discharging to the 12 no. soakaway's. this will result in all stormwater being retained and managed ensuring no additional volumes are conveyed to storm or combined sewers or to drains and ditches.

All wastewater and watermain infrastructure has been designed and will be constructed in accordance with Irish Water standard details and relevant codes of practice.

We trust that adequate detail has been provided for Wastewater drainage layout and Storm water drainage layout. Should you require any further detail, we will be happy to meet and supply same, as you may deem appropriate.

APPENDIX A

Stormwater Drainage Design Calculations

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	16.500	Add Flow / Climate Change (%)	10
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.900	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	30.400	0.507	60.0	0.036	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	33.127	0.946	35.0	0.022	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	4.100	0.041	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	2.000	0.020	100.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.005	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	41.50	5.30	15.500	0.036	0.0	0.0	0.5	1.69	67.3	5.3
S1.001	40.78	5.55	14.500	0.058	0.0	0.0	0.8	2.22	88.2	8.5
S1.002	40.63	5.60	13.554	0.058	0.0	0.0	0.8	1.31	52.0	8.5
S1.003	40.56	5.63	13.513	0.058	0.0	0.0	0.8	1.31	52.0	8.5
S1.004	40.43	5.67	13.493	0.058	0.0	0.0	0.8	0.75	29.8	8.5
S1.005	40.31	5.72	13.486	0.058	0.0	0.0	0.8	0.75	29.8	8.5

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	17.200	1.700	Open Manhole	1200	S1.000	15.500	225				
S2	16.450	1.950	Open Manhole	1200	S1.001	14.500	225	S1.000	14.993	225	493
S3	14.950	1.396	Open Manhole	1200	S1.002	13.554	225	S1.001	13.554	225	
S4	14.950	1.437	Open Manhole	1200	S1.003	13.513	225	S1.002	13.513	225	
S5	14.950	1.457	Open Manhole	1200	S1.004	13.493	225	S1.003	13.493	225	
S6	14.900	1.414	Open Manhole	1200	S1.005	13.486	225	S1.004	13.486	225	
S	14.900	1.421	Open Manhole	0		OUTFALL		S1.005	13.479	225	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	17.200	15.500	1.475	Open Manhole	1200
S1.001	o	225	S2	16.450	14.500	1.725	Open Manhole	1200
S1.002	o	225	S3	14.950	13.554	1.171	Open Manhole	1200
S1.003	o	225	S4	14.950	13.513	1.212	Open Manhole	1200
S1.004	o	225	S5	14.950	13.493	1.232	Open Manhole	1200
S1.005	o	225	S6	14.900	13.486	1.189	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	30.400	60.0	S2	16.450	14.993	1.232	Open Manhole	1200
S1.001	33.127	35.0	S3	14.950	13.554	1.171	Open Manhole	1200
S1.002	4.100	100.0	S4	14.950	13.513	1.212	Open Manhole	1200
S1.003	2.000	100.0	S5	14.950	13.493	1.232	Open Manhole	1200
S1.004	2.000	300.0	S6	14.900	13.486	1.189	Open Manhole	1200
S1.005	2.000	300.0	S	14.900	13.479	1.196	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.005	S	14.900	13.479	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coefficient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Ratio R	0.300
Return Period (years)	1	Profile Type	Summer
Region	Scotland and Ireland	Cv (Summer)	0.900
M5-60 (mm)	16.500	Cv (Winter)	0.840

Synthetic Rainfall Details

Storm Duration (mins) 30

Storage Structures for Storm

Cellular Storage Manhole: S6, DS/PN: S1.005

Invert Level (m) 12.493 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.72000 Porosity 0.40
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	12.0	12.0	1.300	0.0	28.8
1.200	12.0	28.8			

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	16.500	Volumetric Runoff Coeff.	0.900	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	10	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	17.500	0.292	60.0	0.056	5.00	0.0	0.600	o	225	Pipe/Conduit	🔒

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	41.89	5.17	15.517	0.056	0.0	0.0	0.8	1.69	67.3	8.4

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.001	30.600	0.306	100.0	0.185	0.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	25.700	0.321	80.0	0.031	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	1.880	0.013	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	2.000	0.013	150.0	0.000	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.005	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.001	40.74	5.56	15.225	0.241	0.0	0.0	3.2	1.31	52.0	35.1
S2.000	41.52	5.29	15.175	0.031	0.0	0.0	0.4	1.46	58.2	4.6
S1.002	40.66	5.59	14.854	0.272	0.0	0.0	3.6	1.07	42.4	39.5
S1.003	40.57	5.62	14.841	0.272	0.0	0.0	3.6	1.07	42.4	39.5
S1.004	40.46	5.66	14.753	0.272	0.0	0.0	3.6	0.90	63.8	39.5
S1.005	40.36	5.70	14.746	0.272	0.0	0.0	3.6	0.90	63.8	39.5

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	17.100	1.583	Open Manhole	1200	S1.000	15.517	225				
S2	16.650	1.425	Open Manhole	1200	S1.001	15.225	225	S1.000	15.225	225	
S3	16.300	1.125	Open Manhole	1200	S2.000	15.175	225				
S4	16.200	1.346	Open Manhole	1200	S1.002	14.854	225	S1.001	14.919	225	66
								S2.000	14.854	225	
S5	16.200	1.359	Open Manhole	1200	S1.003	14.841	225	S1.002	14.841	225	
S6	16.200	1.447	Open Manhole	1200	S1.004	14.753	300	S1.003	14.828	225	
S7	16.150	1.404	Open Manhole	1200	S1.005	14.746	300	S1.004	14.746	300	
S	16.200	1.460	Open Manhole	0		OUTFALL		S1.005	14.740	300	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	17.100	15.517	1.358	Open Manhole	1200
S1.001	o	225	S2	16.650	15.225	1.200	Open Manhole	1200
S2.000	o	225	S3	16.300	15.175	0.900	Open Manhole	1200
S1.002	o	225	S4	16.200	14.854	1.121	Open Manhole	1200
S1.003	o	225	S5	16.200	14.841	1.134	Open Manhole	1200
S1.004	o	300	S6	16.200	14.753	1.147	Open Manhole	1200
S1.005	o	300	S7	16.150	14.746	1.104	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	17.500	60.0	S2	16.650	15.225	1.200	Open Manhole	1200
S1.001	30.600	100.0	S4	16.200	14.919	1.056	Open Manhole	1200
S2.000	25.700	80.0	S4	16.200	14.854	1.121	Open Manhole	1200
S1.002	1.880	150.0	S5	16.200	14.841	1.134	Open Manhole	1200
S1.003	2.000	150.0	S6	16.200	14.828	1.147	Open Manhole	1200
S1.004	2.000	300.0	S7	16.150	14.746	1.104	Open Manhole	1200
S1.005	2.000	300.0	S	16.200	14.740	1.160	Open Manhole	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	10.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	0	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	16.500	Cv (Summer)	0.900
Return Period (years)	1	Ratio R	0.300	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	Foul Sewage (l/s/ha)	0.000	Maximum Backdrop Height (m)	1.500
M5-60 (mm)	16.700	Volumetric Runoff Coeff.	0.750	Min Design Depth for Optimisation (m)	1.200
Ratio R	0.300	PIMP (%)	100	Min Vel for Auto Design only (m/s)	1.00
Maximum Rainfall (mm/hr)	50	Add Flow / Climate Change (%)	10	Min Slope for Optimisation (1:X)	500
Maximum Time of Concentration (mins)	30	Minimum Backdrop Height (m)	0.200		

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	41.500	1.186	35.0	0.134	5.00	0.0	0.600	o	225	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	41.98	5.31	18.900	0.134	0.0	0.0	1.5	2.22	88.2	16.8

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.001	52.200	1.044	50.0	0.256	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	24.000	0.120	200.0	0.041	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	24.400	0.081	300.0	0.021	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.000	20.200	0.067	300.0	0.018	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.003	25.600	0.640	40.0	0.152	0.00	0.0	0.600	o	350	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.001	40.84	5.70	17.525	0.390	0.0	0.0	4.3	2.23	157.5	47.5
S2.000	41.61	5.43	16.775	0.041	0.0	0.0	0.5	0.92	36.6	5.1
S1.002	39.62	6.15	16.481	0.452	0.0	0.0	4.9	0.90	63.8	53.4
S3.000	41.57	5.45	16.525	0.018	0.0	0.0	0.2	0.75	29.8	2.2
S1.003	39.23	6.31	16.333	0.622	0.0	0.0	6.6	2.75	264.6	72.7

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S4.000	33.450	0.112	300.0	0.050	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.004	5.000	0.017	300.0	0.017	0.00	0.0	0.600	o	350	Pipe/Conduit	
S1.005	6.500	0.033	197.0	0.006	0.00	0.0	0.600	o	350	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S4.000	40.73	5.74	15.425	0.050	0.0	0.0	0.6	0.75	29.8	6.1
S1.004	39.01	6.39	15.189	0.689	0.0	0.0	7.3	1.00	95.8	80.1
S1.005	38.80	6.48	15.172	0.695	0.0	0.0	7.3	1.23	118.5	80.3

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN (Pipe Out)	Pipe Out Invert Level (m)	Diameter (mm)	PN (Pipes In)	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	20.450	1.550	Open Manhole	1200	S1.000	18.900	225				
S3	19.300	1.775	Open Manhole	1200	S1.001	17.525	300	S1.000	17.714	225	114
S4	18.200	1.425	Open Manhole	1200	S2.000	16.775	225				
S5	18.150	1.669	Open Manhole	1200	S1.002	16.481	300	S1.001	16.481	300	
								S2.000	16.655	225	99
S6	17.950	1.425	Open Manhole	1200	S3.000	16.525	225				
S7	18.200	1.867	Open Manhole	1200	S1.003	16.333	350	S1.002	16.400	300	17
								S3.000	16.458	225	
S8	16.850	1.425	Open Manhole	1200	S4.000	15.425	225				
S9	17.100	1.912	Open Manhole	1200	S1.004	15.189	350	S1.003	15.693	350	504
								S4.000	15.314	225	
S10	17.200	2.028	Open Manhole	1200	S1.005	15.172	350	S1.004	15.172	350	
S	17.000	1.861	Open Manhole	0		OUTFALL		S1.005	15.139	350	

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.750	Manhole Headloss Coeff (Global)	0.500	Inlet Coeffiecient	0.800
Areal Reduction Factor	1.000	Foul Sewage per hectare (l/s)	0.000	Flow per Person per Day (l/per/day)	0.000
Hot Start (mins)	0	Additional Flow - % of Total Flow	10.000	Run Time (mins)	60
Hot Start Level (mm)	0	MADD Factor * 10m³/ha Storage	2.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0	Number of Time/Area Diagrams	0
Number of Online Controls	0	Number of Storage Structures	1	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	M5-60 (mm)	16.700	Cv (Summer)	0.750
Return Period (years)	1	Ratio R	0.300	Cv (Winter)	0.840
Region	Scotland and Ireland	Profile Type	Summer	Storm Duration (mins)	30

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	16.500	Add Flow / Climate Change (%)	10
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.900	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	63.500	1.814	35.0	0.296	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	29.900	0.100	300.0	0.054	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	49.100	1.403	35.0	0.174	5.00	0.0	0.600	o	225	Pipe/Conduit	
S2.001	30.600	1.020	30.0	0.174	0.00	0.0	0.600	o	300	Pipe/Conduit	
S2.002	30.100	0.201	149.8	0.051	0.00	0.0	0.600	o	350	Pipe/Conduit	
S1.002	2.450	0.012	200.0	0.000	0.00	0.0	0.600	o	350	Pipe/Conduit	
S1.003	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	400	Pipe/Conduit	
S1.004	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	400	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	40.98	5.48	16.475	0.296	0.0	0.0	3.9	2.22	88.2	43.4
S1.001	39.46	6.03	14.562	0.350	0.0	0.0	4.5	0.90	63.8	49.4
S2.000	41.30	5.37	17.175	0.174	0.0	0.0	2.3	2.22	88.2	25.7
S2.001	40.79	5.55	15.555	0.348	0.0	0.0	4.6	2.88	203.7	50.7
S2.002	39.80	5.90	14.485	0.399	0.0	0.0	5.2	1.41	136.1	56.8
S1.002	39.38	6.06	14.284	0.749	0.0	0.0	9.6	1.22	117.6	105.4
S1.003	39.30	6.09	14.222	0.749	0.0	0.0	9.6	1.08	136.3	105.4
S1.004	39.22	6.12	14.215	0.749	0.0	0.0	9.6	1.08	136.3	105.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	17.900	1.425	Open Manhole	1200	S1.000	16.475	225				
S2	16.100	1.538	Open Manhole	1200	S1.001	14.562	300	S1.000	14.661	225	24
S3	18.800	1.625	Open Manhole	1200	S2.000	17.175	225				
S4	17.250	1.695	Open Manhole	1200	S2.001	15.555	300	S2.000	15.772	225	142
S4	16.000	1.515	Open Manhole	1200	S2.002	14.485	350	S2.001	14.535	300	
S5	16.150	1.866	Open Manhole	1200	S1.002	14.284	350	S1.001	14.462	300	128
								S2.002	14.284	350	
S7	16.150	1.928	Open Manhole	1350	S1.003	14.222	400	S1.002	14.272	350	
S8	16.150	1.935	Open Manhole	1350	S1.004	14.215	400	S1.003	14.215	400	
S	16.150	1.942	Open Manhole	0		OUTFALL		S1.004	14.208	400	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	17.900	16.475	1.200	Open Manhole	1200
S1.001	o	300	S2	16.100	14.562	1.238	Open Manhole	1200
S2.000	o	225	S3	18.800	17.175	1.400	Open Manhole	1200
S2.001	o	300	S4	17.250	15.555	1.395	Open Manhole	1200
S2.002	o	350	S4	16.000	14.485	1.165	Open Manhole	1200
S1.002	o	350	S5	16.150	14.284	1.516	Open Manhole	1200
S1.003	o	400	S7	16.150	14.222	1.528	Open Manhole	1350
S1.004	o	400	S8	16.150	14.215	1.535	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	63.500	35.0	S2	16.100	14.661	1.214	Open Manhole	1200
S1.001	29.900	300.0	S5	16.150	14.462	1.388	Open Manhole	1200
S2.000	49.100	35.0	S4	17.250	15.772	1.253	Open Manhole	1200
S2.001	30.600	30.0	S4	16.000	14.535	1.165	Open Manhole	1200
S2.002	30.100	149.8	S5	16.150	14.284	1.516	Open Manhole	1200
S1.002	2.450	200.0	S7	16.150	14.272	1.528	Open Manhole	1350
S1.003	2.000	300.0	S8	16.150	14.215	1.535	Open Manhole	1350
S1.004	2.000	300.0	S	16.150	14.208	1.542	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.004	S	16.150	14.208	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	0	Number of Storage Structures	1

Simulation Criteria for Storm

Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.900
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.500	Storm Duration (mins)	30
Ratio R	0.300		

Storage Structures for Storm

Cellular Storage Manhole: S8, DS/PN: S1.004

Invert Level (m) 13.075 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 1.02136 Porosity 0.40
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	216.0	216.0	1.300	0.0	316.8
1.200	216.0	316.8			

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	16.500	Add Flow / Climate Change (%)	10
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.900	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	74.000	1.850	40.0	0.268	5.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	22.800	0.253	90.0	0.076	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	14.000	0.400	35.0	0.010	0.00	0.0	0.600	o	225	Pipe/Conduit	
S3.000	31.500	0.105	300.0	0.090	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	8.100	0.027	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	40.65	5.59	19.375	0.268	0.0	0.0	3.5	2.07	82.5	38.9
S2.000	41.58	5.28	18.075	0.076	0.0	0.0	1.0	1.38	54.8	11.3
S1.001	40.35	5.70	17.525	0.354	0.0	0.0	4.6	2.22	88.2	51.1
S3.000	40.35	5.70	16.825	0.090	0.0	0.0	1.2	0.75	29.8	13.0
S1.002	39.94	5.85	16.645	0.444	0.0	0.0	5.8	0.90	63.8	63.4
S1.003	39.84	5.89	16.618	0.444	0.0	0.0	5.8	0.90	63.8	63.4
S1.004	39.74	5.92	16.611	0.444	0.0	0.0	5.8	0.90	63.8	63.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	20.800	1.425	Open Manhole	1200	S1.000	19.375	225				
S2	19.500	1.425	Open Manhole	1200	S2.000	18.075	225				
S3	19.250	1.725	Open Manhole	1200	S1.001	17.525	225	S1.000	17.525	225	
								S2.000	17.822	225	297
S4	18.250	1.425	Open Manhole	1200	S3.000	16.825	225				
S5	18.550	1.905	Open Manhole	1200	S1.002	16.645	300	S1.001	17.125	225	405
								S3.000	16.720	225	
S6	18.550	1.932	Open Manhole	1200	S1.003	16.618	300	S1.002	16.618	300	
S7	18.550	1.939	Open Manhole	1200	S1.004	16.611	300	S1.003	16.611	300	
S	18.550	1.945	Open Manhole	0		OUTFALL		S1.004	16.605	300	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	20.800	19.375	1.200	Open Manhole	1200
S2.000	o	225	S2	19.500	18.075	1.200	Open Manhole	1200
S1.001	o	225	S3	19.250	17.525	1.500	Open Manhole	1200
S3.000	o	225	S4	18.250	16.825	1.200	Open Manhole	1200
S1.002	o	300	S5	18.550	16.645	1.605	Open Manhole	1200
S1.003	o	300	S6	18.550	16.618	1.632	Open Manhole	1200
S1.004	o	300	S7	18.550	16.611	1.639	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	74.000	40.0	S3	19.250	17.525	1.500	Open Manhole	1200
S2.000	22.800	90.0	S3	19.250	17.822	1.203	Open Manhole	1200
S1.001	14.000	35.0	S5	18.550	17.125	1.200	Open Manhole	1200
S3.000	31.500	300.0	S5	18.550	16.720	1.605	Open Manhole	1200
S1.002	8.100	300.0	S6	18.550	16.618	1.632	Open Manhole	1200
S1.003	2.000	300.0	S7	18.550	16.611	1.639	Open Manhole	1200
S1.004	2.000	300.0	S	18.550	16.605	1.645	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.004	S	18.550	16.605	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.900
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.500	Storm Duration (mins)	30
Ratio R	0.300		

Storage Structures for Storm

Cellular Storage Manhole: S7, DS/PN: S1.004

Invert Level (m) 15.420 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.42800 Porosity 0.40
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	195.0	195.0	1.300	0.0	262.2
1.200	195.0	262.2			

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	16.500	Add Flow / Climate Change (%)	10
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.900	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	51.950	1.154	45.0	0.220	5.00	0.0	0.600	o	300	Pipe/Conduit	
S2.000	14.700	0.067	219.4	0.046	5.00	0.0	0.600	o	300	Pipe/Conduit	
S2.001	9.200	0.133	69.1	0.046	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.001	27.050	0.773	35.0	0.034	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.000	33.600	0.840	40.0	0.176	5.00	0.0	0.600	o	225	Pipe/Conduit	
S3.001	26.450	0.756	35.0	0.176	0.00	0.0	0.600	o	300	Pipe/Conduit	
S3.002	26.450	0.176	150.3	0.030	0.00	0.0	0.600	o	350	Pipe/Conduit	
S1.002	3.300	0.017	194.1	0.000	0.00	0.0	0.600	o	400	Pipe/Conduit	
S1.003	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	400	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	41.30	5.37	19.125	0.220	0.0	0.0	3.0	2.35	166.1	32.5
S2.000	41.71	5.23	18.075	0.046	0.0	0.0	0.6	1.06	74.7	6.9
S2.001	41.47	5.31	18.008	0.092	0.0	0.0	1.2	1.89	133.9	13.6
S1.001	40.81	5.54	17.875	0.346	0.0	0.0	4.6	2.67	188.5	50.5
S3.000	41.59	5.27	18.400	0.176	0.0	0.0	2.4	2.07	82.5	26.2
S3.001	41.10	5.44	17.300	0.352	0.0	0.0	4.7	2.67	188.5	51.7
S3.002	40.22	5.75	16.494	0.382	0.0	0.0	5.0	1.41	135.9	54.9
S1.002	40.11	5.79	16.268	0.728	0.0	0.0	9.5	1.35	169.8	104.4
S1.003	40.03	5.82	16.251	0.728	0.0	0.0	9.5	1.08	136.3	104.4

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.004	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	400	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.004	39.94	5.85	16.244	0.728	0.0	0.0	9.5	1.08	136.3	104.4

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
S1	20.550	1.425	Open Manhole	1200	S1.000	19.125	300				
S2	19.500	1.425	Open Manhole	1200	S2.000	18.075	300				
S3	19.450	1.442	Open Manhole	1200	S2.001	18.008	300	S2.000	18.008	300	
S3	19.450	1.575	Open Manhole	1200	S1.001	17.875	300	S1.000	17.971	300	96
								S2.001	17.875	300	
S4	20.000	1.600	Open Manhole	1200	S3.000	18.400	225				
S5	19.000	1.700	Open Manhole	1200	S3.001	17.300	300	S3.000	17.560	225	185
S6	18.000	1.506	Open Manhole	1200	S3.002	16.494	350	S3.001	16.544	300	
S8	18.600	2.332	Open Manhole	1350	S1.002	16.268	400	S1.001	17.102	300	734
								S3.002	16.318	350	
S9	18.600	2.349	Open Manhole	1350	S1.003	16.251	400	S1.002	16.251	400	
S10	18.600	2.356	Open Manhole	1350	S1.004	16.244	400	S1.003	16.244	400	
S	18.600	2.362	Open Manhole	0		OUTFALL		S1.004	16.238	400	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	300	S1	20.550	19.125	1.125	Open Manhole	1200
S2.000	o	300	S2	19.500	18.075	1.125	Open Manhole	1200
S2.001	o	300	S3	19.450	18.008	1.142	Open Manhole	1200
S1.001	o	300	S3	19.450	17.875	1.275	Open Manhole	1200
S3.000	o	225	S4	20.000	18.400	1.375	Open Manhole	1200
S3.001	o	300	S5	19.000	17.300	1.400	Open Manhole	1200
S3.002	o	350	S6	18.000	16.494	1.156	Open Manhole	1200
S1.002	o	400	S8	18.600	16.268	1.932	Open Manhole	1350
S1.003	o	400	S9	18.600	16.251	1.949	Open Manhole	1350
S1.004	o	400	S10	18.600	16.244	1.956	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	51.950	45.0	S3	19.450	17.971	1.179	Open Manhole	1200
S2.000	14.700	219.4	S3	19.450	18.008	1.142	Open Manhole	1200
S2.001	9.200	69.1	S3	19.450	17.875	1.275	Open Manhole	1200
S1.001	27.050	35.0	S8	18.600	17.102	1.198	Open Manhole	1350
S3.000	33.600	40.0	S5	19.000	17.560	1.215	Open Manhole	1200
S3.001	26.450	35.0	S6	18.000	16.544	1.156	Open Manhole	1200
S3.002	26.450	150.3	S8	18.600	16.318	1.932	Open Manhole	1350
S1.002	3.300	194.1	S9	18.600	16.251	1.949	Open Manhole	1350
S1.003	2.000	300.0	S10	18.600	16.244	1.956	Open Manhole	1350
S1.004	2.000	300.0	S	18.600	16.238	1.962	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.004	S	18.600	16.238	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.900
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.500	Storm Duration (mins)	30
Ratio R	0.300		

Storage Structures for Storm

Cellular Storage Manhole: S10, DS/PN: S1.004

Invert Level (m) 15.050 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.42800 Porosity 0.40
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	312.0	312.0	1.300	0.0	424.8
1.200	312.0	424.8			

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	16.600	Add Flow / Climate Change (%)	10
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.900	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	50.500	1.443	35.0	0.144	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	37.100	1.060	35.0	0.144	0.00	0.0	0.600	o	225	Pipe/Conduit	
S1.002	4.900	0.016	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	41.52	5.38	16.300	0.144	0.0	0.0	1.9	2.22	88.2	21.4
S1.001	40.72	5.66	14.325	0.288	0.0	0.0	3.8	2.22	88.2	41.9
S1.002	40.47	5.75	13.190	0.288	0.0	0.0	3.8	0.90	63.8	41.9
S1.003	40.36	5.79	13.174	0.288	0.0	0.0	3.8	0.90	63.8	41.9
S1.004	40.26	5.82	13.167	0.288	0.0	0.0	3.8	0.90	63.8	41.9

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	18.000	1.700	Open Manhole	1200	S1.000	16.300	225				
S2	16.300	1.975	Open Manhole	1200	S1.001	14.325	225	S1.000	14.857	225	532
S3	14.700	1.510	Open Manhole	1200	S1.002	13.190	300	S1.001	13.265	225	
S4	14.700	1.526	Open Manhole	1200	S1.003	13.174	300	S1.002	13.174	300	
S5	14.700	1.533	Open Manhole	1200	S1.004	13.167	300	S1.003	13.167	300	
S	14.700	1.540	Open Manhole	0		OUTFALL		S1.004	13.160	300	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	18.000	16.300	1.475	Open Manhole	1200
S1.001	o	225	S2	16.300	14.325	1.750	Open Manhole	1200
S1.002	o	300	S3	14.700	13.190	1.210	Open Manhole	1200
S1.003	o	300	S4	14.700	13.174	1.226	Open Manhole	1200
S1.004	o	300	S5	14.700	13.167	1.233	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	50.500	35.0	S2	16.300	14.857	1.218	Open Manhole	1200
S1.001	37.100	35.0	S3	14.700	13.265	1.210	Open Manhole	1200
S1.002	4.900	300.0	S4	14.700	13.174	1.226	Open Manhole	1200
S1.003	2.000	300.0	S5	14.700	13.167	1.233	Open Manhole	1200
S1.004	2.000	300.0	S	14.700	13.160	1.240	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.004	S	14.700	13.160	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.900
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.600	Storm Duration (mins)	30
Ratio R	0.300		

Storage Structures for Storm

Cellular Storage Manhole: S5, DS/PN: S1.004

Invert Level (m) 12.000 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.33959 Porosity 0.40
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	120.0	120.0	1.300	0.0	182.4
1.200	120.0	182.4			

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	17.000	Add Flow / Climate Change (%)	10
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	1.00
Volumetric Runoff Coeff.	0.900	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
S1.000	30.200	0.604	50.0	0.068	5.00	0.0	0.600	o	225	Pipe/Conduit	
S2.000	23.200	0.077	300.0	0.081	5.00	0.0	0.600	o	225	Pipe/Conduit	
S1.001	15.600	0.052	300.0	0.170	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.002	3.080	0.010	308.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.003	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
S1.004	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
S1.000	42.87	5.27	15.375	0.068	0.0	0.0	0.9	1.85	73.7	10.4
S2.000	42.13	5.52	14.125	0.081	0.0	0.0	1.1	0.75	29.8	12.2
S1.001	41.30	5.80	13.973	0.319	0.0	0.0	4.3	0.90	63.8	47.1
S1.002	41.14	5.86	13.921	0.319	0.0	0.0	4.3	0.89	63.0	47.1
S1.003	41.04	5.90	13.911	0.319	0.0	0.0	4.3	0.90	63.8	47.1
S1.004	40.94	5.94	13.904	0.319	0.0	0.0	4.3	0.90	63.8	47.1

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
S1	16.850	1.475	Open Manhole	1200	S1.000	15.375	225				
S2	15.550	1.425	Open Manhole	1200	S2.000	14.125	225				
S3	16.200	2.227	Open Manhole	1200	S1.001	13.973	300	S1.000	14.771	225	723
								S2.000	14.048	225	
S4	15.950	2.029	Open Manhole	1200	S1.002	13.921	300	S1.001	13.921	300	
S5	15.950	2.039	Open Manhole	1200	S1.003	13.911	300	S1.002	13.911	300	
S6	15.950	2.046	Open Manhole	1200	S1.004	13.904	300	S1.003	13.904	300	
S	15.950	2.053	Open Manhole	0		OUTFALL		S1.004	13.897	300	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	o	225	S1	16.850	15.375	1.250	Open Manhole	1200
S2.000	o	225	S2	15.550	14.125	1.200	Open Manhole	1200
S1.001	o	300	S3	16.200	13.973	1.927	Open Manhole	1200
S1.002	o	300	S4	15.950	13.921	1.729	Open Manhole	1200
S1.003	o	300	S5	15.950	13.911	1.739	Open Manhole	1200
S1.004	o	300	S6	15.950	13.904	1.746	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
S1.000	30.200	50.0	S3	16.200	14.771	1.204	Open Manhole	1200
S2.000	23.200	300.0	S3	16.200	14.048	1.927	Open Manhole	1200
S1.001	15.600	300.0	S4	15.950	13.921	1.729	Open Manhole	1200
S1.002	3.080	308.0	S5	15.950	13.911	1.739	Open Manhole	1200
S1.003	2.000	300.0	S6	15.950	13.904	1.746	Open Manhole	1200
S1.004	2.000	300.0	S	15.950	13.897	1.753	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
S1.004	S	15.950	13.897	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.900
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	17.000	Storm Duration (mins)	30
Ratio R	0.300		

Storage Structures for Storm

Cellular Storage Manhole: S6, DS/PN: S1.004

Invert Level (m) 12.704 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.08316 Porosity 0.40
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	261.0	261.0	1.300	0.0	352.2
1.200	261.0	352.2			

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	16.800	Add Flow / Climate Change (%)	10
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.900	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	8.900	0.148	60.1	0.068	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	8.218	0.235	35.0	0.025	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	30.000	0.675	44.4	0.025	0.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	25.300	0.723	35.0	0.119	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.003	19.100	0.546	35.0	0.021	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	7.372	0.025	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.005	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.006	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	42.93	5.09	14.925	0.068	0.0	0.0	0.9	1.69	67.2	10.4
1.001	42.73	5.15	14.210	0.093	0.0	0.0	1.3	2.22	88.3	14.2
1.002	41.96	5.40	13.975	0.118	0.0	0.0	1.6	1.97	78.2	17.7
2.000	42.61	5.19	14.175	0.119	0.0	0.0	1.6	2.22	88.2	18.1
1.003	41.54	5.55	13.000	0.258	0.0	0.0	3.5	2.22	88.2	38.3
1.004	41.15	5.68	12.379	0.258	0.0	0.0	3.5	0.90	63.8	38.3
1.005	41.04	5.72	12.354	0.258	0.0	0.0	3.5	0.90	63.8	38.3
1.006	40.94	5.76	12.348	0.258	0.0	0.0	3.5	0.90	63.8	38.3

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	16.350	1.425	Open Manhole	1200	1.000	14.925	225				
2	16.250	2.040	Open Manhole	1200	1.001	14.210	225	1.000	14.777	225	567
3	15.400	1.425	Open Manhole	1200	1.002	13.975	225	1.001	13.975	225	
4	15.600	1.425	Open Manhole	1200	2.000	14.175	225				
5	14.900	1.900	Open Manhole	1200	1.003	13.000	225	1.002	13.300	225	300
								2.000	13.452	225	452
6	13.950	1.571	Open Manhole	1200	1.004	12.379	300	1.003	12.454	225	
7	13.950	1.596	Open Manhole	1200	1.005	12.354	300	1.004	12.354	300	
8	13.950	1.602	Open Manhole	1200	1.006	12.348	300	1.005	12.348	300	
	13.950	1.609	Open Manhole	0		OUTFALL		1.006	12.341	300	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	1	16.350	14.925	1.200	Open Manhole	1200
1.001	o	225	2	16.250	14.210	1.815	Open Manhole	1200
1.002	o	225	3	15.400	13.975	1.200	Open Manhole	1200
2.000	o	225	4	15.600	14.175	1.200	Open Manhole	1200
1.003	o	225	5	14.900	13.000	1.675	Open Manhole	1200
1.004	o	300	6	13.950	12.379	1.271	Open Manhole	1200
1.005	o	300	7	13.950	12.354	1.296	Open Manhole	1200
1.006	o	300	8	13.950	12.348	1.302	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	8.900	60.1	2	16.250	14.777	1.248	Open Manhole	1200
1.001	8.218	35.0	3	15.400	13.975	1.200	Open Manhole	1200
1.002	30.000	44.4	5	14.900	13.300	1.375	Open Manhole	1200
2.000	25.300	35.0	5	14.900	13.452	1.223	Open Manhole	1200
1.003	19.100	35.0	6	13.950	12.454	1.271	Open Manhole	1200
1.004	7.372	300.0	7	13.950	12.354	1.296	Open Manhole	1200
1.005	2.000	300.0	8	13.950	12.348	1.302	Open Manhole	1200
1.006	2.000	300.0		13.950	12.341	1.309	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006		13.950	12.341	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Offline Controls	0
Number of Online Controls	0	Number of Storage Structures	1

Simulation Criteria for Storm

Number of Time/Area Diagrams 0 Number of Real Time Controls 0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.900
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.800	Storm Duration (mins)	30
Ratio R	0.300		

Storage Structures for Storm

Cellular Storage Manhole: 8, DS/PN: 1.006

Invert Level (m) 11.155 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.08316 Porosity 0.40
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	220.0	220.0	1.300	0.0	294.4
1.200	220.0	294.4			

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	16.800	Add Flow / Climate Change (%)	10
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.900	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	21.600	0.617	35.0	0.081	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	19.700	0.563	35.0	0.060	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.002	46.000	0.700	65.7	0.137	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	42.600	0.448	95.0	0.137	0.00	0.0	0.600	o	300	Pipe/Conduit	
2.000	43.700	0.624	70.0	0.119	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.001	19.900	0.100	199.0	0.032	0.00	0.0	0.600	o	225	Pipe/Conduit	
1.004	1.700	0.006	300.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.005	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	
1.006	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	375	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	42.69	5.16	10.292	0.081	0.0	0.0	1.1	2.22	88.2	12.4
1.001	42.24	5.31	9.275	0.141	0.0	0.0	1.9	2.22	88.2	21.3
1.002	41.08	5.70	8.637	0.278	0.0	0.0	3.7	1.94	137.3	40.8
1.003	39.89	6.14	7.937	0.415	0.0	0.0	5.4	1.61	114.0	59.2
2.000	41.78	5.47	8.325	0.119	0.0	0.0	1.6	1.56	62.2	17.8
2.001	40.75	5.82	7.675	0.151	0.0	0.0	2.0	0.92	36.7	22.0
1.004	39.81	6.17	7.414	0.566	0.0	0.0	7.3	1.04	115.0	80.6
1.005	39.73	6.20	7.408	0.566	0.0	0.0	7.3	1.04	115.0	80.6
1.006	39.65	6.24	7.401	0.566	0.0	0.0	7.3	1.04	115.0	80.6

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	12.350	2.058	Open Manhole	1200	1.000	10.292	225				
2	11.100	1.825	Open Manhole	1200	1.001	9.275	225	1.000	9.675	225	400
3	10.200	1.563	Open Manhole	1200	1.002	8.637	300	1.001	8.712	225	
4	9.500	1.563	Open Manhole	1200	1.003	7.937	300	1.002	7.937	300	
5	9.750	1.425	Open Manhole	1200	2.000	8.325	225				
6	9.100	1.425	Open Manhole	1200	2.001	7.675	225	2.000	7.701	225	26
7	9.050	1.636	Open Manhole	1350	1.004	7.414	375	1.003	7.489	300	
								2.001	7.575	225	11
8	9.000	1.592	Open Manhole	1350	1.005	7.408	375	1.004	7.408	375	
9	9.000	1.599	Open Manhole	1350	1.006	7.401	375	1.005	7.401	375	
	9.000	1.605	Open Manhole	0		OUTFALL		1.006	7.395	375	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	1	12.350	10.292	1.833	Open Manhole	1200
1.001	o	225	2	11.100	9.275	1.600	Open Manhole	1200
1.002	o	300	3	10.200	8.637	1.263	Open Manhole	1200
1.003	o	300	4	9.500	7.937	1.263	Open Manhole	1200
2.000	o	225	5	9.750	8.325	1.200	Open Manhole	1200
2.001	o	225	6	9.100	7.675	1.200	Open Manhole	1200
1.004	o	375	7	9.050	7.414	1.261	Open Manhole	1350
1.005	o	375	8	9.000	7.408	1.217	Open Manhole	1350
1.006	o	375	9	9.000	7.401	1.224	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	21.600	35.0	2	11.100	9.675	1.200	Open Manhole	1200
1.001	19.700	35.0	3	10.200	8.712	1.263	Open Manhole	1200
1.002	46.000	65.7	4	9.500	7.937	1.263	Open Manhole	1200
1.003	42.600	95.0	7	9.050	7.489	1.261	Open Manhole	1350
2.000	43.700	70.0	6	9.100	7.701	1.174	Open Manhole	1200
2.001	19.900	199.0	7	9.050	7.575	1.250	Open Manhole	1350
1.004	1.700	300.0	8	9.000	7.408	1.217	Open Manhole	1350
1.005	2.000	300.0	9	9.000	7.401	1.224	Open Manhole	1350
1.006	2.000	300.0		9.000	7.395	1.230	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006		9.000	7.395	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.900
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.800	Storm Duration (mins)	30
Ratio R	0.300		

Storage Structures for Storm

Cellular Storage Manhole: 9, DS/PN: 1.006

Invert Level (m) 6.210 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.33959 Porosity 0.40
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	264.0	264.0	1.300	0.0	362.4
1.200	264.0	362.4			

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	16.800	Add Flow / Climate Change (%)	10
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.900	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	68.000	2.267	30.0	0.217	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	69.600	0.516	135.0	0.206	5.00	0.0	0.600	o	300	Pipe/Conduit	
1.001	26.600	0.133	200.0	0.069	0.00	0.0	0.600	o	350	Pipe/Conduit	
1.002	24.800	0.620	40.0	0.074	0.00	0.0	0.600	o	350	Pipe/Conduit	
1.003	8.973	0.030	300.0	0.007	0.00	0.0	0.600	o	375	Pipe/Conduit	
3.000	35.300	0.122	290.0	0.136	5.00	0.0	0.600	o	225	Pipe/Conduit	
4.000	42.500	0.425	100.0	0.246	5.00	0.0	0.600	o	300	Pipe/Conduit	
3.001	9.800	0.065	150.0	0.008	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	41.75	5.47	11.440	0.217	0.0	0.0	2.9	2.40	95.3	32.4
2.000	40.66	5.86	9.675	0.206	0.0	0.0	2.7	1.35	95.5	29.9
1.001	39.69	6.22	9.048	0.492	0.0	0.0	6.3	1.22	117.6	69.8
1.002	39.30	6.37	8.915	0.566	0.0	0.0	7.2	2.75	264.6	79.5
1.003	38.94	6.51	8.270	0.573	0.0	0.0	7.3	1.04	115.0	79.8
3.000	40.90	5.77	8.575	0.136	0.0	0.0	1.8	0.76	30.3	19.9
4.000	41.82	5.45	8.875	0.246	0.0	0.0	3.3	1.57	111.1	36.8
3.001	40.55	5.90	8.378	0.390	0.0	0.0	5.1	1.28	90.6	56.5

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.004	6.000	0.020	300.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.005	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	
1.006	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	450	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.004	38.73	6.60	8.163	0.963	0.0	0.0	12.1	1.17	185.8	133.3
1.005	38.66	6.63	8.143	0.963	0.0	0.0	12.1	1.17	185.8	133.3
1.006	38.59	6.66	8.136	0.963	0.0	0.0	12.1	1.17	185.8	133.3

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
1	13.330	1.890	Open Manhole	1200	1.000	11.440	225				
2	11.100	1.425	Open Manhole	1200	2.000	9.675	300				
3	10.600	1.552	Open Manhole	1200	1.001	9.048	350	1.000	9.173	225	
								2.000	9.159	300	61
4	10.500	1.585	Open Manhole	1200	1.002	8.915	350	1.001	8.915	350	
5	9.900	1.630	Open Manhole	1350	1.003	8.270	375	1.002	8.295	350	
6	10.000	1.425	Open Manhole	1200	3.000	8.575	225				
7	10.300	1.425	Open Manhole	1200	4.000	8.875	300				
8	10.000	1.622	Open Manhole	1200	3.001	8.378	300	3.000	8.453	225	
								4.000	8.450	300	72
9	10.000	1.837	Open Manhole	1350	1.004	8.163	450	1.003	8.240	375	2
								3.001	8.313	300	
10	10.000	1.857	Open Manhole	1350	1.005	8.143	450	1.004	8.143	450	
11	10.000	1.864	Open Manhole	1350	1.006	8.136	450	1.005	8.136	450	
	10.000	1.870	Open Manhole	0		OUTFALL		1.006	8.130	450	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	1	13.330	11.440	1.665	Open Manhole	1200
2.000	o	300	2	11.100	9.675	1.125	Open Manhole	1200
1.001	o	350	3	10.600	9.048	1.202	Open Manhole	1200
1.002	o	350	4	10.500	8.915	1.235	Open Manhole	1200
1.003	o	375	5	9.900	8.270	1.255	Open Manhole	1350
3.000	o	225	6	10.000	8.575	1.200	Open Manhole	1200
4.000	o	300	7	10.300	8.875	1.125	Open Manhole	1200
3.001	o	300	8	10.000	8.378	1.322	Open Manhole	1200
1.004	o	450	9	10.000	8.163	1.387	Open Manhole	1350
1.005	o	450	10	10.000	8.143	1.407	Open Manhole	1350
1.006	o	450	11	10.000	8.136	1.414	Open Manhole	1350

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	68.000	30.0	3	10.600	9.173	1.202	Open Manhole	1200
2.000	69.600	135.0	3	10.600	9.159	1.141	Open Manhole	1200
1.001	26.600	200.0	4	10.500	8.915	1.235	Open Manhole	1200
1.002	24.800	40.0	5	9.900	8.295	1.255	Open Manhole	1350
1.003	8.973	300.0	9	10.000	8.240	1.385	Open Manhole	1350
3.000	35.300	290.0	8	10.000	8.453	1.322	Open Manhole	1200
4.000	42.500	100.0	8	10.000	8.450	1.250	Open Manhole	1200
3.001	9.800	150.0	9	10.000	8.313	1.387	Open Manhole	1350
1.004	6.000	300.0	10	10.000	8.143	1.407	Open Manhole	1350
1.005	2.000	300.0	11	10.000	8.136	1.414	Open Manhole	1350
1.006	2.000	300.0		10.000	8.130	1.420	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.006		10.000	8.130	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.900
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.800	Storm Duration (mins)	30
Ratio R	0.300		

Storage Structures for Storm

Cellular Storage Manhole: 11, DS/PN: 1.006

Invert Level (m) 6.950 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.74074 Porosity 0.40
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	390.0	390.0	1.300	0.0	493.2
1.200	390.0	493.2			

STORM SEWER DESIGN by the Modified Rational Method

Design Criteria for Storm

Pipe Sizes STANDARD Manhole Sizes STANDARD

FSR Rainfall Model - Scotland and Ireland

Return Period (years)	1	PIMP (%)	100
M5-60 (mm)	16.800	Add Flow / Climate Change (%)	10
Ratio R	0.300	Minimum Backdrop Height (m)	0.200
Maximum Rainfall (mm/hr)	50	Maximum Backdrop Height (m)	1.500
Maximum Time of Concentration (mins)	30	Min Design Depth for Optimisation (m)	1.200
Foul Sewage (l/s/ha)	0.000	Min Vel for Auto Design only (m/s)	0.75
Volumetric Runoff Coeff.	0.900	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Storm

PN	Length (m)	Fall (m)	Slope (1:X)	I.Area (ha)	T.E. (mins)	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	15.300	0.068	225.0	0.052	5.00	0.0	0.600	o	225	Pipe/Conduit	
2.000	27.400	0.122	225.0	0.108	5.00	0.0	0.600	o	225	Pipe/Conduit	
1.001	2.750	0.079	34.8	0.001	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.002	2.000	0.018	111.1	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.003	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	
1.004	2.000	0.007	300.0	0.000	0.00	0.0	0.600	o	300	Pipe/Conduit	

Network Results Table

PN	Rain (mm/hr)	T.C. (mins)	US/IL (m)	Σ I.Area (ha)	Σ Base Flow (l/s)	Foul (l/s)	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	42.29	5.29	7.625	0.052	0.0	0.0	0.7	0.87	34.5	7.9
2.000	41.60	5.53	7.575	0.108	0.0	0.0	1.5	0.87	34.5	16.1
1.001	41.55	5.54	7.150	0.161	0.0	0.0	2.2	2.67	189.0	23.9
1.002	41.48	5.57	7.071	0.161	0.0	0.0	2.2	1.49	105.4	23.9
1.003	41.38	5.60	7.053	0.161	0.0	0.0	2.2	0.90	63.8	23.9
1.004	41.27	5.64	7.046	0.161	0.0	0.0	2.2	0.90	63.8	23.9

Manhole Schedules for Storm

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
1	9.000	1.375	Open Manhole	1200	1.000	7.625	225				
2	9.050	1.475	Open Manhole	1200	2.000	7.575	225				
3	9.200	2.050	Open Manhole	1200	1.001	7.150	300	1.000	7.557	225	332
								2.000	7.453	225	228
4	8.500	1.429	Open Manhole	1200	1.002	7.071	300	1.001	7.071	300	
5	8.500	1.447	Open Manhole	1200	1.003	7.053	300	1.002	7.053	300	
6	8.500	1.454	Open Manhole	1200	1.004	7.046	300	1.003	7.046	300	
	8.500	1.460	Open Manhole	0		OUTFALL		1.004	7.040	300	

PIPELINE SCHEDULES for Storm

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	o	225	1	9.000	7.625	1.150	Open Manhole	1200
2.000	o	225	2	9.050	7.575	1.250	Open Manhole	1200
1.001	o	300	3	9.200	7.150	1.750	Open Manhole	1200
1.002	o	300	4	8.500	7.071	1.129	Open Manhole	1200
1.003	o	300	5	8.500	7.053	1.147	Open Manhole	1200
1.004	o	300	6	8.500	7.046	1.154	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
1.000	15.300	225.0	3	9.200	7.557	1.418	Open Manhole	1200
2.000	27.400	225.0	3	9.200	7.453	1.522	Open Manhole	1200
1.001	2.750	34.8	4	8.500	7.071	1.129	Open Manhole	1200
1.002	2.000	111.1	5	8.500	7.053	1.147	Open Manhole	1200
1.003	2.000	300.0	6	8.500	7.046	1.154	Open Manhole	1200
1.004	2.000	300.0		8.500	7.040	1.160	Open Manhole	0

Free Flowing Outfall Details for Storm

Outfall Pipe Number	Outfall Name	C. Level (m)	I. Level (m)	Min I. Level (m)	D,L (mm)	W (mm)
1.004		8.500	7.040	0.000	0	0

Simulation Criteria for Storm

Volumetric Runoff Coeff	0.900	Additional Flow - % of Total Flow	10.000
Areal Reduction Factor	1.000	MADD Factor * 10m³/ha Storage	2.000
Hot Start (mins)	0	Inlet Coeffiecient	0.800
Hot Start Level (mm)	0	Flow per Person per Day (l/per/day)	0.000
Manhole Headloss Coeff (Global)	0.500	Run Time (mins)	60
Foul Sewage per hectare (l/s)	0.000	Output Interval (mins)	1

Number of Input Hydrographs	0	Number of Storage Structures	1
Number of Online Controls	0	Number of Time/Area Diagrams	0
Number of Offline Controls	0	Number of Real Time Controls	0

Synthetic Rainfall Details

Synthetic Rainfall Details

Rainfall Model	FSR	Profile Type	Summer
Return Period (years)	1	Cv (Summer)	0.900
Region	Scotland and Ireland	Cv (Winter)	0.840
M5-60 (mm)	16.800	Storm Duration (mins)	30
Ratio R	0.300		

Storage Structures for Storm

Cellular Storage Manhole: 6, DS/PN: 1.004

Invert Level (m) 5.850 Safety Factor 2.0
Infiltration Coefficient Base (m/hr) 0.33959 Porosity 0.40
Infiltration Coefficient Side (m/hr) 0.00000

Depth (m)	Area (m²)	Inf. Area (m²)	Depth (m)	Area (m²)	Inf. Area (m²)
0.000	60.0	60.0	1.100	0.0	98.0
1.000	60.0	98.0			

APPENDIX B

Foul Drainage Design Calculations

FOUL SEWERAGE DESIGN

Design Criteria for Foul - Main

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Domestic (l/s/ha)	0.00	Maximum Backdrop Height (m)	1.500
Industrial Peak Flow Factor	0.00	Domestic Peak Flow Factor	6.00	Min Design Depth for Optimisation (m)	1.200
Flow Per Person (l/per/day)	150.00	Add Flow / Climate Change (%)	0	Min Vel for Auto Design only (m/s)	0.75
Persons per House	2.70	Minimum Backdrop Height (m)	0.200	Min Slope for Optimisation (1:X)	300

Designed with Level Soffits

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.000	33.700	0.963	35.0	0.000	8	0.0	1.500	o	150	Pipe/Conduit	🔒
F1.001	52.300	1.308	40.0	0.000	26	0.0	1.500	o	150	Pipe/Conduit	🔓

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.000	19.150	0.000	0.0	8	0.0	10	0.43	1.48	26.2	0.2
F1.001	18.187	0.000	0.0	34	0.0	20	0.66	1.39	24.5	1.0

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.002	38.120	0.318	120.0	0.000	1	0.0	1.500	o	150	Pipe/Conduit	
F2.000	20.510	0.342	60.0	0.000	3	0.0	1.500	o	150	Pipe/Conduit	
F1.003	48.000	1.067	45.0	0.000	11	0.0	1.500	o	150	Pipe/Conduit	
F1.004	30.400	0.304	100.0	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
F3.000	37.400	0.623	60.0	0.000	18	0.0	1.500	o	150	Pipe/Conduit	
F3.001	30.700	0.614	50.0	0.000	23	0.0	1.500	o	150	Pipe/Conduit	
F3.002	31.600	0.243	130.0	0.000	2	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.002	16.880	0.000	0.0	35	0.0	27	0.45	0.80	14.1	1.0
F2.000	17.200	0.000	0.0	3	0.0	7	0.26	1.13	20.0	0.1
F1.003	16.562	0.000	0.0	49	0.0	25	0.71	1.31	23.1	1.4
F1.004	15.495	0.000	0.0	54	0.0	32	0.55	0.88	15.5	1.5
F3.000	16.150	0.000	0.0	18	0.0	17	0.47	1.13	20.0	0.5
F3.001	15.527	0.000	0.0	41	0.0	24	0.65	1.24	21.9	1.2
F3.002	14.913	0.000	0.0	43	0.0	30	0.47	0.77	13.6	1.2

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F3.003	30.400	0.234	130.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F1.005	24.700	0.190	130.0	0.000	2	0.0	1.500	o	150	Pipe/Conduit	
F1.006	38.600	0.297	130.0	0.000	2	0.0	1.500	o	150	Pipe/Conduit	
F4.000	49.200	1.230	40.0	0.000	13	0.0	1.500	o	150	Pipe/Conduit	
F4.001	33.600	0.960	35.0	0.000	7	0.0	1.500	o	150	Pipe/Conduit	
F1.007	11.000	0.085	130.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F1.008	12.900	0.099	130.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F3.003	14.670	0.000	0.0	43	0.0	30	0.47	0.77	13.6	1.2
F1.005	14.436	0.000	0.0	99	0.0	46	0.60	0.77	13.6	2.8
F1.006	14.246	0.000	0.0	101	0.0	47	0.61	0.77	13.6	2.8
F4.000	17.250	0.000	0.0	13	0.0	13	0.48	1.39	24.5	0.4
F4.001	16.020	0.000	0.0	20	0.0	15	0.58	1.48	26.2	0.6
F1.007	13.949	0.000	0.0	121	0.0	51	0.64	0.77	13.6	3.4
F1.008	13.865	0.000	0.0	121	0.0	51	0.64	0.77	13.6	3.4

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.009	39.400	0.303	130.0	0.000	2	0.0	1.500	o	225	Pipe/Conduit	
F1.010	32.800	0.164	200.0	0.000	2	0.0	1.500	o	225	Pipe/Conduit	
F5.000	60.800	2.027	30.0	0.000	9	0.0	1.500	o	150	Pipe/Conduit	
F1.011	37.400	0.187	200.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.012	31.870	0.159	200.0	0.000	14	0.0	1.500	o	225	Pipe/Conduit	
F6.000	28.770	0.719	40.0	0.000	13	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.009	13.690	0.000	0.0	123	0.0	45	0.62	1.01	40.0	3.5
F1.010	13.387	0.000	0.0	125	0.0	50	0.53	0.81	32.2	3.5
F5.000	16.650	0.000	0.0	9	0.0	10	0.47	1.60	28.3	0.3
F1.011	13.223	0.000	0.0	134	0.0	52	0.54	0.81	32.2	3.8
F1.012	13.036	0.000	0.0	148	0.0	55	0.56	0.81	32.2	4.2
F6.000	15.300	0.000	0.0	13	0.0	13	0.48	1.39	24.5	0.4

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F1.013	41.300	0.207	200.0	0.000	27	0.0	1.500	o	225	Pipe/Conduit	
F1.014	19.530	0.977	20.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.015	19.710	0.986	20.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.016	5.000	0.097	51.5	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F7.000	23.700	0.948	25.0	0.000	5	0.0	1.500	o	150	Pipe/Conduit	
F7.001	19.000	0.760	25.0	0.000	2	0.0	1.500	o	150	Pipe/Conduit	
F1.017	43.900	0.798	55.0	0.000	3	0.0	1.500	o	225	Pipe/Conduit	
F1.018	53.900	0.539	100.0	0.000	29	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F1.013	12.877	0.000	0.0	188	0.0	62	0.60	0.81	32.2	5.3
F1.014	12.670	0.000	0.0	188	0.0	35	1.35	2.57	102.3	5.3
F1.015	10.000	0.000	0.0	188	0.0	35	1.35	2.57	102.3	5.3
F1.016	9.014	0.000	0.0	188	0.0	44	0.97	1.60	63.7	5.3
F7.000	10.700	0.000	0.0	5	0.0	8	0.42	1.76	31.0	0.1
F7.001	9.752	0.000	0.0	7	0.0	9	0.47	1.76	31.0	0.2
F1.017	8.917	0.000	0.0	198	0.0	46	0.96	1.55	61.6	5.6
F1.018	8.119	0.000	0.0	227	0.0	57	0.81	1.15	45.6	6.4

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F8.000	37.200	0.744	50.0	0.000	10	0.0	1.500	o	150	Pipe/Conduit	
F8.001	38.600	0.772	50.0	0.000	3	0.0	1.500	o	150	Pipe/Conduit	
F8.002	64.000	0.640	100.0	0.000	7	0.0	1.500	o	150	Pipe/Conduit	
F9.000	60.600	1.212	50.0	0.000	25	0.0	1.500	o	150	Pipe/Conduit	
F8.003	34.400	0.344	100.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F8.004	23.600	0.455	51.9	0.000	0	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F8.000	19.450	0.000	0.0	10	0.0	12	0.41	1.24	21.9	0.3
F8.001	18.706	0.000	0.0	13	0.0	14	0.45	1.24	21.9	0.4
F8.002	17.934	0.000	0.0	20	0.0	20	0.41	0.88	15.5	0.6
F9.000	19.250	0.000	0.0	25	0.0	19	0.55	1.24	21.9	0.7
F8.003	17.294	0.000	0.0	45	0.0	29	0.52	0.88	15.5	1.3
F8.004	16.950	0.000	0.0	45	0.0	25	0.66	1.22	21.5	1.3

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F10.000	34.100	0.853	40.0	0.000	5	0.0	1.500	o	225	Pipe/Conduit	
F10.001	44.100	1.103	40.0	0.000	5	0.0	1.500	o	225	Pipe/Conduit	
F8.005	8.500	0.131	65.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.006	43.900	1.463	30.0	0.000	4	0.0	1.500	o	225	Pipe/Conduit	
F8.007	8.600	0.287	30.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.008	31.400	0.563	55.8	0.000	1	0.0	1.500	o	225	Pipe/Conduit	
F11.000	27.700	0.504	55.0	0.000	4	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F10.000	18.475	0.000	0.0	5	0.0	8	0.33	1.82	72.3	0.1
F10.001	17.523	0.000	0.0	10	0.0	10	0.42	1.82	72.3	0.3
F8.005	16.421	0.000	0.0	55	0.0	26	0.61	1.43	56.7	1.5
F8.006	16.200	0.000	0.0	59	0.0	22	0.82	2.10	83.5	1.7
F8.007	14.250	0.000	0.0	59	0.0	22	0.82	2.10	83.6	1.7
F8.008	13.963	0.000	0.0	60	0.0	26	0.66	1.54	61.2	1.7
F11.000	13.975	0.000	0.0	4	0.0	8	0.28	1.55	61.6	0.1

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F8.009	21.900	0.876	25.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F8.010	79.800	3.192	25.0	0.000	10	0.0	1.500	o	225	Pipe/Conduit	
F12.000	49.150	0.819	60.0	0.000	8	0.0	1.500	o	150	Pipe/Conduit	
F12.001	22.370	0.224	99.9	0.000	2	0.0	1.500	o	150	Pipe/Conduit	
F8.011	30.430	0.203	150.0	0.000	3	0.0	1.500	o	225	Pipe/Conduit	
F8.012	23.900	0.159	150.0	0.000	3	0.0	1.500	o	225	Pipe/Conduit	
F13.000	39.600	0.660	60.0	0.000	33	0.0	1.500	o	150	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F8.009	13.400	0.000	0.0	64	0.0	22	0.90	2.30	91.5	1.8
F8.010	12.324	0.000	0.0	74	0.0	24	0.94	2.30	91.5	2.1
F12.000	9.850	0.000	0.0	8	0.0	12	0.36	1.13	20.0	0.2
F12.001	9.031	0.000	0.0	10	0.0	14	0.33	0.88	15.5	0.3
F8.011	8.732	0.000	0.0	87	0.0	39	0.53	0.94	37.2	2.4
F8.012	8.529	0.000	0.0	90	0.0	40	0.53	0.94	37.2	2.5
F13.000	8.900	0.000	0.0	33	0.0	22	0.57	1.13	20.0	0.9

Network Design Table for Foul - Main

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
F13.001	27.900	0.233	120.0	0.000	3	0.0	1.500	o	150	Pipe/Conduit	
F8.013	55.200	0.368	150.0	0.000	7	0.0	1.500	o	225	Pipe/Conduit	
F14.000	56.100	0.935	60.0	0.000	8	0.0	1.500	o	150	Pipe/Conduit	
F14.001	9.200	0.092	100.0	0.000	0	0.0	1.500	o	150	Pipe/Conduit	
F8.014	9.100	0.091	100.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
F1.019	11.500	0.043	267.4	0.000	0	0.0	1.500	o	300	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	P.Dep (mm)	P.Vel (m/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
F13.001	8.240	0.000	0.0	36	0.0	27	0.46	0.80	14.1	1.0
F8.013	7.933	0.000	0.0	133	0.0	48	0.60	0.94	37.2	3.7
F14.000	8.250	0.000	0.0	8	0.0	12	0.36	1.13	20.0	0.2
F14.001	7.315	0.000	0.0	8	0.0	13	0.30	0.88	15.5	0.2
F8.014	7.148	0.000	0.0	141	0.0	45	0.70	1.15	45.6	4.0
F1.019	6.982	0.000	0.0	368	0.0	84	0.64	0.85	59.8	10.4

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
FMH21	20.500	1.350	Open Manhole	1200	F1.000	19.150	150				
FMH20	19.450	1.263	Open Manhole	1200	F1.001	18.187	150	F1.000	18.187	150	
FMH19	18.150	1.270	Open Manhole	1200	F1.002	16.880	150	F1.001	16.880	150	
FMH18.1	18.550	1.350	Open Manhole	1200	F2.000	17.200	150				
FMH18	18.250	1.688	Open Manhole	1200	F1.003	16.562	150	F1.002	16.562	150	
								F2.000	16.858	150	296
F17	16.850	1.355	Open Manhole	1200	F1.004	15.495	150	F1.003	15.495	150	
FMH16.4	17.500	1.350	Open Manhole	1200	F3.000	16.150	150				
FMH16.3	17.000	1.473	Open Manhole	1200	F3.001	15.527	150	F3.000	15.527	150	
FMH16.2	16.250	1.337	Open Manhole	1200	F3.002	14.913	150	F3.001	14.913	150	
FMH16.1	16.300	1.630	Open Manhole	1200	F3.003	14.670	150	F3.002	14.670	150	
FMH16	16.200	1.764	Open Manhole	1200	F1.005	14.436	150	F1.004	15.191	150	755
								F3.003	14.436	150	
FMH15	16.100	1.854	Open Manhole	1200	F1.006	14.246	150	F1.005	14.246	150	
FMH14.2	18.800	1.550	Open Manhole	1200	F4.000	17.250	150				
FMH14.1	17.250	1.230	Open Manhole	1200	F4.001	16.020	150	F4.000	16.020	150	
FMH14	16.000	2.051	Open Manhole	1200	F1.007	13.949	150	F1.006	13.949	150	
								F4.001	15.060	150	1111
FMH13	15.750	1.885	Open Manhole	1200	F1.008	13.865	150	F1.007	13.865	150	

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	Pipe Out PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	Pipes In PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
FMH12	15.550	1.860	Open Manhole	1200	F1.009	13.690	225	F1.008	13.765	150	
FMH11	14.900	1.513	Open Manhole	1200	F1.010	13.387	225	F1.009	13.387	225	
FMH10.1	18.000	1.350	Open Manhole	1200	F5.000	16.650	150				
FMH10	15.900	2.677	Open Manhole	1200	F1.011	13.223	225	F1.010	13.223	225	
								F5.000	14.623	150	1325
FMH9	15.000	1.964	Open Manhole	1200	F1.012	13.036	225	F1.011	13.036	225	
FMH8.1	16.850	1.550	Open Manhole	1200	F6.000	15.300	150				
FMH8	15.800	2.923	Open Manhole	1200	F1.013	12.877	225	F1.012	12.877	225	
								F6.000	14.581	150	1629
FMH 7	14.900	2.230	Open Manhole	1200	F1.014	12.670	225	F1.013	12.670	225	
FMH 6	12.600	2.600	Open Manhole	1200	F1.015	10.000	225	F1.014	11.694	225	1694
FMH 5	10.200	1.186	Open Manhole	1200	F1.016	9.014	225	F1.015	9.014	225	
FMH 4.2	12.400	1.700	Open Manhole	1200	F7.000	10.700	150				
FMH 4.1	11.100	1.348	Open Manhole	1200	F7.001	9.752	150	F7.000	9.752	150	
FMH 4.0	10.200	1.283	Open Manhole	1200	F1.017	8.917	225	F1.016	8.917	225	
								F7.001	8.992	150	
FMH 3	9.500	1.381	Open Manhole	1200	F1.018	8.119	225	F1.017	8.119	225	
FMH 2.15	20.800	1.350	Open Manhole	1200	F8.000	19.450	150				
FMH 2.14	20.100	1.394	Open Manhole	1200	F8.001	18.706	150	F8.000	18.706	150	

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Diameter (mm)	PN	Pipes In Invert Level (m)	Diameter (mm)	Backdrop (mm)
FMH 2.13	19.200	1.266	Open Manhole	1200	F8.002	17.934	150	F8.001	17.934	150	
FMH 2.12 A	20.600	1.350	Open Manhole	1200	F9.000	19.250	150				
FMH 2.12	19.400	2.106	Open Manhole	1200	F8.003	17.294	150	F8.002	17.294	150	
								F9.000	18.038	150	744
FMH 2.11	18.500	1.550	Open Manhole	1200	F8.004	16.950	150	F8.003	16.950	150	
FMH 2.10 B	19.900	1.425	Open Manhole	1200	F10.000	18.475	225				
FMH 2.10 A	19.000	1.477	Open Manhole	1200	F10.001	17.523	225	F10.000	17.623	225	100
FMH 2.10	17.900	1.480	Open Manhole	1200	F8.005	16.421	225	F8.004	16.496	150	
								F10.001	16.421	225	
FMH 2.9	17.850	1.650	Open Manhole	1200	F8.006	16.200	225	F8.005	16.290	225	90
FMH 2.8	16.250	2.000	Open Manhole	1200	F8.007	14.250	225	F8.006	14.737	225	487
FMH 2.7	15.400	1.437	Open Manhole	1200	F8.008	13.963	225	F8.007	13.963	225	
FMH 2.6 A	15.600	1.625	Open Manhole	1200	F11.000	13.975	225				
FMH 2.6	14.900	1.500	Open Manhole	1200	F8.009	13.400	225	F8.008	13.400	225	
								F11.000	13.471	225	71
FMH 2.5	13.950	1.626	Open Manhole	1200	F8.010	12.324	225	F8.009	12.524	225	200
FMH 2.4 B	11.000	1.150	Open Manhole	1200	F12.000	9.850	150				
FMH 2.4 A	10.550	1.519	Open Manhole	1200	F12.001	9.031	150	F12.000	9.031	150	
FMH 2.4	10.600	1.868	Open Manhole	1200	F8.011	8.732	225	F8.010	9.132	225	400

Manhole Schedules for Foul - Main

MH Name	MH CL (m)	MH Depth (m)	MH Connection	MH Diam.,L*W (mm)	PN	Pipe Out Invert Level (m)	Pipe Out Diameter (mm)	PN	Pipes In Invert Level (m)	Pipes In Diameter (mm)	Backdrop (mm)
								F12.001	8.807	150	
FMH 2.3	10.450	1.921	Open Manhole	1200	F8.012	8.529	225	F8.011	8.529	225	
FMH 2.2 B	10.250	1.350	Open Manhole	1200	F13.000	8.900	150				
FMH 2.2 A	9.850	1.610	Open Manhole	1200	F13.001	8.240	150	F13.000	8.240	150	
FMH 2.2	10.000	2.068	Open Manhole	1200	F8.013	7.933	225	F8.012	8.370	225	437
								F13.001	8.008	150	
FMH 2.1 B	9.400	1.150	Open Manhole	1200	F14.000	8.250	150				
FMH 2.1 A	9.100	1.785	Open Manhole	1200	F14.001	7.315	150	F14.000	7.315	150	
FMH 2.1	9.000	1.852	Open Manhole	1200	F8.014	7.148	225	F8.013	7.565	225	417
								F14.001	7.223	150	
FMH 2.0	9.000	2.018	Open Manhole	1200	F1.019	6.982	300	F1.018	7.580	225	523
								F8.014	7.057	225	
FMH 1	0.000		Open Manhole	0		OUTFALL		F1.019	6.939	300	

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	o	150	FMH21	20.500	19.150	1.200	Open Manhole	1200
F1.001	o	150	FMH20	19.450	18.187	1.113	Open Manhole	1200
F1.002	o	150	FMH19	18.150	16.880	1.120	Open Manhole	1200
F2.000	o	150	FMH18.1	18.550	17.200	1.200	Open Manhole	1200
F1.003	o	150	FMH18	18.250	16.562	1.538	Open Manhole	1200
F1.004	o	150	F17	16.850	15.495	1.205	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.000	33.700	35.0	FMH20	19.450	18.187	1.113	Open Manhole	1200
F1.001	52.300	40.0	FMH19	18.150	16.880	1.120	Open Manhole	1200
F1.002	38.120	120.0	FMH18	18.250	16.562	1.538	Open Manhole	1200
F2.000	20.510	60.0	FMH18	18.250	16.858	1.242	Open Manhole	1200
F1.003	48.000	45.0	F17	16.850	15.495	1.205	Open Manhole	1200
F1.004	30.400	100.0	FMH16	16.200	15.191	0.859	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F3.000	o	150	FMH16.4	17.500	16.150	1.200	Open Manhole	1200
F3.001	o	150	FMH16.3	17.000	15.527	1.323	Open Manhole	1200
F3.002	o	150	FMH16.2	16.250	14.913	1.187	Open Manhole	1200
F3.003	o	150	FMH16.1	16.300	14.670	1.480	Open Manhole	1200
F1.005	o	150	FMH16	16.200	14.436	1.614	Open Manhole	1200
F1.006	o	150	FMH15	16.100	14.246	1.704	Open Manhole	1200
F4.000	o	150	FMH14.2	18.800	17.250	1.400	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F3.000	37.400	60.0	FMH16.3	17.000	15.527	1.323	Open Manhole	1200
F3.001	30.700	50.0	FMH16.2	16.250	14.913	1.187	Open Manhole	1200
F3.002	31.600	130.0	FMH16.1	16.300	14.670	1.480	Open Manhole	1200
F3.003	30.400	130.0	FMH16	16.200	14.436	1.614	Open Manhole	1200
F1.005	24.700	130.0	FMH15	16.100	14.246	1.704	Open Manhole	1200
F1.006	38.600	130.0	FMH14	16.000	13.949	1.901	Open Manhole	1200
F4.000	49.200	40.0	FMH14.1	17.250	16.020	1.080	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F4.001	o	150	FMH14.1	17.250	16.020	1.080	Open Manhole	1200
F1.007	o	150	FMH14	16.000	13.949	1.901	Open Manhole	1200
F1.008	o	150	FMH13	15.750	13.865	1.735	Open Manhole	1200
F1.009	o	225	FMH12	15.550	13.690	1.635	Open Manhole	1200
F1.010	o	225	FMH11	14.900	13.387	1.288	Open Manhole	1200
F5.000	o	150	FMH10.1	18.000	16.650	1.200	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F4.001	33.600	35.0	FMH14	16.000	15.060	0.790	Open Manhole	1200
F1.007	11.000	130.0	FMH13	15.750	13.865	1.735	Open Manhole	1200
F1.008	12.900	130.0	FMH12	15.550	13.765	1.635	Open Manhole	1200
F1.009	39.400	130.0	FMH11	14.900	13.387	1.288	Open Manhole	1200
F1.010	32.800	200.0	FMH10	15.900	13.223	2.452	Open Manhole	1200
F5.000	60.800	30.0	FMH10	15.900	14.623	1.127	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.011	o	225	FMH10	15.900	13.223	2.452	Open Manhole	1200
F1.012	o	225	FMH9	15.000	13.036	1.739	Open Manhole	1200
F6.000	o	150	FMH8.1	16.850	15.300	1.400	Open Manhole	1200
F1.013	o	225	FMH8	15.800	12.877	2.698	Open Manhole	1200
F1.014	o	225	FMH 7	14.900	12.670	2.005	Open Manhole	1200
F1.015	o	225	FMH 6	12.600	10.000	2.375	Open Manhole	1200
F1.016	o	225	FMH 5	10.200	9.014	0.961	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.011	37.400	200.0	FMH9	15.000	13.036	1.739	Open Manhole	1200
F1.012	31.870	200.0	FMH8	15.800	12.877	2.698	Open Manhole	1200
F6.000	28.770	40.0	FMH8	15.800	14.581	1.069	Open Manhole	1200
F1.013	41.300	200.0	FMH 7	14.900	12.670	2.005	Open Manhole	1200
F1.014	19.530	20.0	FMH 6	12.600	11.694	0.681	Open Manhole	1200
F1.015	19.710	20.0	FMH 5	10.200	9.014	0.961	Open Manhole	1200
F1.016	5.000	51.5	FMH 4.0	10.200	8.917	1.058	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.000	o	150	FMH 4.2	12.400	10.700	1.550	Open Manhole	1200
F7.001	o	150	FMH 4.1	11.100	9.752	1.198	Open Manhole	1200
F1.017	o	225	FMH 4.0	10.200	8.917	1.058	Open Manhole	1200
F1.018	o	225	FMH 3	9.500	8.119	1.156	Open Manhole	1200
F8.000	o	150	FMH 2.15	20.800	19.450	1.200	Open Manhole	1200
F8.001	o	150	FMH 2.14	20.100	18.706	1.244	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F7.000	23.700	25.0	FMH 4.1	11.100	9.752	1.198	Open Manhole	1200
F7.001	19.000	25.0	FMH 4.0	10.200	8.992	1.058	Open Manhole	1200
F1.017	43.900	55.0	FMH 3	9.500	8.119	1.156	Open Manhole	1200
F1.018	53.900	100.0	FMH 2.0	9.000	7.580	1.195	Open Manhole	1200
F8.000	37.200	50.0	FMH 2.14	20.100	18.706	1.244	Open Manhole	1200
F8.001	38.600	50.0	FMH 2.13	19.200	17.934	1.116	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F8.002	o	150	FMH 2.13	19.200	17.934	1.116	Open Manhole	1200
F9.000	o	150	FMH 2.12 A	20.600	19.250	1.200	Open Manhole	1200
F8.003	o	150	FMH 2.12	19.400	17.294	1.956	Open Manhole	1200
F8.004	o	150	FMH 2.11	18.500	16.950	1.400	Open Manhole	1200
F10.000	o	225	FMH 2.10 B	19.900	18.475	1.200	Open Manhole	1200
F10.001	o	225	FMH 2.10 A	19.000	17.523	1.252	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F8.002	64.000	100.0	FMH 2.12	19.400	17.294	1.956	Open Manhole	1200
F9.000	60.600	50.0	FMH 2.12	19.400	18.038	1.212	Open Manhole	1200
F8.003	34.400	100.0	FMH 2.11	18.500	16.950	1.400	Open Manhole	1200
F8.004	23.600	51.9	FMH 2.10	17.900	16.496	1.255	Open Manhole	1200
F10.000	34.100	40.0	FMH 2.10 A	19.000	17.623	1.153	Open Manhole	1200
F10.001	44.100	40.0	FMH 2.10	17.900	16.421	1.255	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F8.005	o	225	FMH 2.10	17.900	16.421	1.254	Open Manhole	1200
F8.006	o	225	FMH 2.9	17.850	16.200	1.425	Open Manhole	1200
F8.007	o	225	FMH 2.8	16.250	14.250	1.775	Open Manhole	1200
F8.008	o	225	FMH 2.7	15.400	13.963	1.212	Open Manhole	1200
F11.000	o	225	FMH 2.6 A	15.600	13.975	1.400	Open Manhole	1200
F8.009	o	225	FMH 2.6	14.900	13.400	1.275	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F8.005	8.500	65.0	FMH 2.9	17.850	16.290	1.335	Open Manhole	1200
F8.006	43.900	30.0	FMH 2.8	16.250	14.737	1.288	Open Manhole	1200
F8.007	8.600	30.0	FMH 2.7	15.400	13.963	1.212	Open Manhole	1200
F8.008	31.400	55.8	FMH 2.6	14.900	13.400	1.275	Open Manhole	1200
F11.000	27.700	55.0	FMH 2.6	14.900	13.471	1.204	Open Manhole	1200
F8.009	21.900	25.0	FMH 2.5	13.950	12.524	1.201	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F8.010	o	225	FMH 2.5	13.950	12.324	1.401	Open Manhole	1200
F12.000	o	150	FMH 2.4 B	11.000	9.850	1.000	Open Manhole	1200
F12.001	o	150	FMH 2.4 A	10.550	9.031	1.369	Open Manhole	1200
F8.011	o	225	FMH 2.4	10.600	8.732	1.643	Open Manhole	1200
F8.012	o	225	FMH 2.3	10.450	8.529	1.696	Open Manhole	1200
F13.000	o	150	FMH 2.2 B	10.250	8.900	1.200	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F8.010	79.800	25.0	FMH 2.4	10.600	9.132	1.243	Open Manhole	1200
F12.000	49.150	60.0	FMH 2.4 A	10.550	9.031	1.369	Open Manhole	1200
F12.001	22.370	99.9	FMH 2.4	10.600	8.807	1.643	Open Manhole	1200
F8.011	30.430	150.0	FMH 2.3	10.450	8.529	1.696	Open Manhole	1200
F8.012	23.900	150.0	FMH 2.2	10.000	8.370	1.405	Open Manhole	1200
F13.000	39.600	60.0	FMH 2.2 A	9.850	8.240	1.460	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F13.001	o	150	FMH 2.2 A	9.850	8.240	1.460	Open Manhole	1200
F8.013	o	225	FMH 2.2	10.000	7.933	1.843	Open Manhole	1200
F14.000	o	150	FMH 2.1 B	9.400	8.250	1.000	Open Manhole	1200
F14.001	o	150	FMH 2.1 A	9.100	7.315	1.635	Open Manhole	1200
F8.014	o	225	FMH 2.1	9.000	7.148	1.627	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F13.001	27.900	120.0	FMH 2.2	10.000	8.008	1.843	Open Manhole	1200
F8.013	55.200	150.0	FMH 2.1	9.000	7.565	1.211	Open Manhole	1200
F14.000	56.100	60.0	FMH 2.1 A	9.100	7.315	1.635	Open Manhole	1200
F14.001	9.200	100.0	FMH 2.1	9.000	7.223	1.627	Open Manhole	1200
F8.014	9.100	100.0	FMH 2.0	9.000	7.057	1.718	Open Manhole	1200

PIPELINE SCHEDULES for Foul - Main

Upstream Manhole

PN	Hyd Sect	Diam (mm)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.019	o	300	FMH 2.0	9.000	6.982	1.718	Open Manhole	1200

Downstream Manhole

PN	Length (m)	Slope (1:X)	MH Name	C.Level (m)	I.Level (m)	D.Depth (m)	MH Connection	MH DIAM., L*W (mm)
F1.019	11.500	267.4	FMH 1	0.000	6.939		Open Manhole	0

APPENDIX C

Soakaway Design Calculations

Project No.	10690	Client :	Alber Homes	Project:	Rosshill development

Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

O = a_{s50} *x f x D*
where;
a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 1

Drained Area = **521.514** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
3	4	1.2

a_{s50} 8.4 m^2

Void Ratio 40 %

Infiltration Rate (f) 2.5514E-04 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	5.966	1.286	5	12	OK
15.00	12.2	6.999	1.929	5	13	OK
30.00	15.8	9.064	3.858	5	13	OK
60.00	20.5	11.760	7.715	4	10	OK
120.00	26.6	15.259	15.431	0	0	OK
360.00	40.2	23.061	46.293	-23	-58	OK
720.00	52.1	29.888	92.585	-63	-157	OK
1440.00	67.6	38.780	185.170	-146	-366	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang
Highlighted cell is volume required for critcal storm duration

Project No.	10690	Client :	Alber Homes	Project:	Rosshill development

Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

O = a_{s50} *x f x D*
where;
a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 2

Drained Area = **2439.855** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
13	**6**	**1.2**

a_{s50} 22.8 m^2

Void Ratio 40 %

Infiltration Rate (f) 2.5514E-04 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	27.912	3.490	24	61	OK
15.00	12.2	32.743	5.235	28	69	OK
30.00	15.8	42.405	10.471	32	80	OK
60.00	20.5	55.019	20.942	34	85	OK
120.00	26.6	71.390	41.884	30	74	OK
360.00	40.2	107.890	125.651	-18	-44	OK
720.00	52.1	139.828	251.303	-111	-279	OK
1440.00	67.6	181.428	502.605	-321	-803	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang
Highlighted cell is volume required for critcal storm duration

Project No.	10690	Client :	Alber Homes	Project:	Rosshill development

TOBIN CONSULTING ENGINEERS

Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

$O = a_{s50} \times f \times D$
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 3

Drained Area = **6521.337** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
29	**8**	**1.2**

a_{s50} 44.4 m^2

Void Ratio 40 %

Infiltration Rate (f) 2.5514E-04 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	74.604	6.797	68	170	OK
15.00	12.2	87.516	10.195	77	193	OK
30.00	15.8	113.341	20.391	93	232	OK
60.00	20.5	147.056	40.782	106	266	OK
120.00	26.6	190.814	81.563	109	273	OK
360.00	40.2	288.374	244.689	44	109	OK
720.00	52.1	373.738	489.379	-116	-289	OK
1440.00	67.6	484.927	978.758	-494	-1235	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang
Highlighted cell is volume required for critcal storm duration

Project No.	10690	Client :	Alber Homes	Project:	Rosshill development

Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

O = $a_{s50} \times f \times D$
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 4

Drained Area = **6738.417** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
36	**6**	**1.2**

a_{s50} 50.4 m^2

Void Ratio 40 %

Infiltration Rate (f) 2.8371E-04 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	77.087	8.579	69	171	OK
15.00	12.2	90.430	12.869	78	194	OK
30.00	15.8	117.114	25.738	91	228	OK
60.00	20.5	151.951	51.476	100	251	OK
120.00	26.6	197.166	102.953	94	236	OK
360.00	40.2	297.973	308.858	-11	-27	OK
720.00	52.1	386.179	617.716	-232	-579	OK
1440.00	67.6	501.069	1235.432	-734	-1836	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang
Highlighted cell is volume required for critcal storm duration

Project No.	10690	Client :	Alber Homes	Project:	Rosshill development

TOBIN CONSULTING ENGINEERS

Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

O = a_{s50} x f x D
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 5

Drained Area = **4004.532** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
15	13	1.2

a_{s50} 33.6 m^2

Void Ratio 40 %

Infiltration Rate (f) 1.1889E-04 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	45.812	2.397	43	109	OK
15.00	12.2	53.741	3.595	50	125	OK
30.00	15.8	69.599	7.190	62	156	OK
60.00	20.5	90.302	14.381	76	190	OK
120.00	26.6	117.173	28.762	88	221	OK
360.00	40.2	177.080	86.286	91	227	OK
720.00	52.1	229.500	172.571	57	142	OK
1440.00	67.6	297.777	345.142	-47	-118	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang
Highlighted cell is volume required for critcal storm duration

Project No.	10690 **Client :**	Alber Homes	**Project:**	Rosshill development

Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

$O = a_{s50} \times f \times D$
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 6

Drained Area = **6535.935** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
39	**8**	**1.2**

a_{s50} 56.4 m^2

Void Ratio 40 %

Infiltration Rate (f) 1.1889E-04 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	74.771	4.023	71	177	OK
15.00	12.2	87.712	6.035	82	204	OK
30.00	15.8	113.595	12.070	102	254	OK
60.00	20.5	147.385	24.139	123	308	OK
120.00	26.6	191.241	48.279	143	357	OK
360.00	40.2	289.019	144.837	144	360	OK
720.00	52.1	374.574	289.673	85	212	OK
1440.00	67.6	486.012	579.346	-93	-233	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang
Highlighted cell is volume required for critcal storm duration

Project No.	10690 **Client :**	Alber Homes	**Project:**	Rosshill development

Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

$O = a_{s50} \times f \times D$
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 7

Drained Area = **2688.534** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
20	**6**	**1.2**

a_{s50} 31.2 m^2

Void Ratio 40 %

Infiltration Rate (f) 9.4330E-05 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	30.757	1.766	29	72	OK
15.00	12.2	36.080	2.649	33	84	OK
30.00	15.8	46.727	5.298	41	104	OK
60.00	20.5	60.626	10.595	50	125	OK
120.00	26.6	78.667	21.190	57	144	OK
360.00	40.2	118.887	63.571	55	138	OK
720.00	52.1	154.080	127.142	27	67	OK
1440.00	67.6	199.919	254.283	-54	-136	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang
Highlighted cell is volume required for critcal storm duration

Project No.	10690	Client :	Alber Homes	Project:	Rosshill development

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Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

O = a_{s50} x *f* x *D*
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 8

Drained Area = **2873.799** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
29	9	1.2

a_{s50} 45.6 m^2

Void Ratio 40 %

Infiltration Rate (f) 2.3100E-05 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	32.876	0.632	32	81	OK
15.00	12.2	38.566	0.948	38	94	OK
30.00	15.8	49.947	1.896	48	120	OK
60.00	20.5	64.804	3.792	61	153	OK
120.00	26.6	84.087	7.584	77	191	OK
360.00	40.2	127.079	22.753	104	261	OK
720.00	52.1	164.697	45.505	119	298	OK
1440.00	67.6	213.696	91.010	123	307	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang
Highlighted cell is volume required for critcal storm duration

Project No.	10690	Client :	Alber Homes	Project:	Rosshill development

Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

$O = a_{s50} \times f \times D$
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 9

Drained Area = **2318.364** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
20	**11**	**1.2**

a_{s50} 37.2 m^2

Void Ratio 40 %

Infiltration Rate (f) 2.3100E-05 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	26.522	0.516	26	65	OK
15.00	12.2	31.112	0.773	30	76	OK
30.00	15.8	40.293	1.547	39	97	OK
60.00	20.5	52.279	3.094	49	123	OK
120.00	26.6	67.835	6.187	62	154	OK
360.00	40.2	102.518	18.561	84	210	OK
720.00	52.1	132.865	37.123	96	239	OK
1440.00	67.6	172.394	74.245	98	245	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang
Highlighted cell is volume required for critcal storm duration

Project No.	10690	Client :	Alber Homes	Project:	Rosshill development

Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

O = a_{s50} *x f x D*
where;
a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 10

Drained Area = **5104.08** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
33	**8**	**1.2**

a_{s50} 49.2 m^2

Void Ratio 40 %

Infiltration Rate (f) 9.4330E-05 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	58.391	2.785	56	139	OK
15.00	12.2	68.497	4.177	64	161	OK
30.00	15.8	88.709	8.354	80	201	OK
60.00	20.5	115.097	16.708	98	246	OK
120.00	26.6	149.345	33.415	116	290	OK
360.00	40.2	225.702	100.246	125	314	OK
720.00	52.1	292.515	200.493	92	230	OK
1440.00	67.6	379.539	400.986	-21	-54	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang
Highlighted cell is volume required for critcal storm duration

Project No.	10690	Client :	Alber Homes	Project:	Rosshill development

Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

TOBIN CONSULTING ENGINEERS

$O = a_{s50} \times f \times D$
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 11

Drained Area = **8758.551** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
30	13	1.2

a_{s50} 51.6 m^2

Void Ratio 40 %

Infiltration Rate (f) 2.0576E-04 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	100.198	6.370	94	235	OK
15.00	12.2	117.540	9.555	108	270	OK
30.00	15.8	152.224	19.111	133	333	OK
60.00	20.5	197.505	38.222	159	398	OK
120.00	26.6	256.275	76.444	180	450	OK
360.00	40.2	387.303	229.332	158	395	OK
720.00	52.1	501.953	458.664	43	108	OK
1440.00	67.6	651.286	917.327	-266	-665	OK

Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang
Highlighted cell is volume required for critcal storm duration

Project No.	10690 Client :	Alber Homes	Project:	Rosshill development

Soakaway Design to BRE 365

Design Procedure I - O = S
where;
I = Inflow from impermeable area to be drained
O = Outflow infiltrating into the soil during rainfall
S = Storage required

I = A x R
where;
A = the impermeable area drained to the soakaway;
R = the total rainfall in a 100 yrdesign storm

$O = a_{s50} \times f \times D$
where;

a_{s50} = the internal surface area of the soakaway to 50% effective depth
f = the soil infiltration rate determined in trial pit at the site of the proposed soakaway
D = the storm Duration

Soakaway No. 12

Drained Area = **1451.43** m2

Proposed Soakaway

Length (m)	Width (m)	Depth (m)
15	4	1.2

a_{s50} 22.8 m^2

Void Ratio 40 %

Infiltration Rate (f) 9.4330E-05 m/s

For a 100 Year return period from table below

Duration Minutes	M100 - D (mm)	I (m^3)	O (m^3)	S (m^3)	S required @ 40% voids	Check
10.00	10.4	16.604	1.290	15	38	OK
15.00	12.2	19.478	1.936	18	44	OK
30.00	15.8	25.226	3.871	21	53	OK
60.00	20.5	32.730	7.743	25	62	OK
120.00	26.6	42.469	15.485	27	67	OK
360.00	40.2	64.182	46.456	18	44	OK
720.00	52.1	83.181	92.911	-10	-24	OK
1440.00	67.6	107.928	185.823	-78	-195	OK

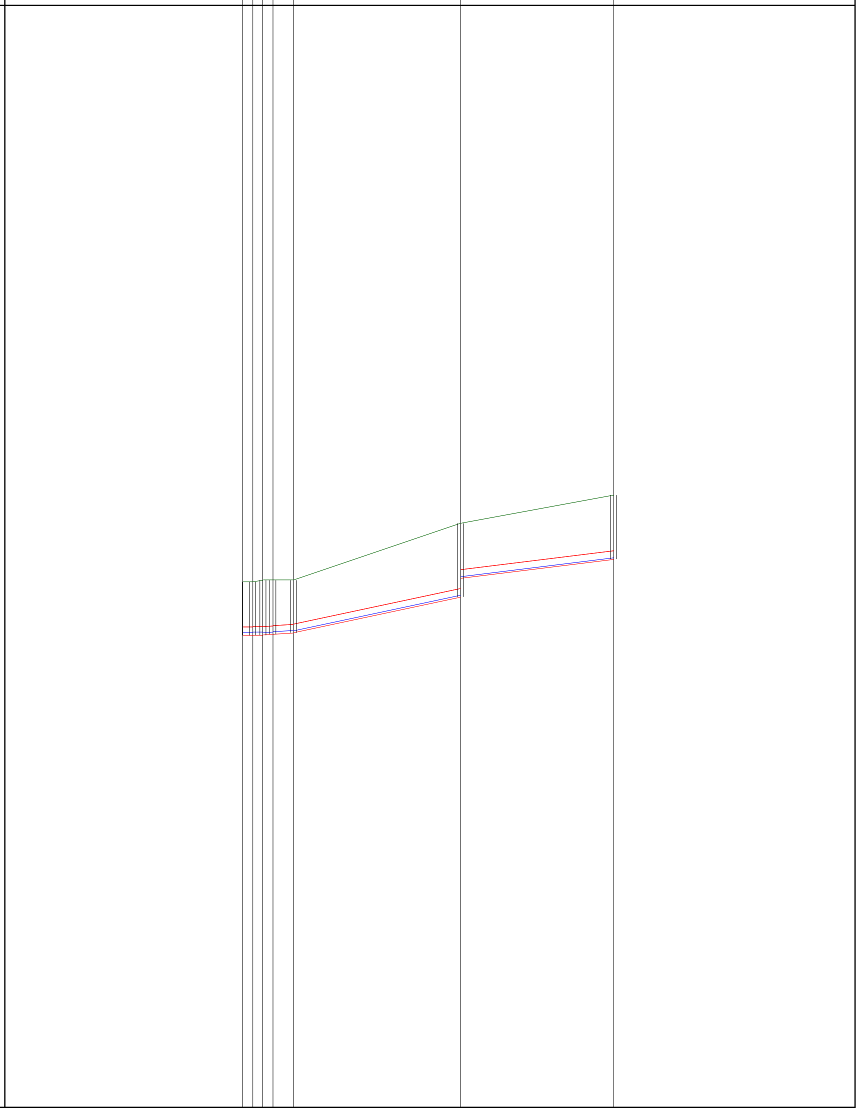
Rainfall Data obtained from Met Eireann for Grid co-ords 134241E, 225001N (Irish Grid) with 10% added for climate chang

Highlighted cell is volume required for critcal storm duration

APPENDIX D

Storm Drainage Sections

MH Name	S		S2		S1



Hor Scale 1500

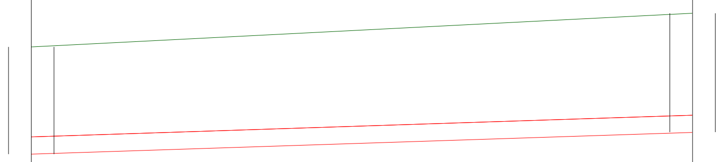
Ver Scale 200

Datum (m)1.000

	S		S2		S1
PN		S1.001		S1.000	
Dia (mm)		225		225	
Slope (1:X)		35.0		60.0	
Cover Level (m)	14.900		16.450		17.200
Invert Level (m)	13.554		14.500 / 14.993		15.500
Length (m)		33.127		30.400	

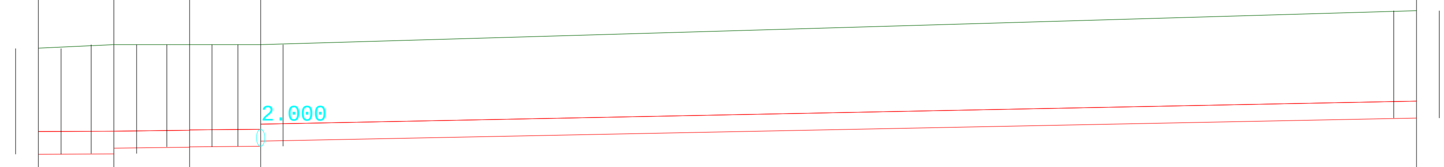
TOBIN Consulting Engineers		Page 1
Fairgreen House Fairgreen Road Galway		
Date 05/12/2019 17:47 File STORM DESIGN NETWORK NO. 2_REV B.MDX	Designed by Richard Daly Checked by	
Micro Drainage	Network 2017.1.2	

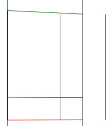
MH Name		S2	S1
Hor Scale 200 Ver Scale 100 Datum (m)13.000			

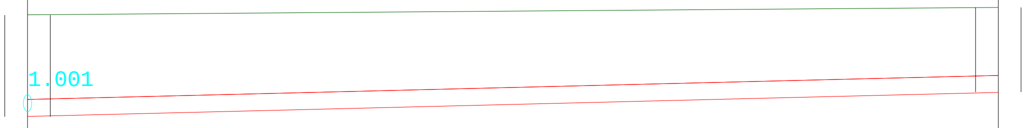


PN		S1.000	
Dia (mm)		225	
Slope (1:X)		60.0	
Cover Level (m)	16.650		17.100
Invert Level (m)	15.225		15.517
Length (m)		17.500	

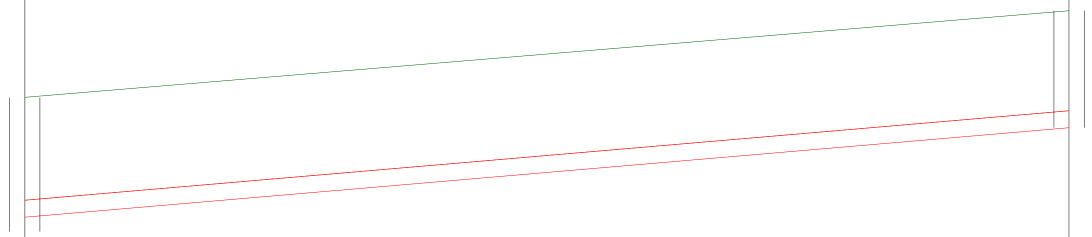
TOBIN Consulting Engineers		Page 2
Fairgreen House Fairgreen Road Galway		
Date 05/12/2019 17:47 File STORM DESIGN NETWORK NO. 2_REV B.MDX	Designed by Richard Daly Checked by	
Micro Drainage	Network 2017.1.2	

MH Name	S7	S2
Hor Scale 200 Ver Scale 100 Datum (m)12.000		
PN	S1.001	
Dia (mm)	225	
Slope (1:X)	100.0	
Cover Level (m)	16.150, 16.200, 16.200, 16.200	16.650
Invert Level (m)	14.746, 14.753, 14.828, 14.841, 14.841, 14.854, 14.919	15.225
Length (m)	30.600	

MH Name	S	
Hor Scale 200 Ver Scale 100 Datum (m)12.000		
PN		
Dia (mm)		
Slope (1:X)		
Cover Level (m)	16.200	16.150
Invert Level (m)	14.740	14.746
Length (m)		

MH Name	S4		S3
Hor Scale 200 Ver Scale 100 Datum (m)12.000			
PN		S2.000	
Dia (mm)		225	
Slope (1:X)		80.0	
Cover Level (m)	16.200		16.300
Invert Level (m)	14.854		15.175
Length (m)		25.700	

TOBIN Consulting Engineers		Page 1
Fairgreen House Fairgreen Road Galway		
Date 05/12/2019 17:50 File Storm Design Network no. 3_Rev B.mdx	Designed by Richard Daly Checked by	
Micro Drainage	Network 2017.1.2	

MH Name	S3		S1
Hor Scale 300 Ver Scale 100 Datum (m)16.000			
PN		S1.000	
Dia (mm)		225	
Slope (1:X)		35.0	
Cover Level (m)	19.300		20.450
Invert Level (m)	17.714		18.900
Length (m)		41.500	

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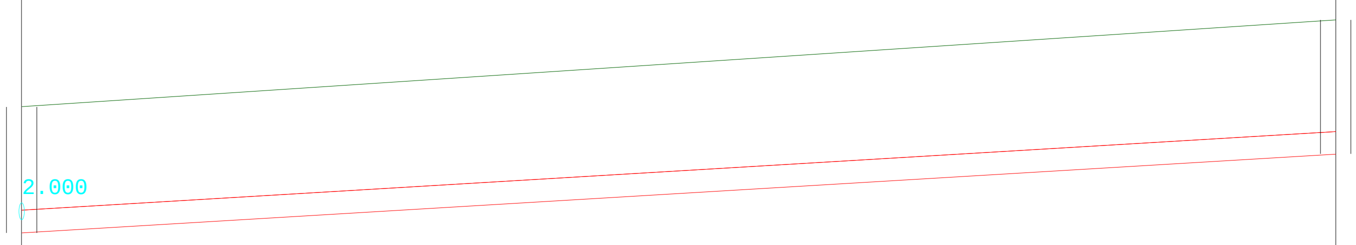
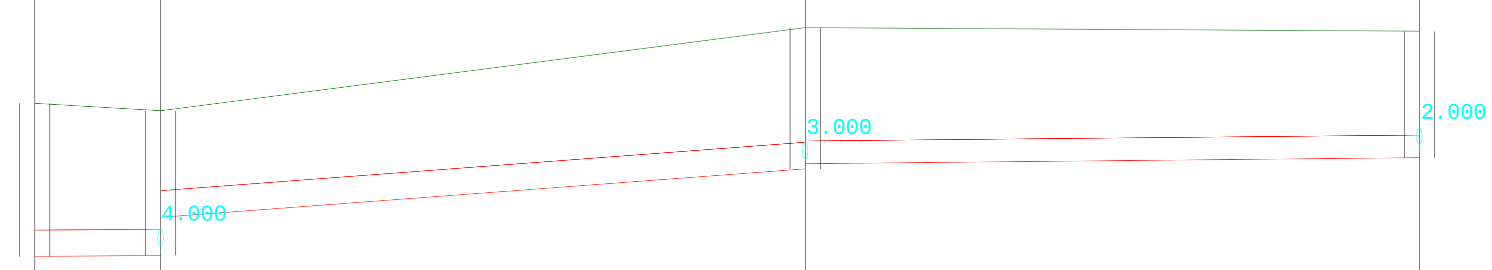
Fairgreen House Fairgreen Road Galway		
Date 05/12/2019 17:50 File Storm Design Network no. 3_Rev B.mdx	Designed by Richard Daly Checked by	
Micro Drainage	Network 2017.1.2	

MH Name	S5		S3
Hor Scale 300 Ver Scale 100 Datum (m)14.000			
PN		S1.001	
Dia (mm)		300	
Slope (1:X)		50.0	
Cover Level (m)	18.150		19.300
Invert Level (m)	16.481		17.525
Length (m)		52.200	

TOBIN Consulting Engineers		Page 3
Fairgreen House Fairgreen Road Galway		
Date 05/12/2019 17:50 File Storm Design Network no. 3_Rev B.mdx	Designed by Richard Daly Checked by	
Micro Drainage	Network 2017.1.2	

MH Name	S10		S9		S7		S5



Hor Scale 300

Ver Scale 100

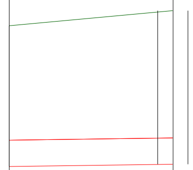
Datum (m)13.000

	S10		S9		S7		S5
PN		S1.004		S1.003		S1.002	
Dia (mm)		350		350		300	
Slope (1:X)		300.0		40.0		300.0	
Cover Level (m)	17.200		17.100		18.200		18.150
Invert Level (m)	15.172		15.189 15.693		16.333 16.400		16.481
Length (m)		5.000		25.600		24.400	

Hor Scale 300

Ver Scale 100

Datum (m)13.000



MH Name	S		S10
PN		S1.005	
Dia (mm)		350	
Slope (1:X)		197.0	
Cover Level (m)	17.000		17.200
Invert Level (m)	15.139		15.172
Length (m)		6.500	

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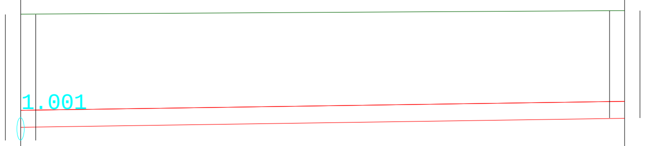
Fairgreen House Fairgreen Road Galway		
Date 05/12/2019 17:50 File Storm Design Network no. 3_Rev B.mdx	Designed by Richard Daly Checked by	
Micro Drainage	Network 2017.1.2	

MH Name	S5		S4	
Hor Scale 300 Ver Scale 100 Datum (m)14.000				
PN		S2.000		
Dia (mm)		225		
Slope (1:X)		200.0		
Cover Level (m)	18.150		18.200	
Invert Level (m)	16.655		16.775	
Length (m)		24.000		

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Fairgreen House Fairgreen Road Galway		
Date 05/12/2019 17:50 File Storm Design Network no. 3_Rev B.mdx	Designed by Richard Daly Checked by	
Micro Drainage	Network 2017.1.2	

MH Name	S7	S6
Hor Scale 300 Ver Scale 100 Datum (m)14.000		

PN		S3.000	
Dia (mm)		225	
Slope (1:X)		300.0	
Cover Level (m)	18.200		17.950
Invert Level (m)	16.458		16.525
Length (m)		20.200	

MH Name	S9	S8
Hor Scale 300 Ver Scale 100 Datum (m)13.000		

PN		S4.000	
Dia (mm)		225	
Slope (1:X)		300.0	
Cover Level (m)	17.100		16.850
Invert Level (m)	15.314		15.425
Length (m)		33.450	

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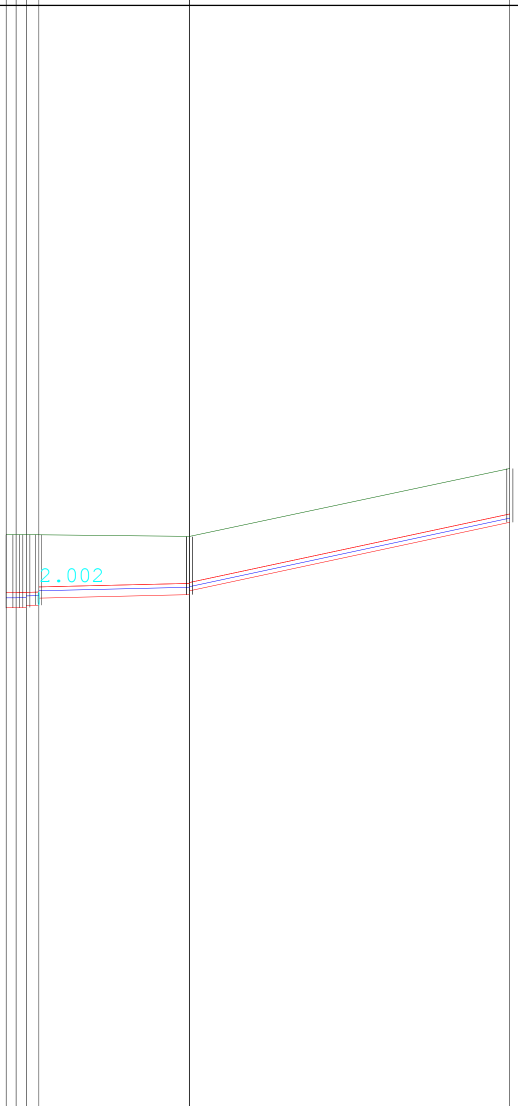
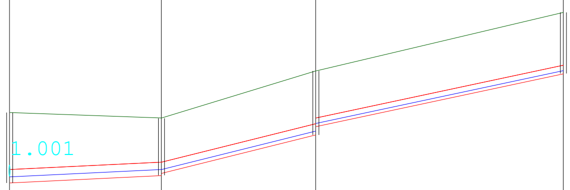
Fairgreen House Fairgreen Road Galway		Micro Drainage (logo)
Date 11/07/2019 10:22 File STORM DESIGN NETWORK NO...	Designed by Fiontan Gallagher Checked by	
Micro Drainage	Network 2017.1.2	

MH Name	S		S2		S1
Hor Scale 1500 Ver Scale 200 Datum (m)1.000					
PN		S1.001		S1.000	
Dia (mm)		300		225	
Slope (1:X)		300.0		35.0	
Cover Level (m)	16.150		16.100		17.900
Invert Level (m)		14.462	14.562 / 14.661		16.475
Length (m)		29.900		63.500	



MH Name	S5		S4		S4		S3



Hor Scale 1500

Ver Scale 200

Datum (m) 2.000

	S5		S4		S4		S3
PN		S2.002		S2.001		S2.000	
Dia (mm)		350		300		225	
Slope (1:X)		149.8		30.0		35.0	
Cover Level (m)	16.150		16.000		17.250		18.800
Invert Level (m)	14.284		14.485 / 14.535		15.555 / 15.772		17.175
Length (m)		30.100		30.600		49.100	

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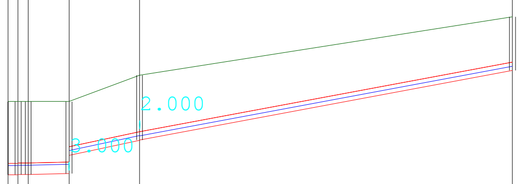
Fairgreen House Fairgreen Road Galway		Micro Drainage
Date 11/07/2019 10:23 File STORM DESIGN NETWORK NO...	Designed by Fiontan Gallagher Checked by	
Micro Drainage	Network 2017.1.2	



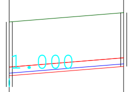
Hor Scale 1500

Ver Scale 200

Datum (m) 4.000

MH Name	S						S1
PN						S1.000	
Dia (mm)						225	
Slope (1:X)						40.0	
Cover Level (m)	18.550	18.550		19.250			20.800
Invert Level (m)		16.645	17.125	17.525	17.525		19.375
Length (m)						74.000	

MH Name	S3	S2

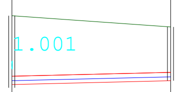


Hor Scale 1500

Ver Scale 200

Datum (m) 4.000

PN	S2.000	
Dia (mm)	225	
Slope (1:X)	90.0	
Cover Level (m)	19.250	19.500
Invert Level (m)	17.822	18.075
Length (m)	22.800	



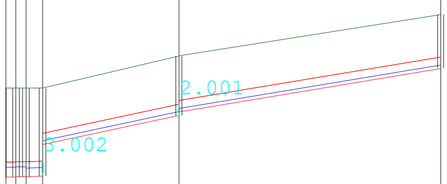
Hor Scale 1500

Ver Scale 200

Datum (m) 3.000

MH Name	S5		S4
PN		S3.000	
Dia (mm)		225	
Slope (1:X)		300.0	
Cover Level (m)	18.550		18.250
Invert Level (m)	16.720		16.825
Length (m)		31.500	

TOBIN Consulting Engineers		Page 1
Fairgreen House Fairgreen Road Galway		
Date 11/07/2019 10:24 File STORM DESIGN NETWORK NO...	Designed by Fiontan Gallagher Checked by	
Micro Drainage	Network 2017.1.2	



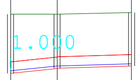
Hor Scale 1500

Ver Scale 200

Datum (m) 4.000

MH Name	S		S3		S1
PN		S1.001		S1.000	
Dia (mm)		300		300	
Slope (1:X)		35.0		45.0	
Cover Level (m)	18.600		19.450		20.550
Invert Level (m)	17.102		17.875 / 17.971		19.125
Length (m)		27.050		51.950	

MH Name	S3		



Hor Scale 1500

Ver Scale 200

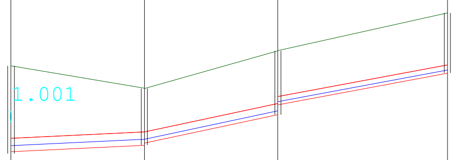
Datum (m) 4.000

PN			
Dia (mm)			
Slope (1:X)			
Cover Level (m)	19.450	19.450	19.500
Invert Level (m)	18.008	18.008	18.075
Length (m)			

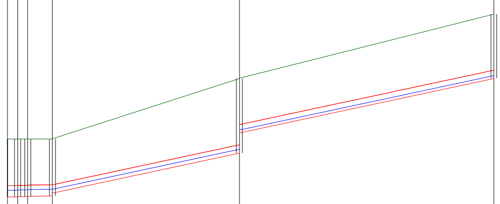
Hor Scale 1500

Ver Scale 200

Datum (m) 4.000



MH Name	S8		S6		S5		S4
PN		S3.002		S3.001		S3.000	
Dia (mm)		350		300		225	
Slope (1:X)		150.3		35.0		40.0	
Cover Level (m)	18.600		18.000		19.000		20.000
Invert Level (m)	16.318		16.494 16.544		17.300 17.560		18.400
Length (m)		26.450		26.450		33.600	

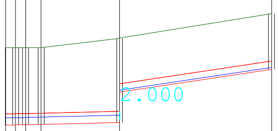


Hor Scale 1500

Ver Scale 200

Datum (m) 1.000

MH Name	S		S2		S1
PN		S1.001		S1.000	
Dia (mm)		225		225	
Slope (1:X)		35.0		35.0	
Cover Level (m)	14.700		16.300		18.000
Invert Level (m)	13.265		14.325 / 14.857		16.300
Length (m)		37.100		50.500	



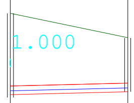
Hor Scale 1500

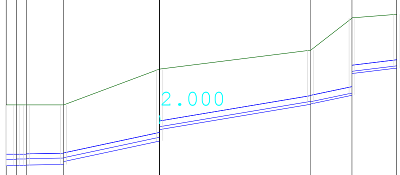
Ver Scale 200

Datum (m) 1.000

MH Name	S				S1
PN				S1.000	
Dia (mm)				225	
Slope (1:X)				50.0	
Cover Level (m)	15.950		16.200		16.850
Invert Level (m)		13.921	13.973	14.771	15.375
Length (m)				30.200	

MH Name	S3	S2
Hor Scale 1500 Ver Scale 200 Datum (m)1.000		
PN	S2.000	
Dia (mm)	225	
Slope (1:X)	300.0	
Cover Level (m)	16.200	15.550
Invert Level (m)	14.048	14.125
Length (m)	23.200	





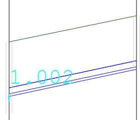
Hor Scale 1500

Ver Scale 200

Datum (m) 0.000

MH Name			5	3		
PN			1.003	1.002		
Dia (mm)			225	225		
Slope (1:X)			35.0	44.4		
Cover Level (m)	13.950	13.950	14.900	15.400	16.250	16.350
Invert Level (m)		12.379	12.454 / 13.000	13.300 / 13.975	14.210	14.925
Length (m)			19.100	30.000		

MH Name	5	4



Hor Scale 1500

Ver Scale 200

Datum (m) 0.000

PN		2.000	
Dia (mm)		225	
Slope (1:X)		35.0	
Cover Level (m)	14.900		15.600
Invert Level (m)	13.452		14.175
Length (m)		25.300	

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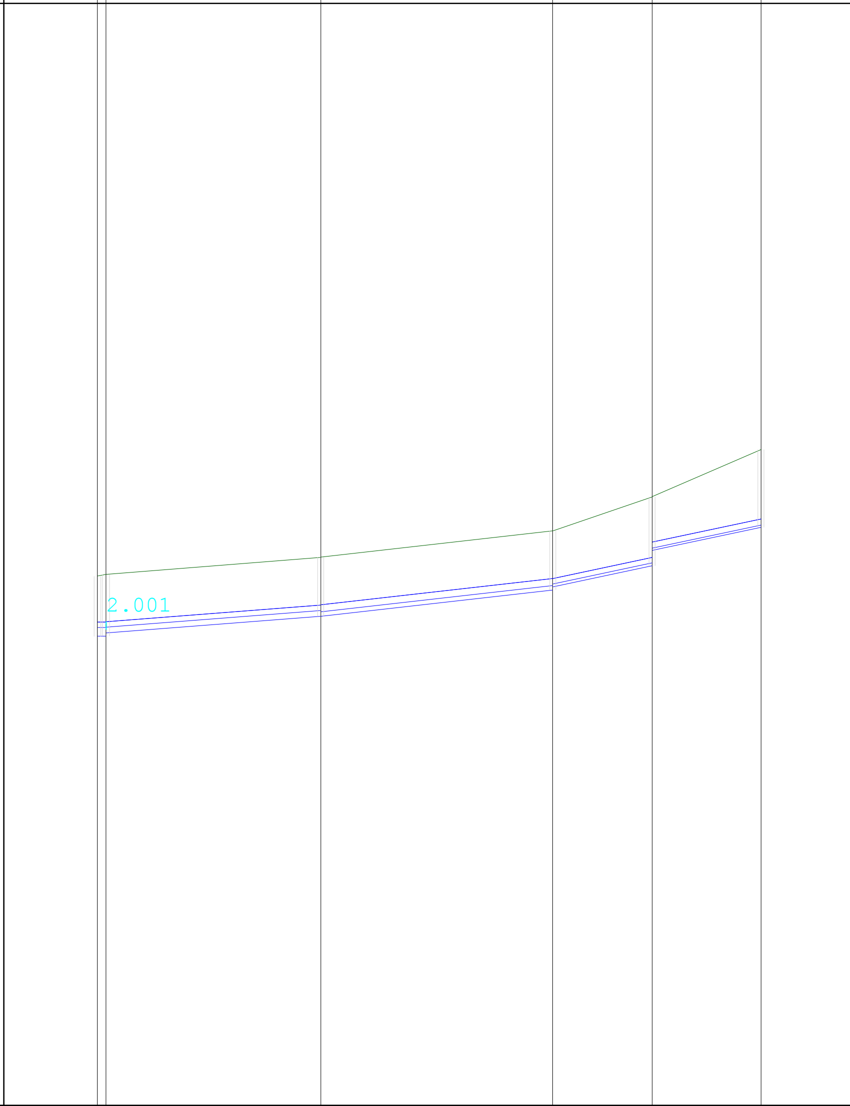
Fairgreen House Fairgreen Road Galway		
Date 11/07/2019 10:25 File STORM DESIGN NETWORK NO...	Designed by Fiontan Gallagher Checked by	
Micro Drainage	Network 2017.1.2	

MH Name	8	4	3	2	1



Hor Scale 1500

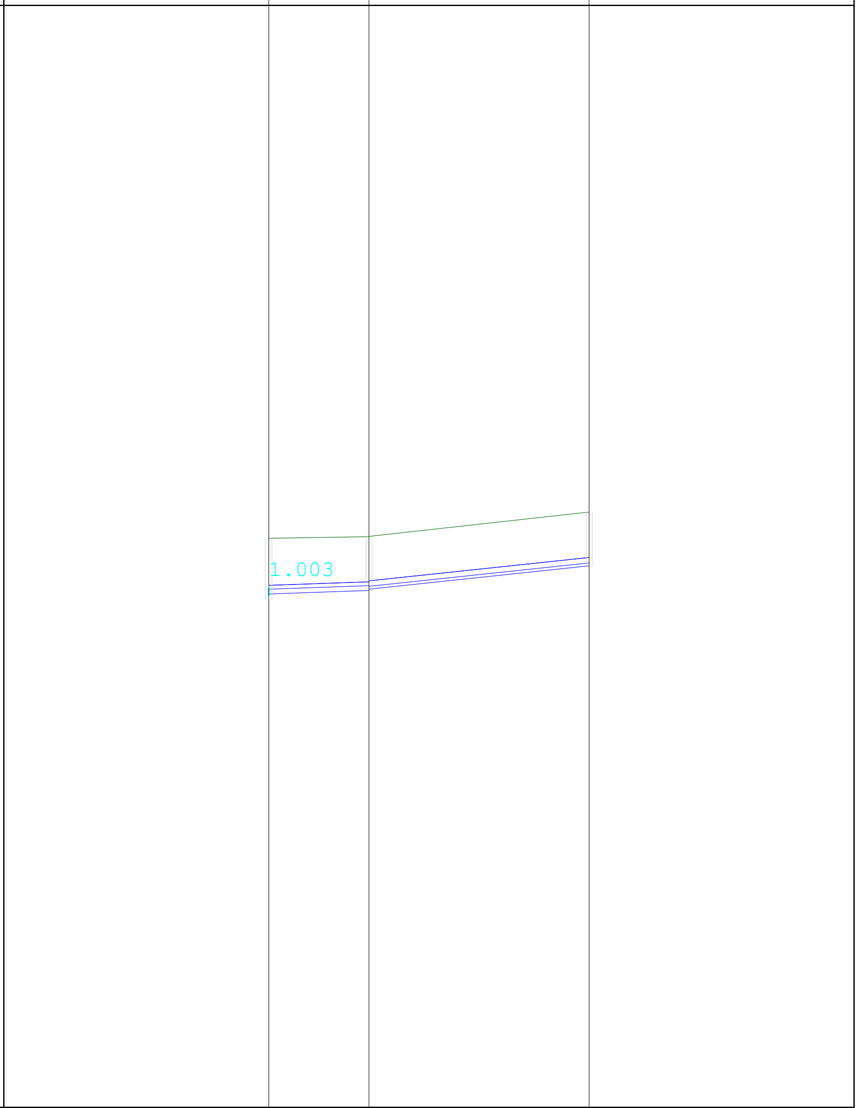
Ver Scale 200

Datum (m) -5.000

PN		1.003		1.002	1.001	1.000
Dia (mm)		300		300	225	225
Slope (1:X)		95.0		65.7	35.0	35.0
Cover Level (m)	9.000		9.500	10.200	11.100	12.350
Invert Level (m)		7.489	7.937 7.937	8.637 8.712	9.275 9.675	10.292
Length (m)		42.600		46.000	19.700	21.600

MH Name	
Hor Scale 1500 Ver Scale 200 Datum (m)-6.000	
PN	
Dia (mm)	
Slope (1:X)	
Cover Level (m)	9.000
Invert Level (m)	
Length (m)	

MH Name	7		6		5



Hor Scale 1500

Ver Scale 200

Datum (m) -6.000

	MH 7		MH 6		MH 5
PN		2.001		2.000	
Dia (mm)		225		225	
Slope (1:X)		199.0		70.0	
Cover Level (m)	9.050		9.100		9.750
Invert Level (m)	7.575		7.675 / 7.701		8.325
Length (m)		19.900		43.700	

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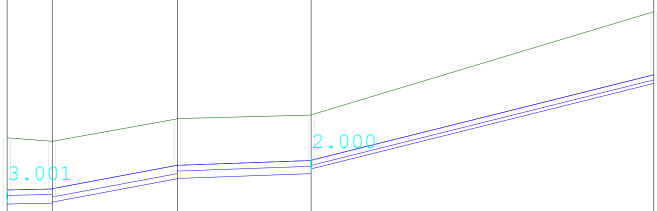
Fairgreen House Fairgreen Road Galway		
Date 11/07/2019 10:26 File STORM DESIGN NETWORK NO...	Designed by Fiontan Gallagher Checked by	
Micro Drainage	Network 2017.1.2	



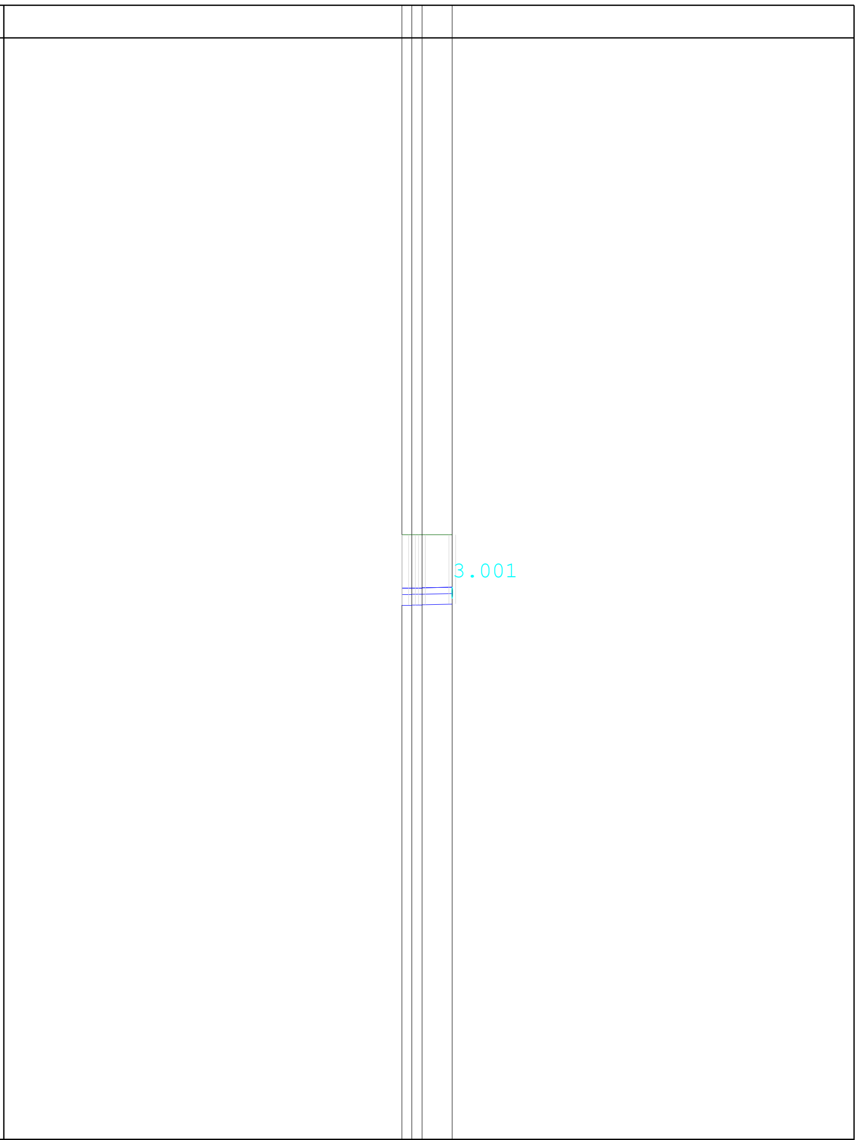
Hor Scale 1500

Ver Scale 200

Datum (m) -4.000

MH Name	9		4	3	1	
PN			1.002	1.001	1.000	
Dia (mm)			350	350	225	
Slope (1:X)			40.0	200.0	30.0	
Cover Level (m)	10.000	9.900	10.500	10.600	13.330	
Invert Level (m)		8.270	8.295 8.915	8.915 9.048	9.173 11.440	
Length (m)			24.800	26.600	68.000	

MH Name



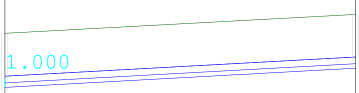
Hor Scale 1500

Ver Scale 200

Datum (m) -6.000

PN		
Dia (mm)		
Slope (1:X)		
Cover Level (m)	10.000	10.000
Invert Level (m)		8.163
Length (m)		

MH Name	3	2

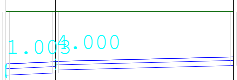


Hor Scale 1500

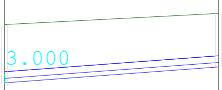
Ver Scale 200

Datum (m) -5.000

	3		2
PN		2.000	
Dia (mm)		300	
Slope (1:X)		135.0	
Cover Level (m)	10.600		11.100
Invert Level (m)	9.159		9.675
Length (m)		69.600	



MH Name	9		6	
Hor Scale 1500 Ver Scale 200 Datum (m)-5.000				
PN			3.000	
Dia (mm)			225	
Slope (1:X)			290.0	
Cover Level (m)	10.000	10.000	10.000	
Invert Level (m)		8.378	8.453 8.575	
Length (m)			35.300	



MH Name	8	7	
Hor Scale 1500 Ver Scale 200 Datum (m)-5.000			
PN		4.000	
Dia (mm)		300	
Slope (1:X)		100.0	
Cover Level (m)	10.000	10.300	
Invert Level (m)	8.450	8.875	
Length (m)		42.500	

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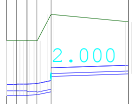
Fairgreen House Fairgreen Road Galway		
Date 11/07/2019 10:26 File STORM DESIGN NETWORK NO...	Designed by Fiontan Gallagher Checked by	
Micro Drainage	Network 2017.1.2	

MH Name



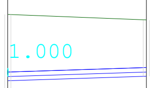
Hor Scale 1500

Ver Scale 200

Datum (m) -6.000

PN		
Dia (mm)		
Slope (1:X)		
Cover Level (m)	8.500	9.000
Invert Level (m)	7.557	7.625
Length (m)		

MH Name	3	2



Hor Scale 1500

Ver Scale 200

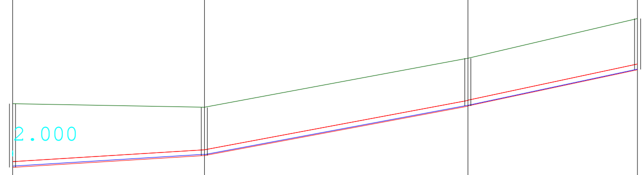
Datum (m) -6.000

PN		2.000	
Dia (mm)		225	
Slope (1:X)		225.0	
Cover Level (m)	9.200		9.050
Invert Level (m)	7.453		7.575
Length (m)		27.400	

APPENDIX E

Foul Drainage Sections

TOBIN Consulting Engineers		Page 1
Fairgreen House Fairgreen Road Galway		
Date 11/07/2019 10:07 File FOUL DRAINAGE WITH ADDI...	Designed by Fiontan Gallagher Checked by	
Micro Drainage	Network 2017.1.2	

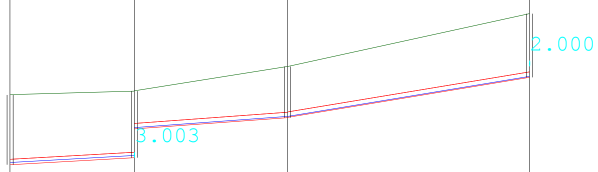


Hor Scale 1500

Ver Scale 200

Datum (m) 4.000

MH Name	F5		F3		F2		F1
PN		F1.002		F1.001		F1.000	
Dia (mm)		150		150		150	
Slope (1:X)		120.0		40.0		35.0	
Cover Level (m)	18.250		18.150		19.450		20.500
Invert Level (m)	16.562		16.880 / 16.880		18.187 / 18.187		19.150
Length (m)		38.120		52.300		33.700	

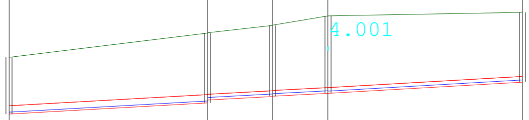


Hor Scale 1500

Ver Scale 200

Datum (m) 2.000

MH Name	F12		F11		F6		F5
PN		F1.005		F1.004		F1.003	
Dia (mm)		150		150		150	
Slope (1:X)		130.0		100.0		45.0	
Cover Level (m)	16.100		16.200		16.850		18.250
Invert Level (m)	14.246		14.436 / 15.191		15.495 / 15.495		16.562
Length (m)		24.700		30.400		48.000	

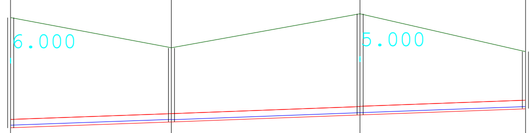


Hor Scale 1500

Ver Scale 200

Datum (m) 0.000

MH Name	F18	F17			F12	
PN		F1.009			F1.006	
Dia (mm)		225			150	
Slope (1:X)		130.0			130.0	
Cover Level (m)	14.900	15.550	15.750	16.000	16.100	
Invert Level (m)	13.387	13.690 13.765	13.865 13.865	13.949 13.949	14.246	
Length (m)		39.400			38.600	



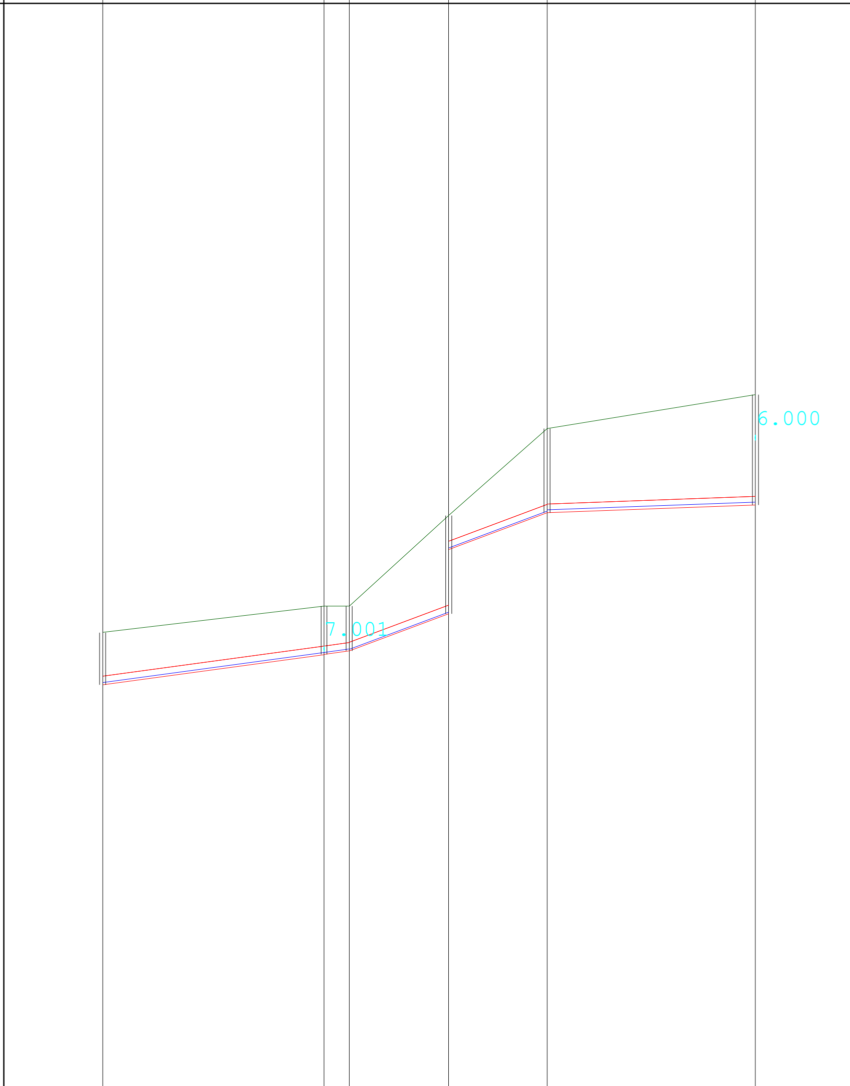
Hor Scale 1500

Ver Scale 200

Datum (m) 0.000

MH Name	F23		F21		F20		F18
PN		F1.012		F1.011		F1.010	
Dia (mm)		225		225		225	
Slope (1:X)		200.0		200.0		200.0	
Cover Level (m)	15.800		15.000		15.900		14.900
Invert Level (m)	12.877		13.036 / 13.036		13.223 / 13.223		13.387
Length (m)		31.870		37.400		32.800	

MH Name	F30		F29		F25		F24		F23

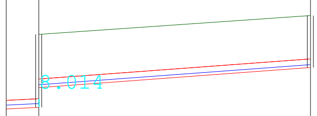


Hor Scale 1500

Ver Scale 200

Datum (m)-3.000

	F30		F29		F25		F24		F23
PN		F1.017		F1.015		F1.014		F1.013	
Dia (mm)		225		225		225		225	
Slope (1:X)		55.0		20.0		20.0		200.0	
Cover Level (m)	9.500		10.200		12.600		14.900		15.800
Invert Level (m)	8.119		8.917 / 9.014		10.000 / 11.694		12.670 / 12.670		12.877
Length (m)		43.900		19.710		19.530		41.300	



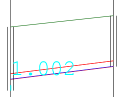
Hor Scale 1500

Ver Scale 200

Datum (m)-6.000

MH Name	F			F30
PN			F1.018	
Dia (mm)			225	
Slope (1:X)			100.0	
Cover Level (m)	0.000	9.000		9.500
Invert Level (m)		7.057	7.580	8.119
Length (m)			53.900	

MH Name	F5	F4



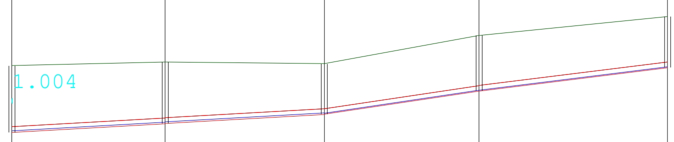
Hor Scale 1500

Ver Scale 200

Datum (m) 3.000

PN	F2.000	
Dia (mm)	150	
Slope (1:X)	60.0	
Cover Level (m)	18.250	18.550
Invert Level (m)	16.858	17.200
Length (m)	20.510	

MH Name	F11		F10		F9		F8		F7



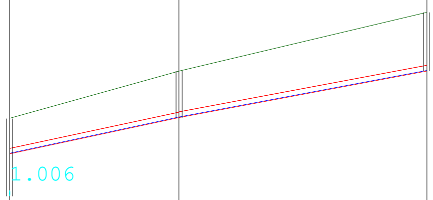
Hor Scale 1500

Ver Scale 200

Datum (m)1.000

		F3.003	F3.002	F3.001	F3.000
PN		F3.003	F3.002	F3.001	F3.000
Dia (mm)		150	150	150	150
Slope (1:X)		130.0	130.0	50.0	60.0
Length (m)		30.400	31.600	30.700	37.400

	F11	F10	F9	F8	F7
Cover Level (m)	16.200	16.300	16.250	17.000	17.500
Invert Level (m)	14.436	14.670 / 14.670	14.913 / 14.913	15.527 / 15.527	16.150



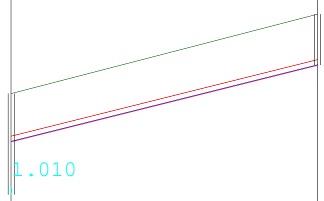
Hor Scale 1500

Ver Scale 200

Datum (m) 2.000

MH Name	F15		F14		F13
PN		F4.001		F4.000	
Dia (mm)		150		150	
Slope (1:X)		35.0		40.0	
Cover Level (m)	16.000		17.250		18.800
Invert Level (m)	15.060		16.020 / 16.020		17.250
Length (m)		33.600		49.200	

MH Name		F20	F19	



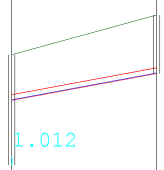
Hor Scale 1500

Ver Scale 200

Datum (m)1.000

PN		F5.000		
Dia (mm)		150		
Slope (1:X)		30.0		
Cover Level (m)	15.900		18.000	
Invert Level (m)		14.623	16.650	
Length (m)		60.800		

MH Name	F23	F22

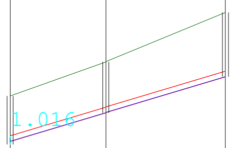


Hor Scale 1500

Ver Scale 200

Datum (m) 0.000

PN	F6.000	
Dia (mm)	150	
Slope (1:X)	40.0	
Cover Level (m)	15.800	16.850
Invert Level (m)	14.581	15.300
Length (m)	28.770	

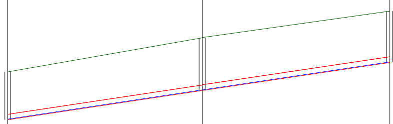


Hor Scale 1500

Ver Scale 200

Datum (m) -4.000

MH Name	F29		F28		F27
PN		F7.001		F7.000	
Dia (mm)		150		150	
Slope (1:X)		25.0		25.0	
Cover Level (m)	10.200		11.100		12.400
Invert Level (m)	8.992		9.752 / 9.752		10.700
Length (m)		19.000		23.700	



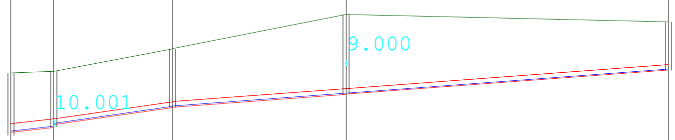
Hor Scale 1500

Ver Scale 200

Datum (m) 5.000

MH Name	F33		F32		F31
PN		F8.001		F8.000	
Dia (mm)		150		150	
Slope (1:X)		50.0		50.0	
Cover Level (m)	19.200		20.100		20.800
Invert Level (m)	17.934		18.706 / 18.706		19.450
Length (m)		38.600		37.200	

MH Name	F40		F36	F35	F33	

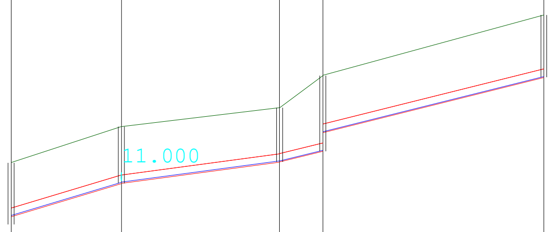


Hor Scale 1500

Ver Scale 200

Datum (m) 3.000

PN			F8.004	F8.003	F8.002	
Dia (mm)			150	150	150	
Slope (1:X)			51.9	100.0	100.0	
Cover Level (m)	17.850	17.900	18.500	19.400	19.200	
Invert Level (m)		16.421	16.496 16.950	16.950 17.294	17.294 17.934	
Length (m)			23.600	34.400	64.000	



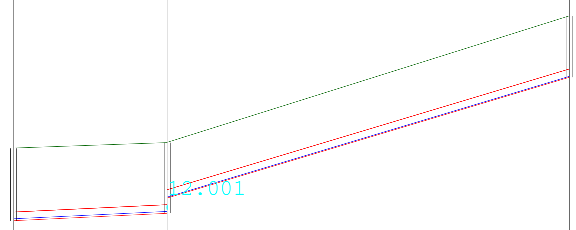
Hor Scale 1500

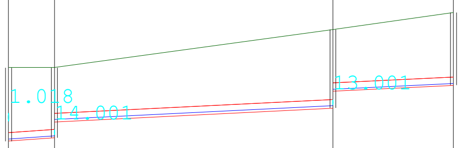
Ver Scale 200

Datum (m) 1.000

MH Name	F45		F44		F42			F40
PN		F8.009		F8.008			F8.006	
Dia (mm)		225		225			225	
Slope (1:X)		25.0		55.8			30.0	
Cover Level (m)	13.950		14.900		15.400	16.250		17.850
Invert Level (m)	12.524		13.400 13.400		13.963	14.250 14.737		16.200
Length (m)		21.900		31.400			43.900	

MH Name	F48		F47		F45
Hor Scale 1500 Ver Scale 200 Datum (m)-3.000					
PN		F8.011		F8.010	
Dia (mm)		225		225	
Slope (1:X)		150.0		25.0	
Cover Level (m)	10.450		10.600		13.950
Invert Level (m)	8.529		8.732 9.132		12.324
Length (m)		30.430		79.800	





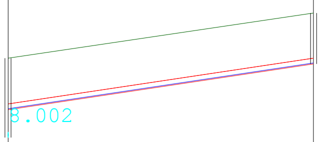
Hor Scale 1500

Ver Scale 200

Datum (m)-6.000

MH Name	F55		F51	F48	
PN			F8.013	F8.012	
Dia (mm)			225	225	
Slope (1:X)			150.0	150.0	
Cover Level (m)	9.000	9.000	10.000	10.450	
Invert Level (m)		7.148	7.565 7.933	8.370 8.529	
Length (m)			55.200	23.900	

MH Name		F35	F34

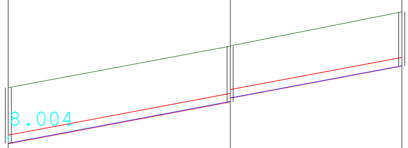


Hor Scale 1500

Ver Scale 200

Datum (m) 4.000

PN		F9.000	
Dia (mm)		150	
Slope (1:X)		50.0	
Cover Level (m)	19.400		20.600
Invert Level (m)	18.038		19.250
Length (m)		60.600	

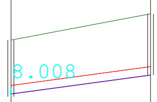


Hor Scale 1500

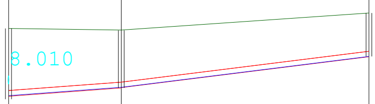
Ver Scale 200

Datum (m) 4.000

MH Name	F39		F38		F37
PN		F10.001		F10.000	
Dia (mm)		225		225	
Slope (1:X)		40.0		40.0	
Cover Level (m)	17.900		19.000		19.900
Invert Level (m)	16.421		17.523 / 17.623		18.475
Length (m)		44.100		34.100	

MH Name	F44	F43
		
Hor Scale 1500		
Ver Scale 200		
Datum (m) 0.000		
PN	F11.000	
Dia (mm)	225	
Slope (1:X)	55.0	
Cover Level (m)	14.900	15.600
Invert Level (m)	13.471	13.975
Length (m)	27.700	

MH Name	F47	F47	F46



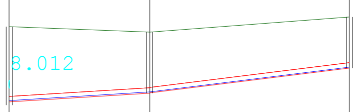
Hor Scale 1500

Ver Scale 200

Datum (m) -5.000

PN	F12.001	F12.000	
Dia (mm)	150	150	
Slope (1:X)	99.9	60.0	
Cover Level (m)	10.600	10.550	11.000
Invert Level (m)	8.807 / 9.031	9.031 / 9.850	
Length (m)	22.370	49.150	

TOBIN Consulting Engineers		Page 22
Fairgreen House Fairgreen Road Galway		
Date 11/07/2019 10:07 File FOUL DRAINAGE WITH ADDI...	Designed by Fiontan Gallagher Checked by	
Micro Drainage	Network 2017.1.2	



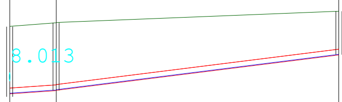
Hor Scale 1500

Ver Scale 200

Datum (m)-5.000

MH Name	F51		F50		F49
PN		F13.001		F13.000	
Dia (mm)		150		150	
Slope (1:X)		120.0		60.0	
Cover Level (m)	10.000		9.850		10.250
Invert Level (m)	8.008		8.240 / 8.240		8.900
Length (m)		27.900		39.600	

MH Name	F54		F52



Hor Scale 1500

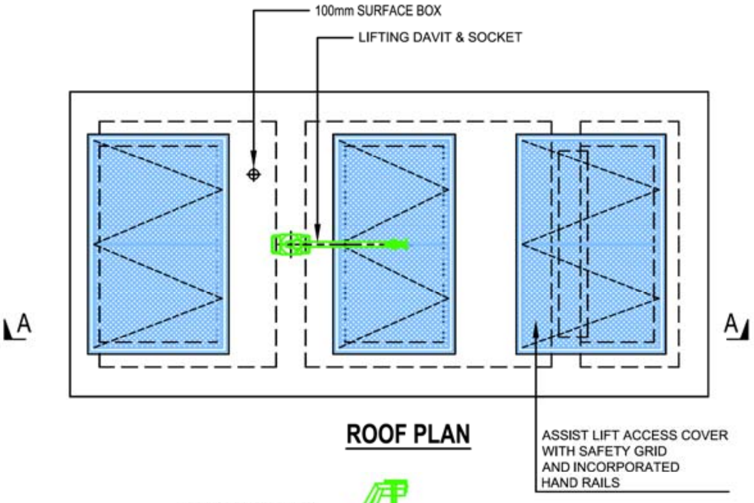
Ver Scale 200

Datum (m) -6.000

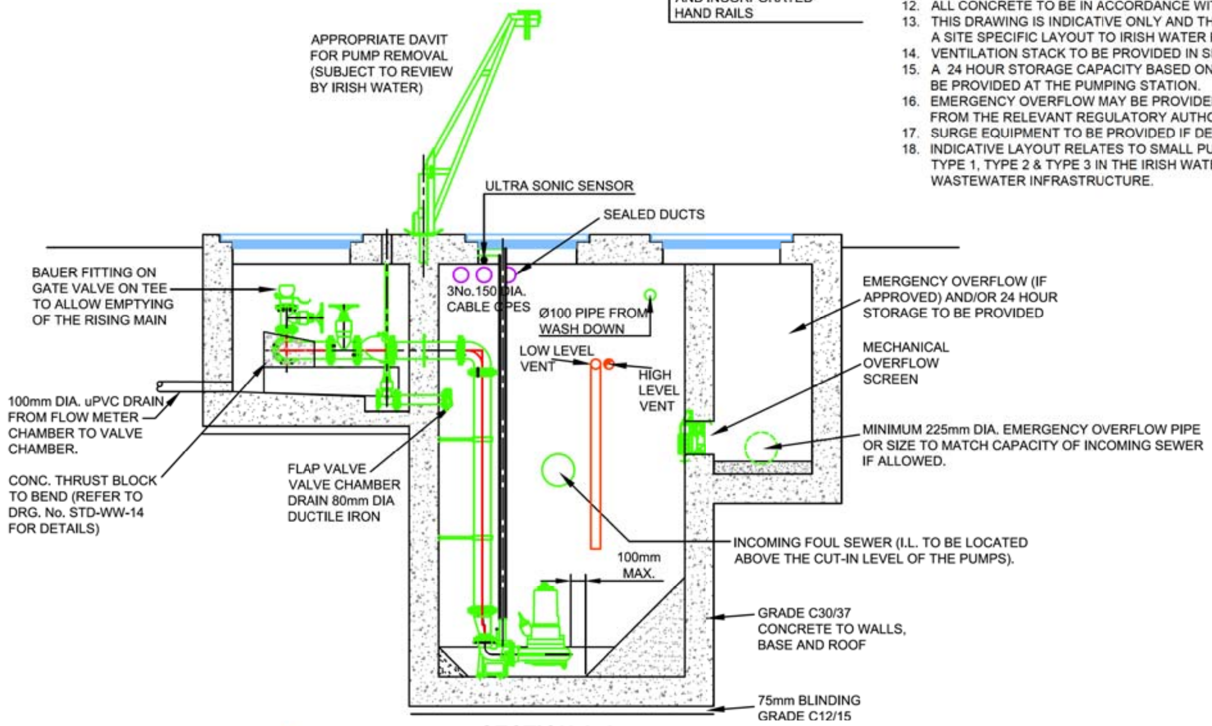
PN			F14.000	
Dia (mm)			150	
Slope (1:X)			60.0	
Cover Level (m)	9.000	9.100		9.400
Invert Level (m)		7.315	7.315	8.250
Length (m)			56.100	

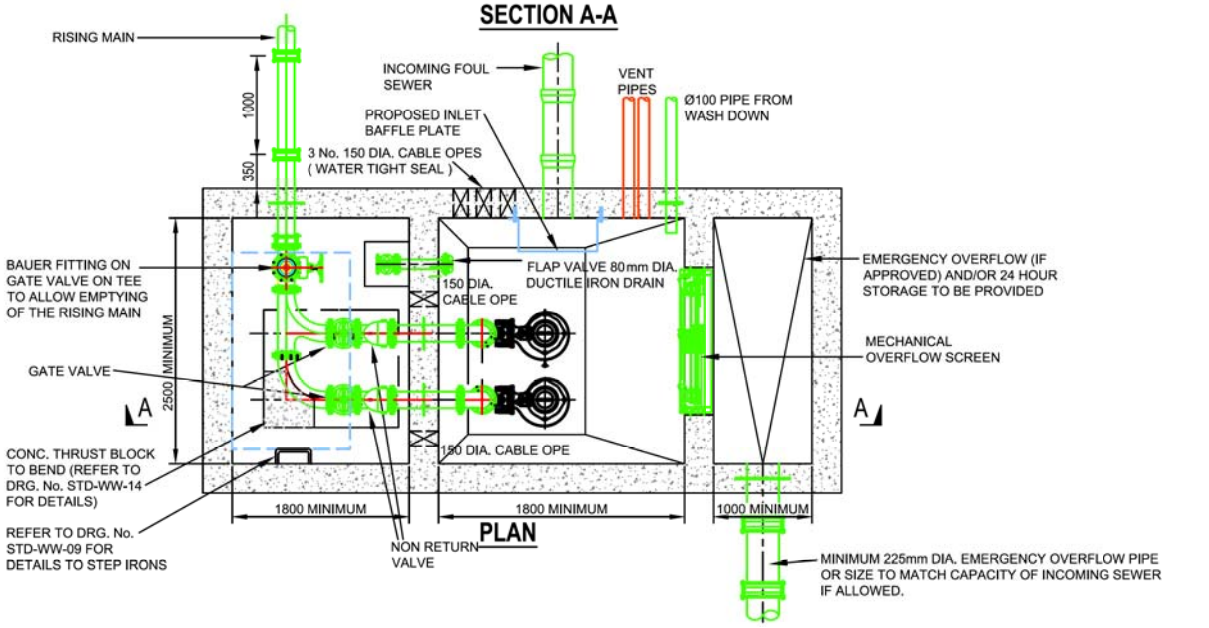
APPENDIX F

Typical Pumping Station Detail Drawing



1. ALL DIMENSIONS ARE IN MILLIMETRES (mm) UNLESS NOTED OTHERWISE.
2. PUMPS SHALL BE INSTALLED TO IRISH WATER REQUIREMENTS. REFER TO PART 5 OF THE CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE .
3. ALL DUCTILE IRON PIPE WORK AND FITTINGS TO BE IN ACCORDANCE WITH IS EN 598.
4. PRE-CAST CONCRETE CHAMBERS MAY BE USED SUBJECT TO REVIEW BY IRISH WATER. REFER TO DRG. No. WW-28A FOR DETAILS.
5. ALL GATE VALVES TO BE CLOCKWISE CLOSING.
6. WET WELL TO BE IN ACCORDANCE WITH BS EN 1992-3.
7. COVERS TO BE SIZED TO ALLOW ADEQUATE SPACE FOR PUMP REMOVAL MINIMUM 1400 x 800mm.
8. CHAMBER ACCESS COVERS WITH A CLEAR OPENING EXCEEDING 1m SHALL CONFORM TO BS 9124.
9. WALL THICKNESS AND REINFORCEMENT SHALL BE SELECTED BASED ON SITE SPECIFIC DESIGN AND SHALL BE SUBJECT TO REVIEW BY IRISH WATER. ROOF SLABS SHALL BE DESIGNED TO CARRY ALL LIVE LOADS & DEAD LOADS, & CONSIST OF A REINFORCED CONCRETE SLAB OF IN-SITU CONCRETE, GRADE C30/37, WITH A MINIMUM THICKNESS OF 225mm. ALTERNATIVELY, PRE-CAST CONCRETE ROOFS MAY BE USED, SUBJECT TO IRISH WATER REVIEW, & COMPLIANCE WITH BS 5911, Part 4
10. THE PUMPING STATION SHOULD NOT BE LOCATED IN AREAS THAT ARE SUSCEPTIBLE TO FLOODING AT MORE THAN A 1:30 YEAR RECURRENCE. THE PUMPING STATION FACILITY SHALL BE DESIGNED FOR INUNDATION. THE FINISHED SLAB LEVEL SHALL BE POSITIONED ABOVE THE 1:100 YEAR FLOOD LEVEL. ALL ELECTRICAL CONTROL EQUIPMENT SHALL BE WATER RESISTANT AND POSITIONED ABOVE 1:200 YEAR FLOOD LEVEL.
11. ALL CHAMBERS TO BE CHECKED FOR UPLIFT BY THE DEVELOPER BASED ON GROUND CONDITIONS WITHIN THE SITE. SHOULD ANTI FLOATATION MEASURES BE REQUIRED THEY SHALL BE SUBJECT TO REVIEW BY IRISH WATER.
12. ALL CONCRETE TO BE IN ACCORDANCE WITH IS EN 206.
13. THIS DRAWING IS INDICATIVE ONLY AND THE DEVELOPER SHALL SUBMIT A SITE SPECIFIC LAYOUT TO IRISH WATER FOR REVIEW.
14. VENTILATION STACK TO BE PROVIDED IN SENSITIVE AREAS.
15. A 24 HOUR STORAGE CAPACITY BASED ON DRY WEATHER FLOW, SHALL BE PROVIDED AT THE PUMPING STATION.
16. EMERGENCY OVERFLOW MAY BE PROVIDED SUBJECT TO APPROVAL FROM THE RELEVANT REGULATORY AUTHORITIES.
17. SURGE EQUIPMENT TO BE PROVIDED IF DEEMED NECESSARY.
18. INDICATIVE LAYOUT RELATES TO SMALL PUMPING STATIONS AS PER TYPE 1, TYPE 2 & TYPE 3 IN THE IRISH WATER CODE OF PRACTICE FOR WASTEWATER INFRASTRUCTURE.





REFER TO INDEX SHEET FOR NOTES REGARDING DESIGN RESPONSIBILITY & RISK ASSESSMENT

UISCE ÉIREANN : IRISH WATER

No.	Date	Drn	Chk	Description	App
2	11/'17	JMC	TOC	Revised notes 2,4,9 & 11	MOD
1	08/'16	JMC	TOC	Revised note 4, incoming sewer note & added thrust block & step irons to valve chamber	MOD
0	09/'15	JMC	TOC	Initial Issue	SL

STANDARD DETAILS - WASTEWATER

SCALE: NOT TO SCALE

DATE: SEPT. 2015

TITLE: INDICATIVE SUBMERSIBLE PUMPING STATION

DRAWING No.: STD-WW-28

REV: 2

APPENDIX G

Irish Water Confirmation of Feasibility Correspondence

Barry Duffy

c/o Richard Daly
Tobin Consulting Engineers
1st Floor Fairgreen House
Fairgreen Road
Co. Galway
4 December 2019

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

Dear Barry Duffy,

Re: Connection Reference No CDS19001343 pre-connection enquiry Rev B - Subject to contract | Contract denied

Connection for Development of 342 unit(s) and Creche at Rosshill, Galway City, Co. Galway.

Irish Water has reviewed your pre-connection enquiry in relation to a water and wastewater connection at Rosshill, Galway City, Co. Galway.

Based upon the details that you have provided with your pre-connection enquiry and on the capacity currently available in the network(s), as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, and subject to the conditions outlined below, your proposed connection to the Irish Water network(s) can be facilitated.

Wastewater Connection:

You have presented in your pre connection enquiry submission the phased breakdown of development proposed. Phases 1 & 2 which comprise of a total of 102 housing units and a crèche can be accommodated by the existing network infrastructure subject to you putting in place a night time pumping regime for the discharge to the Irish Water network.

In order to accommodate the proposed connection of Phases 3 & 4 totalling an additional 240 housing units, upgrade works are required to be delivered at Merlin Park No. 1 Pumping Station to provide additional storage. Irish Water is currently delivering a capital project to provide this additional storage. This project is currently underway and is at site investigation and land owner liaison stage. The project is currently scheduled to be complete by 2024 (subject to change).

It is proposed to connect to the Irish Water network via a pumping station and rising main connection. The proposed pumping station layout should be sized to cater for development on adjoining lands to the south which are currently zoned low residential. The sizing will be confirmed at connection application stage. The proposed development is high density; therefore the densities of future development on the adjoining lands will require to be determined

Water Connection:

The nearest point of connection to the watermain network will be to a 200mm diameter watermain which is being extended to a point north of the railway bridge on the Coast Road. This watermain extension is currently being delivered as part of the development works for a housing development north of the railway on the Coast Road. A connection can be facilitated to this watermain.

Please be aware that Irish Water is now responsible for the delivery of the connection related works in the public domain. The costs and conditions associated with the connection would be detailed in a connection offer at connection application stage.

Irish Water notes that the scale of this development dictates that it is subject to the Strategic Housing Development planning process. in advance of submitting your full application to An Bord Pleanala for assessment, you must have reviewed this development with Irish Water and received a Statement of Design Acceptance in relation to the layout of water and wastewater services.

All infrastructure should be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details. A design proposal for the water and/or wastewater infrastructure should be submitted to Irish Water for assessment. The design proposal can be submitted to cdsdesignqa@water.ie

You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed at a later date.

A connection agreement can be applied for by completing the connection application form available at **www.water.ie/connections**. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities.

If you have any further questions, please contact James O'Malley from the design team at jomalley@water.ie. For further information, visit **www.water.ie/connections.**

Yours sincerely,

M O'Dwyer

Maria O'Dwyer

Connections and Developer Services

APPENDIX H

Irish Water Statement of Design Acceptance

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

Barry Duffy
1st Floor Fairgreen House
Fairgreen Road
Co. Galway

3 December 2019

Re: Design Submission for Rosshill, Galway City, Co. Galway (the "Development") (the "Design Submission") / Connection Reference No: CDS19001343

Dear Barry Duffy,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Irish Water has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before you can connect to our network you must sign a connection agreement with Irish Water. This can be applied for by completing the connection application form at www.water.ie/connections. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities (CRU)(https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Irish Water's network(s) (the "**Self-Lay Works**"), as reflected in your Design Submission. Acceptance of the Design Submission by Irish Water does not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Irish Water representative:
Name: James O'Malley
Phone: 094 90 43310
Email: jomalley@water.ie

Yours sincerely,

M O'Dwyer

Maria O'Dwyer
Connections and Developer Services

Appendix A

Document Title & Revision

- 10690-2001_Rev F – Proposed Drainage and Watermain Layout
- 10690-2002_Rev D – Proposed Drainage – Part 1
- 10690-2003_Rev D – Proposed Drainage – Part 2
- 10690-2004_Rev F – Proposed Watermain – Part 2
- 10690-2005_Rev E – Proposed Watermain – Part 2

*For further information, visit **www.water.ie/connections***

Notwithstanding any matters listed above, the Customer (including any appointed designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay Works. Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

www.tobin.ie

TOBIN Consulting Engineers

@tobinengineers

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LAND PLANNING & DESIGN

CUNNANE STRATTON REYNOLDS
LAND PLANNING & DESIGN

PROPOSED RESIDENTIAL DEVELOPMENT AT
ROSSHILL,
GALWAY.

LANDSCAPE DESIGN & OUTLINE MAINTENANCE REPORT

DECEMBER 2019

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LAND PLANNING & DESIGN

- Context
- Landscape Design Aims & Objectives
- Maintenance and Management

CONTEXT

The overall site area for the proposed development is 24.881 acres, (approximate area identified by redline in image below). The development site is currently a greenfield site located at Rosshill Galway on the eastern edge of Galway City. Located between the established Galway suburbs of Murrough to the east and Roscam to the west, it is located immediately south of the Galway to Dublin railway line which runs parallel to the site's northern boundary. The western boundary is defined by an existing row of exceptionally quality mature beech trees, beyond which extends a mixed quality woodland scrub. To the south and east the site is bound by agricultural pastureland and clusters of one off residential and agricultural properties. Within the site there are a number of existing trees, many a legacy of its relatively recent past development as a golf course – these trees are in the main still young and of relatively low value. There are however some areas of more mature woodland / scrub which predates the golf course tree planting and are of greater value.

The application is for a residential development consisting of 342no. units comprising 185no. houses and 157no. apartments, including a ground-floor community space, office, cafe and retail unit. A two-storey childcare facility. The provision of public realm landscaping including shared public open space and play areas, public art, public lighting, resident and visitor parking including car rental bays, electric vehicle charging points and bike rental spaces. Pedestrian, cyclist and vehicular links throughout the development. Access road and junction improvements at Rosshill Road/Old Dublin Road. Provision of all associated surface water and foul drainage services and connections including pumping station. All associated site works and ancillary services, (refer to Landscape Master Plan Dwg 19112_3_100).

A Natura Impact Statement ('NIS') and Environmental Impact Assessment Report ('EIAR') have been prepared and accompany the application. The application is also accompanied by a Statement of Material Contravention of the Development Plan.

LEGEND

- CLASS A INDIVIDUAL TREE (HIGH QUALITY - RETENTION HIGHLY DESIRABLE)
- CLASS B INDIVIDUAL TREE (MODERATE QUALITY - RETENTION DESIRABLE)
- CLASS C INDIVIDUAL TREE (LOW QUALITY - RETENTION OPTIONAL)
- CLASS U INDIVIDUAL TREE (RECOMMEND REMOVAL)
- TREE GROUPS (COLOUR REPRESENTING GROUP CLASSIFICATION)
- PIONEER SCRUB VEGETATION / REGENERATIVE GROWTH
- CALCULATED ROOT PROTECTION ZONE (RPA)

NOTE:

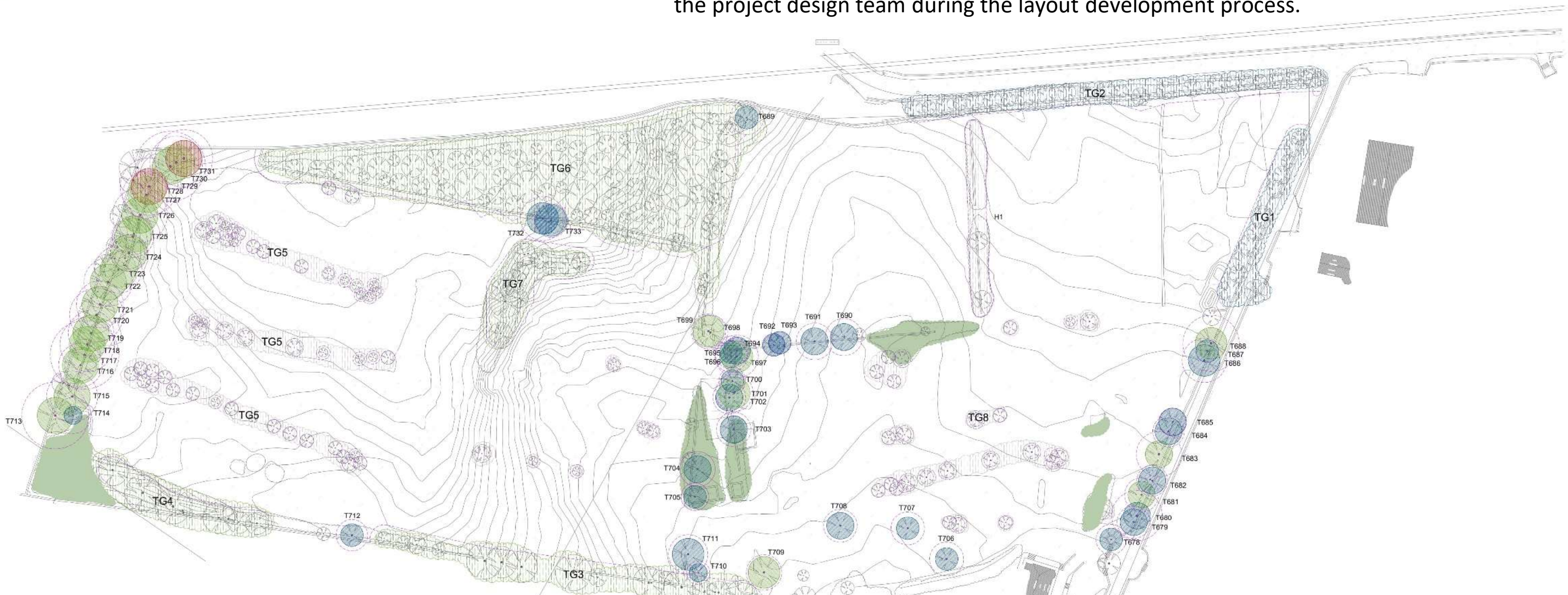
RPA's FOR TAGGED TREES ARE INDIVIDUALLY CALCULATED RPA's FOR 'TREE GROUPS' & 'HEDGEROWS' ARE INDICATIVE - BASED ON AVERAGE SIZE.

(THIS DRAWING IS PRODUCED IN COLOUR, MONOCHROME VERSIONS SHALL NOT BE RELIED UPON).

An overriding principle of the proposed schemes landscape design philosophy is to retain the best of the existing trees present on the site helping to create a high quality external setting and environment for the proposed development whilst retaining the landscape character.

The retention of the existing landform topography is a critical element of achieving successful tree retention, and whilst presenting some development challenges, it will ultimately offer future residents an attractive and varied natural landscape setting as well as ecologically valuable environment in which to live.

As such a BS5837:2012 tree survey was undertaken at the project outset and used to inform the project design team during the layout development process.



The tree survey identified the exceptionally high value of the Beech trees along the sites western boundary and made their retention and protection a project priority. Other areas prioritised for retention include mature boundary trees and areas of contiguous woodland scrub with ecological value.

REV	DATE	AMENDMENT

CUNNANE STRATTON REYNOLDS
LAND PLANNING & DESIGN

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PROJECT: ROSSHILL, GALWAY.	DATE:	FEBRUARY 2019
	SCALE:	1:1,000@A1
DRAWING: TREE CONSTRAINTS	DRAWN: CHECKED:	KM KM
	DRAWING NO:	19112_T_102

LANSCAPE DESIGN AIM & OBJECTIVES

The landscape design seeks to work with the existing topography and tree cover on the site, retaining site features of value or merit such as embankments and significant tree stands to create a variety of connected public open spaces suitable for both passive and active recreation. In this way the proposed development is able to meet a wide range of passive and active recreational needs, and the varying requirements and needs of all residents. The retention of the sites sylvan character is achieved both through the retention of the highest value trees and significant additional tree planting with an emphasis on native species. An area of relatively steep level change across the middle of the site with existing scrub woodland cover presents an opportunity to develop a multi-level outdoor natural playground, utilising changes in level to create both visually interesting and physically challenging play opportunities such as zip lines and slides. Additionally it is proposed to develop a naturalistic amphitheatre around the playground offering further opportunities for play and rest. An outdoor gym will be carefully integrated with existing woodland trees in a similar multi-level basis in this central area.

LANSCAPE DESIGN AIM & OBJECTIVES

A linear parkland has been integrated along the northern and western boundaries, facilitating continuous off road pedestrian linkage between the southwest and north eastern corners of the site. This area also preserves much of the highest value tree cover found on the site including the particularly valuable western boundary trees. A minimalist intervention approach has been taken here to ensure the preservation of the trees into the future, with the only proposed development being an access path constructed in a non-dig method using a combination of timber sleepers, 'cellweb' system and gravel to ensure increased access to the root protection areas of the trees occurs in a manner that will not be detrimental to the trees. Additionally native wildflower meadow grass will be seeded along margins facilitating a low frequency mowing regime in these areas whilst promoting biodiversity and habitat values.

LANSCAPE DESIGN AIM & OBJECTIVES

A hierarchy of high quality, safe and usable public open spaces have been carefully integrated into the overall layout. Complimenting the larger open spaces which offer looped walking routes, (west/north linear park and central space), a series of medium and small local open spaces are distributed throughout; e.g. level areas of suitable size to accommodate informal children's ball sport and smaller 'greens' offering passive enjoyment of the landscape, thereby ensuring close open space proximity for all residents. The size and location of open spaces have been developed in conjunction with both the existing topography, tree cover and other existing site features, thereby preserving and enhance local landscape character. Incorporation of existing features adds visual interest, allows preservation of highest quality trees and of views to local landmarks. The network of open space across the site also facilitates a new network structural tree planting, providing diversification of the age and species profile of the sylvan setting. Sightlines and views are a key element of the layout and design, for example preserving views towards the nearby monument across an open space, whilst 'overlooking' of open space and the associated 'passive supervision' benefits is another key consideration of layout and design.

LANSCAPE DESIGN AIM & OBJECTIVES

The streetscape and public open space is designed in line with the Urban Design Manual and Galway City Councils Development Plan objectives to provide a balanced approach between vehicular, cycle and pedestrian movement through the site. This has been achieved through both design layout and detailing, such as shared surfaces for pedestrian focus, street tree planting for visual 'enclosure', and privacy strip planting around buildings. Pedestrian site permeability is achieved through a connected network of paths both roadside and off road including a liner park around the west & northern perimeter.

A balance of passive and active open space uses has been developed, allowing for adventure playground, outdoor gym stations and kickabout areas as well as a number of smaller spaces that will facilitate passive recreation activity such as walking and sitting. By incorporating a carefully designed mix of grass lawns, semi mature street tree planting, limited paved areas, seating, bicycle storage and a rich diversity of integrated shrub planting the nature and functionality of the intervening space between apartment buildings, parking areas and streets offers both an attractive and functional setting to live and work.

An emphasis will be made within the planting scheme on the use of native tree species where possible to strengthen ecological value as well as flowering and fruiting species in accordance with the National Pollinator Plan. These will be complimented with a rich palette of flowering shrubs, chosen to provide both visual interest and pollinator opportunities across the seasons.

TREE PLANTING

Larger native or naturalised structure trees such as Oak, Beech and Alder have been selected where space allows to facilitate the continuity of the localities sylvan setting into the future, mitigating tree against losses necessary to facilitate the development. These trees will add scale and structure to the landscape over time as well as important ecological benefits including habitat.


Quercus petraea (Oak)


Fagus sylvatica (Beech)


Alnus glutinosa (Alder)

Smaller native trees such as Birch, Whitebeam and Rowan have been selected where space is more restricted, helping to structure and visually soften the environment around the proposed buildings. These trees also offer important ecological and habitat benefits.


Betula pendula (Silver Birch)


Sorbus aria (Whitebeam)


Sorbus aucuparia (Rowan)


Native Fruit Tree Orchard

SUMMARY

High quality safe and usable public open space has been provided in a considered hierarchy of interlinked public open spaces located across the site, the size and location of which reflect the desire to both preserve and enhance existing site features such as topography and sylvan setting.

Public recreational needs have been catered for across the full spectrum of age and gender - from equipped children's and teenage playgrounds, adult outdoor gym exercise and circulatory walking loops and general passive recreation opportunities all integrated to the scheme.

All spaces are passively supervised through strategic location and orientation of adjacent residential and commercial property as well as a network of interlinking paths and roadways permeating the site.

Indicative Maintenance Programme

This programme is a guideline only and times of operations may vary on approval by landscape architect.

ONGOING REQUIREMENTS:	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Lawn grass cutting (Min 24 cuts)		*	**	**	***	***	***	***	***	**	**	
Edging to lawn grass areas				*			*			*		
Rough Grass							*					
Fertiliser application to lawn grass areas.					*		*			*		
Hedge pruning/cutting					*			*			*	
Shrubs pruning and feeding				*		*			*			
Weed control of hedge and shrub planting areas		*	*	*	*	*	*	*	*	*	*	
Tree pruning											*	*
Removal of tree stakes (3-5yr)				*								
Mulch top-up to tree circles/ squares						*				*		
Herbicide app. to tree mulch circles				*			*			*		
Herbicide app./weeding to shrubs & hedgerow				*			*			*		
Watering of new trees (or after 3 weeks of no rain)				*	*	*	*	*				
Trimming of scrub areas												*
Weed control of scrub areas				*					*			
Application of residual weed killer to footpaths, cycle paths.				*								
Litter Clearance/pick up	***	***	***	***	***	***	***	***	***	***	***	***

An Roinn Cultúir,
Oidhreachta agus Gaeltachta
Department of Culture,
Heritage and the Gaeltacht

Your Ref: 181058 Roscam
Our Ref: G Pre0082/2019 *(Please quote in all related correspondence)*

11 April 2019

McCarthy Keville O'Sullivan Ltd.
Planning & Environmental Consultants
MKO,
Tuam Road,
Galway,
H91 VW84

Via email to: smullen@mccarthykos.ie

Re: Notification to the Minister for Culture, Heritage and the Gaeltacht under the Planning and Development Act, 2000, as amended.

Proposed Development: McCarthy Keville O'Sullivan; about to enter the Strategic Housing Development (SHD) process for a residential development in Rosshill, Roscam Galway (location in attached map). The development consists of approximately 300 residential units together with a creche and local services. A site layout drawing is also attached

A chara

On behalf of the Department of Culture, Heritage and the Gaeltacht, I refer to correspondence received in connection with the above.

Outlined below are heritage-related observations/recommendations of the Department under the stated heading(s).

<u>Nature Conservation</u>

The Department refers to your email correspondence of 07/03/19, at pre-application stage, in relation a proposed Strategic Housing Development (SHD) at Rosshill, Roscam, Galway City. The project drawing and proposed layout are noted, as is the indicative ecological scope of works.

This submission is made by the Department in its advisory role in relation to biodiversity, nature conservation, and the nature directives (i.e. the Birds and Habitats Directives). The observations are not exhaustive and focus on key issues of potential relevance to European sites, natural habitats and protected species, biodiversity protection, aspects of proper planning and sustainable development, and the scope of the environmental assessments that may be required. The observations are made on the basis of the information provided and are without prejudice to any future recommendation that may be made by the Department if/when a planning application is made. The earlier initial email response of 12/03/19 from NPWS to McCarthy Keville O'Sullivan should also be noted.

You are advised to consult the 'Planning' section of the NPWS website[1] as this contains text/advice on consulting NPWS in relation to 'development applications', data and information sources, and the basic elements of environmental assessments that may be required. The observations below are made on the basis that advice on this section of the website has been taken into account.

Project outline and setting

It is understood that the development is to comprise approximately 300 residential units, a crèche and local services. The proposed development site (hereafter the site) is located on the eastern side of the city, south of Merlin Woods and the railway line. The site has an area of approximately 9ha and comprises a network of agricultural grassland fields with some well-developed hedgerows, trees and patches of woodland which merge with larger areas of woodland and wider ecological networks.

The site borders part of the European site, Galway Bay Complex SAC (site code 000268), and is approximately 120m from Inner Galway Bay SPA (site code 004031). The woodland on the site is an extension of woodland in the SAC.

Project description

The NIS, EIAR or ecological impact assessment should be based on full and detailed descriptions of all parts of the project, and all development, including associated and ancillary works and services, and all lands required, at all project stages from construction and operation, to decommissioning, if appropriate. All relevant project details and works areas, whether required on a permanent or temporary basis, should be shown in maps and drawings, and should form part of any application for consent. For a more detailed list of potential considerations, see the 'Review checklist', and specifically 'Section 1 – Description of the project', in Environmental Impact Assessment: Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Commission, 2017).

NPWS has already advised that no disturbing or damaging ground investigations or testing should take place in advance of the main project consent without due consideration of the need for planning permission (for exempted development where there are restrictions on exemptions). The Council should be consulted, as necessary.

[1] https://www.npws.ie/development%20consultations

Assessments required
You have outlined that an NIS and (non-statutory) ecological impact assessment (EcIA) are being prepared. The information on the scope of the ecological assessments and planned surveys is noted. It is presumed that screening for a sub-threshold EIA will be carried out by An Bord Pleanála when the SHD application is made. Biodiversity impacts of particular relevance to the determination of whether there will be likely significant effects on the environment are set out below.

Likely significant effects on European sites
The site adjoins part of Galway Bay Complex SAC and is close to Inner Galway Bay SPA. Both European sites have site specific conservation objectives, and associated supporting documents and habitat and species datasets, all of which should be accessed and utilised in producing the NIS, if necessary.

In relation to potential significant effects on a European site, assessments are carried out with respect to the implications for the conservation objectives of that site. Where available, the attributes, targets and notes specified as part of the conservation objectives will determine the scope and detail of surveys, data and analyses required to produce an NIS[2], if required. The NIS should present the scientific examination of all necessary evidence and data. It should be noted that the conservation objectives of a European site are wider in scope than the qualifying interests or special conservation interests alone, and will encompass other habitats and species, as well as aspects of habitat structure and function, and existing environmental problems and trends. The final analyses are carried out with respect to whether the conservation objective is to maintain or to restore the favourable conservation condition of the habitat or species in question within the site.

The key concerns in relation to likely significant effects of the project alone and in combination with other plans and projects, on these European sites, in view of their conservation objectives, include the following:

- Disturbance of coastal areas, woodlands and other green areas in and adjacent to European sites arising from the development, from increased local populations, and from increased formal and informal amenity and recreation requirements and provision
- Added pressures on existing water services which, in this case, are linked to European sites, e.g. increased water abstraction from, and increased discharges of treated effluent to SACs and SPAs
- Added pressures on other existing services and infrastructure, including transport infrastructure, and the need for future developments such as roads

[2] Noting the definition and function of 'NIS' in planning law, and the tests and standards of the appropriate assessment process

and cycleways which may be unable to avoid European sites, e.g. as set out in the Galway Transport Strategy

- Increased disturbance and displacement of species, and progressive habitat loss, fragmentation and deterioration within European sites arising the development, increased local populations and urban encroachment, and the pressures outlined above

Likely significant effects on the environment

The site is partly wooded and contains hedgerows and trees. These interlink with Merlin Woods, other wooded areas and hedgerows, the coastal margin and inner bay, and other natural and semi-natural habitats to form an ecological network on the south-eastern edge of Galway city. These areas have a role in relation to the maintenance and restoration of biodiversity, including under Article 10 of the Habitats Directive and as part of the 'green network' of Galway city, and this should be recognised and the layout, design and scale of the development should be planned accordingly. Merlin Woods and other local sites are identified as important biodiversity and natural heritage features in Galway City Development Plan.

The development of the site should be consistent with protective policies and objectives in Galway City Development Plan, including Policy 4.1: Green network, and Policy 4.2: Protected spaces: Sites of European, national and local importance, Policy 4.3: Blue spaces: Coast, canals and waterways, Policy 4.4: Green spaces: Urban woodlands and trees, in particular.

Taking the above, and the results of habitat and species surveys, into account, a constraints-led approach should be adopted in planning and designing the layout and scale of the development, and in devising mitigation measures, including mitigation by avoidance. At a minimum, it is advised that areas of woodland and treelines on and bordering the site should be retained and protected by appropriate setback distances, landscaping and boundary treatments.

Recent habitat mapping is available for the much of Galway city and should be sourced. Substantial data on species, particularly the more mobile species such as bats, are also available for parts of the city and the environmental assessment documentation associated with the proposed N6 Galway City Ring Road should be consulted. Local studies of Merlin Woods have been carried out.

Ecological surveys required

The Department notes the scope of the assessments as set out. Ecological surveys should be carried out in accordance with recognised methodologies, and should provide a comprehensive description and evaluation of the ecological baseline of the site, and an assessment of the likely direct, indirect and cumulative effects of all aspects of the proposed development.

The EIAR or EcIA should contain:

- Full details of habitats and vegetation on and bordering the site, and/or likely to be affected in any way by the development at site preparation, construction and operation stages
- A habitat map
- Mammal surveys, including bat surveys to establish usage of the site and surrounds
- Bird surveys

Proper planning and sustainable development

The planning policy context should include consideration of the extent to which there is compliance with objectives and policies for the protection and conservation of biodiversity and natural heritage in Galway City Development Plan, among other things.

The above observations/recommendations are based on the papers submitted to this Department on a pre-planning basis and are made without prejudice to any observations that the Minister may make in the context of any consultation arising on foot of any development application referred to the Minister, by the planning authority, in her role as statutory consultee under the Planning and Development Act, 2000, as amended.

You are requested to send further communications to this Department's Development Applications Unit (DAU) at manager.dau@chg.gov.ie (team monitored); if this is not possible, correspondence may alternatively be sent to:

The Manager
Development Applications Unit (DAU)
Department of Culture, Heritage and the Gaeltacht
Newtown Road
Wexford
Y35 AP90

Is mise, le meas

Diarmuid Buttimer
Development Applications Unit

Relevé 1 Semi-improved dry neutral grassland, grid reference: 34244 24936

Common Name	Scientific Name	Percentage cover
Yorkshire fog	*Holcus lanatus*	60%
Creeping thistle	*Cirsium arvense*	15%
Curled dock	*Rumex crispus*	7%
Common mouse-ear	*Cerastium fontanum*	2%
Creeping buttercup	*Ranunculus repens*	3%
Common sorrel	*Rumex acetosa*	3%
Ragwort	*Senecio jacobaea*	3%
Rough meadow grass	*Poa trivialis*	5%
Common bent	*Agrostis capillaris*	5%
Cleavers	*Galium aparine*	+

Relevé 2 Semi-improved dry neutral grassland, grid reference: 34262 25034

Common Name	Scientific Name	Percentage cover
Yorkshire fog	*Holcus lanatus*	40%
Creeping buttercup	*Ranunculus repens*	25%
Common sorrel	*Rumex acetosa*	15%
Sweet vernal grass	*Anthoxanthum odoratum*	3%
Rough meadow grass	*Poa trivialis*	5%
Common bent	*Agrostis capillaris*	4%
Cock's foot	*Dactylis glomerata*	2%
Hogweed		+
Knapweed	*Centaurea nigra*	+
Ribwort plantain	*Plantago lanceolata*	1
Common mouse-ear	*Cerastium fontanum*	2%
Red clover	*Trifolium pretense*	+

Relevé 3 Semi-improved Dry neutral grassland (close to field boundary), grid reference: 34273 25060

Common Name	Scientific Name	Percentage cover
Yorkshire fog	*Holcus lanatus*	20%
Common bent	*Agrostis capillaris*	25%
Sweet vernal grass	*Anthoxanthum odoratum*	10%
Common sorrel	*Rumex acetosa*	7%
Common mouse-ear	*Cerastium fontanum*	1%
Knapweed	*Centaurea nigra*	3-4%
Selfheal	*Prunella vulgaris*	1-2%
Meadow buttercup	*Ranunculus acris*	7%
White clover	*Trifolium repens*	3%
Creeping buttercup	*Ranunculus repens*	+
Ribwort plantain	*Plantago lanceolata*	4%
Yarrow	*Alchemilla millefolium*	1%
Red clover	*Trifolium pretense*	+
Rough meadow grass	*Poa trivialis*	2%
False oat grass	*Arrhenatherum elatius*	+
Germander speedwell	*Veronica chamaedrys*	+
Dandelion	*Taraxacum officinale agg.*	+
Smooth hawksbeard	*Crepis capillaris*	+

Relevé 4 Oak-ash-hazel woodland (WN2), grid reference: 34168 25049

Common Name	Scientific Name	Percentage cover
Ash	*Fraxinus excelsior*	30%
Beech	*Fagus sylvatica*	50%
Sycamore	*Acer pseudoplatanus*	5%
Hazel		15%
Hawthorn	*Crataegus monogyna*	7%
Ivy	*Hedera helix*	20%
Lords and ladies	*Arum maculatum*	1%
Herb Robert	*Geranium robertianum*	+
Wood avens	*Geum urbanum*	+
Hart's tongue		+
	Brachythecium rutuabulum	5%
	Thamnobryum alopercum	2%
Bare ground / Litter		85%

Relevé 5 Wet grassland, grid reference: 34087 25021

Common Name	Scientific Name	Percentage cover
Yorkshire fog	*Holcus lanatus*	20%
Common bent	*Agrostis capillaris*	20%
Sweet vernal grass	*Anthoxanthum odoratum*	2%
Crested dog's tail	*Cynosurus cristatus*	6%
Marsh thistle	*Cirsium palustre*	5%
Creeping buttercup	*Ranunculus repens*	30%
Compact rush	*Juncus conglomeratus*	8%
Common sorrel	*Rumex acetosa*	7%
Curled dock	*Rumex crispus*	2%
White clover	*Trifolium repends*	4%
Rough meadow grass	*Poa trivialis*	1%
False oat grass	*Arrhenatherum elatius*	2%
Dandelion	*Taraxacum officinale agg.*	+

Relevé 6 Dry calcareous grassland, grid reference: 34413 25068

Common Name	Scientific Name	Percentage cover
Red clover	*Trifolium pretense*	25%
Selfheal	*Prunella vulgaris*	10%
Glaucous sedge	*Carex flacca*	10%
Common mouse-ear	*Cerastium fontanum*	1%
White clover	*Trifolium repends*	3%
Centaury	*Centaurium erythyraea*	4%
Black medick	*Medicago lupulina*	20%
Dandelion	*Taraxacum officinale agg.*	1%
Common sorrel	*Rumex acetosa*	2%
Crested dog's tail	*Cynosurus cristatus*	3%
Sweet vernal grass	*Anthoxanthum odoratum*	10%
Yorkshire fog	*Holcus lanatus*	3%
Silverweed	*Potentilla anserina*	1%
Meadow buttercup	*Ranunculus acris*	1%
Tufted vetch	*Vicia cracca*	+
Ribwort plantain	*Plantago lanceolata*	5%
Hawkbit	*Leontodon sp.*	+
Sheep's fescue	*Festuca ovina*	30%
	Calliergonella cuspidata	10%
Compact rush	*Juncus conglomeratus*	2%
Ragwort	*Senecio jacobaea*	4%

LEGEND

Trees Retained	Wildflower meadow grass (infrequent cut regime)
Proposed Tree (Medium)	Grass Pubic Open Space (frequent cut regime)
Proposed Tree (Large)	Perennials & Seasonal Bulbs
Proposed Woodland Trees	Existing scrub vegetation
Ornamental Street Trees	Coloured concrete paving setts
Ornamental shrub mix (medium to tall height)	Brushed concrete or tarmac paths
Ornamental shrub mix (medium to low height)	Cycle racks
Formal clipped hedge	Site Boundary

INDICATIVE PLANTING SCHEDULES / SPECIES LISTS

PARKLAND TREE PLANTING

Species	Specification
(Ag) Alnus glutinosa	12-14cm girth / clearstem / rootball or airpot
(Cd) Cedrus deodara	1-2m high / rootball or airpot
(Cd) Cedrus libanii	1-2m high / rootball or airpot
(Fs) Fagus sylvatica	18-20cm girth / clearstem / rootball or airpot
(Ps) Pinus sylvestris	1m high / rootball or airpot
(Qp) Quercus petraea	18-20cm girth / clearstem / rootball or airpot

STREET TREE PLANTING

Species	Specification
(Bp) Betula pendula	8-10cm girth / clearstem / rootball or airpot
(Pc) Pyrus calleryana 'Chanticleer'	8-10cm girth / clearstem / rootball or airpot
(Sa) Sorbus aria	8-10cm girth / clearstem / rootball or airpot
(Sa) Sorbus aucuparia	8-10cm girth / clearstem / rootball or airpot
(Tc) Tilia cordata 'Greenspire'	8-10cm girth / clearstem / rootball or airpot

NATIVE WOODLAND TREE & UNDERSTORY PLANTING

Species	Specification
(Ag) Alnus glutinosa	10-12cm girth / clearstem / rootball or airpot
(Bp) Betula pubescens	10-12cm girth / clearstem / rootball or airpot
(Ps) Pinus sylvestris	1m high rootball / airpot
(Qp) Quercus petraea	10-12cm girth / clearstem / rootball or airpo
(Ul) Ulmus glabra	6-8cm girth / clearstem /rootballed or airpot
Corylus avellana	1+ 2 br transplant / 60-90cm
Ilex aquifolium	3l pots / 20-30cm

NATIVE HEDGEROW SUPPLEMENTAL PLANTING

Species	Specification
Crataegus monogyna	1+ 2 br transplant / 60-90cm
Euonymous europaeus	1+ 2 br transplant / 60-90cm
Prunus padus	1+ 2 br transplant / 60-90cm
Prunus spinosa	1+ 2 br transplant / 60-90cm
Quercus petraea	6-8cm girth / feathered / bare-root
Sambucus nigra	1+ 2 br transplant / 60-90cm
Rosa canina	1+ 2 br transplant / 60-90cm
Viburnum opulus	1+ 2 br transplant / 60-90cm

CLIPPED HEDGING (6 per lin.m)

Species	Specification
Fagus sylvatica	1+2 bareroot transplants / 60-90cm
Carpinus betulus	1+2 bareroot transplants / 60-90cm

LOW HEIGHT SHRUB MIX - indicative schedule*;

Species	Spec	Density
Cotoneaster decorus	2l pot	3/sqm
Crocosmia lucifer	2l pot	5/sqm
Hypericum hidcote	2l pot	3/sqm
Lavandula angustifolia	2l pot	3/sqm
Prunus laurocerasus 'Zabelliana'	2l pot	2/sqm
Rosa 'Flower Carpet' (White)	2l pot	3/sqm
Stipa tenuissima 'Pony Tails'	2l pot	4/sqm
Viburnum davidii	2l pot	3/sqm

* (An emphasis on pollinator friendly planting to be developed and incorporated to planting schemes at detail design stage, in accordance with 'All Ireland Pollinator Plan').

REV	DATE	AMENDMENT

CUNNANE STRATTON REYNOLDS
LAND PLANNING & DESIGN

GALWAY OFFICE
ARDACONG, BALLYTRASNA, TUAM, CO GALWAY
TEL 093 60854
EMAIL galwayinfo@csrlandplan.ie

PROJECT: **ROSSHILL, GALWAY.**	DATE: DEC 2019
	SCALE: 1:1000 @ A1
DRAWING: **LANDSCAPE MASTER PLAN**	DRAWN: KM CHECKED: KM
	DRAWING NO: 19112-3-100

MOLONEYFOX
CONSULTING ENGINEERS

19.1849

SITE LIGHTING DESIGN REPORT
ROSSHILL, CO. GALWAY

DATE: 08/04/2019

Moloney Fox Consulting Limited
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Directors: John Moloney, Matt Fox

Contents

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1.0 Executive Summary

This report outlines the design intent and considerations to be taken with regards to bat populations in conjunction with the proposed development, Rosshill, Co. Galway

The report outlines the lighting design as developed by Moloney Fox Consulting The lighting design has been developed with the following principal considerations:

- To minimise the impact of lighting on the bats natural habitat.
- Provide adequate illumination to contribute towards the safe use of the proposed pathways, roads and buildings
- Contain the lighting within the site.
- Minimise light pollution and visual glare to the surrounding neighbourhood
- Provide a visually interesting environment.

The complete external lighting installation will be designed in accordance with the regulations for electrical services as ETCI National Rules for Electrical Installations ET101:2008 as well as consideration of relevant publications including “The Effect of Street Lighting on Bats” (2008) by Matt Emery, and “Bats and Lighting” (2014), Emma Stone - University of Bristol/Bat Conservation Trust.

The predicted performance of the external lighting installations has been assessed in detail using Lighting Simulation software.

Our design intent comprises of column lighting for the pathways and site roads is described in Section 4.0. An indicative example of the type of proposed luminaires (light fittings) have been included, with accompanying images.

An accompanying layout drawing indicates the proposed locations of light fittings and the calculated light levels from the simulation.

2.0 Design Guidelines

A study of artificial light sources and controls was undertaken by Emery (2008) and concluded that shielding and masking of street lights using internal or external louvres, can reduce light spillage by as much as 97%. He recommends that due to their high cost, they are used where the lighting is extremely close to bats. In other areas he recommends that shields can be used which reduce light spill by up to 40%.

Emery considered several lamp types in his analysis, but not however LED sources, which were not as prevalent for external street lights then as they are now.

A comprehensive study by Emma Stone (2014) University of Bristol/Bat Conservation Trust, entitled "Bats and Lighting", considers the optimum means to mitigate the effects of artificial lighting on bats. This study concludes that the type of light fitting with the lowest negative impact on bats are :

- Narrow Spectrum Lights with no UV content
- Low pressure sodium and warm white LED*
- Directional downlights - illuminating below the horizontal plane which avoid light trespass into the environment

The study highlights that warm Low Pressure Sodium and Warm White LED sources have a low relative attractiveness for insects, and therefore least effect on bat prey items.

This study also proposed that lighting control regimes be considered such as dimming lights at certain times, in order to reduce illumination and spill. It is also suggested that lights could be dimmed during periods of low human activity (e.g. 12.30AM to 5.30AM).

3.0 Proposed Site Lighting Design

The proposed scheme comprises primarily of LED luminaires on 6-metre high poles for pathways and roadway areas, located as per drawing 19.1849/E100.

The quantity of luminaires has been calculated to achieve an average illuminance on pathways and roads of 6.3/6.8 Lux with a minimum lux of 1.2.

This complies with Class P3 of IS EN 13201/BS5489 for residential roads and pathways with a S/P ratio of 1.4 (6.0lux average, 1.2 minimum)

The proposed light fitting/scheme has the following features which will help mitigate the effect of the artificial lighting on the bat population:

- Warm White LED light source – less attractive to insects, and a good light source to enable directional luminaires
- Internal Louvres – to reduce light spill and eliminate upward light
- Lowest possible design illuminance levels considering the nature of the site
- Planting will be provided at the perimeter of the car park on the west of the site in order to minimise light spill

Figure 1: Proposed Luminaire

Simulation Results

The results of the simulation calculations are indicated on drawing 19.1849/E100. The results may be summarised as follows:

- Average ground illuminance on road / pathways of 6.3 / 6.8 Lux
- Minimal light spill
- Zero lux light spill
- Zero Lux up light over the entire assessed area of the site
- 0.5 Lux contour line indicated for information

4.0 Conclusion

The proposed lighting scheme has been carefully considered in order to minimise the effect on bat populations.

The Scheme comprises primarily of pole mounted Warm White LED fittings with internal louvres. The Warm White LED light source has the least negative impact on insects and bat prey items as identified in previous studies and is also a compact light source which enables easier control of the light spread.

The internal louvres minimise light spill, particularly to the rear of the fitting, and also completely eliminate any upward light from the fittings. Internal louvres are a recommended strategy for reducing the impact of lighting on bats as identified in previous studies.

The fittings at the will be angled up to 15 degrees to further reduce light spill.

The design light levels (e.g. 6 lux for pathways and roadway areas) have been chosen in order to both comply with Irish Standards for external lighting, while at the same time maintaining light levels as low as practically possible considering the safety of people on site, the locality, and the proximity of bats to the site.

In addition, the site lighting could be dimmed to 50% of its standard brightness during a 5 hour period late at night when human activity on the site will be lower in order to further reduce the impact of the site lighting on bats.

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PO Box 448,
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www.water.ie

Barry Duffy

c/o Richard Daly

Tobin Consulting Engineers

1st Floor Fairgreen House

Fairgreen Road

Co. Galway

31 July 2019

Dear Barry Duffy,

Re: Connection Reference No CDS19001343 pre-connection enquiry - Subject to contract | Contract denied

Connection for Development of 393 unit(s) at Rosshill, Galway City, Co. Galway.

Irish Water has reviewed your pre-connection enquiry in relation to a water and wastewater connection at Rosshill, Galway City, Co. Galway.

Based upon the details that you have provided with your pre-connection enquiry and on the capacity currently available in the network(s), as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, and subject to the completion of the capital project as referenced below, your proposed connection to the Irish Water network(s) can be facilitated.

Wastewater Connection:

In order to accommodate the proposed connection of the 393 housing units, upgrade works are required to be delivered at Merlin Park No. 1 Pumping Station to provide additional storage. Irish Water is currently delivering a capital project to provide this additional storage. This project is at design stage A connection could be facilitated as soon as practicably possible after the delivery of this project.

It is proposed to connect to the Irish Water network via a pumping station and rising main connection. The proposed pumping station should be sized to cater for development on adjoining lands to the south which are currently zoned low residential. The sizing will be confirmed at connection application stage. The proposed development is high density; therefore the densities of future development on the adjoining lands will require to be determined

Water Connection:

The nearest point of connection to the watermain network will be to a 200mm diameter watermain which is being extended to a point north of the railway bridge on the Coast Road. This watermain extension is currently being delivered as part of the development works for a housing development north of the railway on the Coast Road. A connection can be facilitated to this watermain.

Please be aware that Irish Water is now responsible for the delivery of the connection related works in the public domain. The costs and conditions associated with the connection would be detailed in a connection offer at connection application stage.

Irish Water notes that the scale of this development dictates that it is subject to the Strategic Housing Development planning process. in advance of submitting your full application to An Bord Pleanala for assessment, you must have reviewed this development with Irish Water and received a Statement of Design Acceptance in relation to the layout of water and wastewater services.

All infrastructure should be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details. A design proposal for the water and/or wastewater infrastructure should be submitted to Irish Water for assessment. The design proposal can be submitted to cdsdesignqa@water.ie

You are advised that this correspondence does not constitute an offer in whole or in part to provide a connection to any Irish Water infrastructure and is provided subject to a connection agreement being signed at a later date.

A connection agreement can be applied for by completing the connection application form available at **www.water.ie/connections**. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities.

If you have any further questions, please contact James O'Malley from the design team at jomalley@water.ie. For further information, visit **www.water.ie/connections.**

Yours sincerely,

Maria O'Dwyer

Connections and Developer Services

TOBIN
CONSULTING ENGINEERS
BUILT ON KNOWLEDGE

Kegata Ltd.

Residential Development, Rosshill, Galway

Flood Risk Assessment

Residential Development, Rosshill, Galway
Flood Risk Assessment

Document Control Sheet	
Document Reference	
Report Status	Final Issue
Report Date	10th December 2019
Current Revision	B
Client:	Kegata Ltd.
Client Address:	1st Floor, Fairgreen House, Fairgreen Rd, Galway, H91 AXK8
Project Number	10690

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Revision	Description	Author:	Date	Reviewed By:	Date	Authorised by:	Date
D01	Draft	BM	06/2019	PF	06/2019	PF	06/2019
A	Updated Boundary	BM	12/2019	PC	12/2019	PC	12/2019
B	Minor revisions	BM	12/2019	PC	12/2019	PC	12/2019

TOBIN Consulting Engineers

TOBIN CONSULTING ENGINEERS

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1 Introduction

TOBIN Consulting Engineers were appointed in May 2019 to provide engineering and environmental consultancy services for the proposed residential development at Rosshill, in Galway City (Figure 1.1 & Figure 1.2).

This preliminary Flood Risk Assessment (FRA) has been prepared in accordance with a Stage 2 Initial Flood Risk Assessment as defined by the guidelines produced by the Department of Environment, Heritage and Local Government (DoEHLG), *The Planning and Flood Risk Management Guidelines for Planning Authorities, 2009* as follows:

> *"to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped."*

The proposed residential development is located along the Rosshill Road, just off of the Old Dublin Road (see Figure 1.1). The Galway-Dublin railway line passes along the northern boundary of the site. The site is located in a local depression which extends north of the railway line but is divided by the railway line embankment. The greenfield site is approximately 10.06 ha in area. Existing ground elevations vary from 6.70mOD (localised depression) to 20.62mOD.

The aim of this FRA is to "appraise the adequacy of existing information" (extract from PSFRM Guidelines, see above) to identify the risk, if any, of flooding in relation to the proposed development.

Figure 1.1 – Site Location

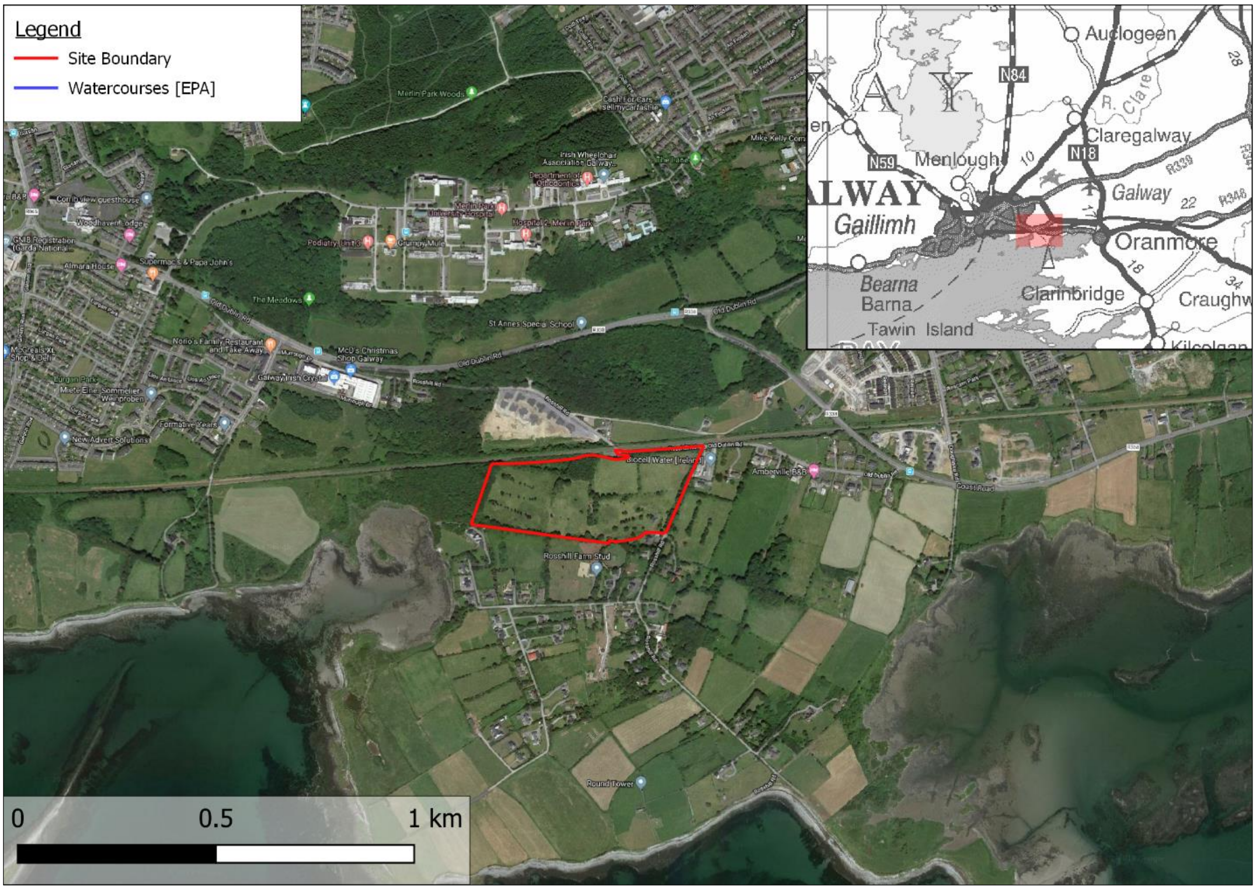


Figure 1.2 - Proposed Site Development Plan

2 Historical Flooding & Flood Maps

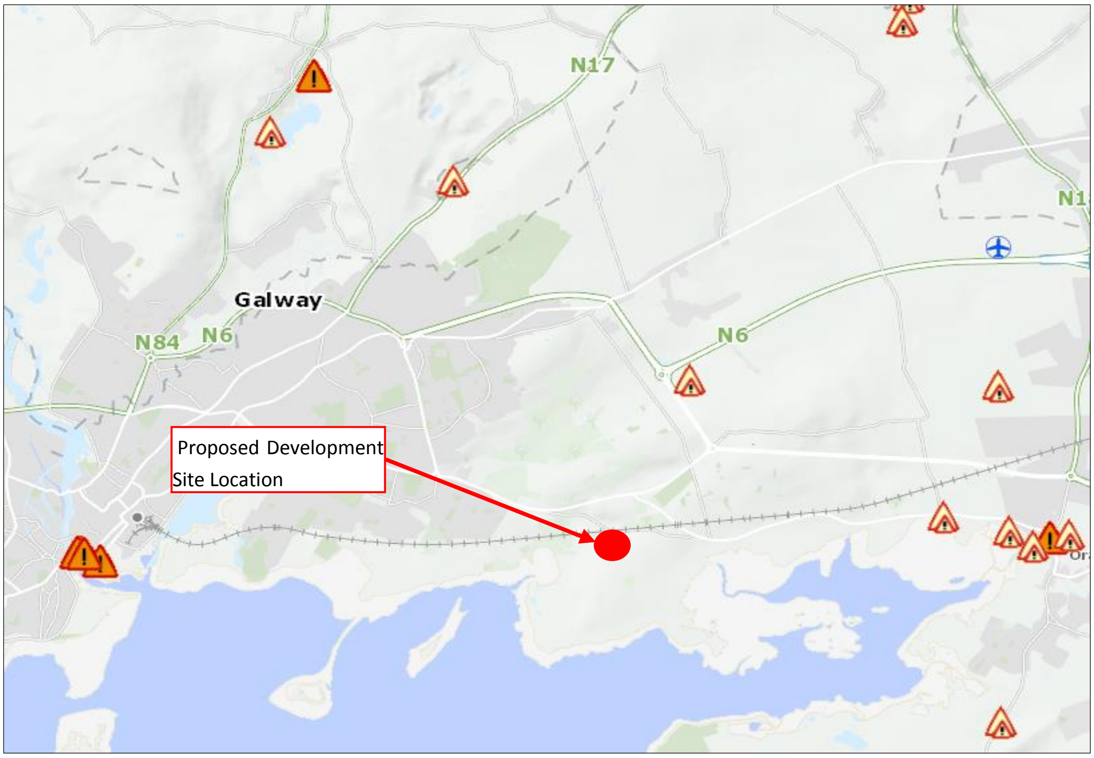
2.1 OPW Flood Maps

Between the years 2004 to 2006 the OPW developed the Flood Hazard Mapping website, www.floodmaps.ie, which provided information about the location of known flood events in Ireland and showed supporting information in the form of reports, photos and press articles about those floods. During this time a huge data collection program was undertaken, visiting over 50 organisations (mainly local authorities and national organisations, eg Waterways Ireland, DoEHLG, and Teagasc) to collect and collate a vast array of information about flooding. The type of information varied from photographs of flood events, to consultants' reports, recordings from gauging stations, eyewitness accounts from staff plus letters from members of the public and minutes of meetings with key officials.

All this information was reviewed, verified, assessed and catalogued to create a National Flood Data Archive. From this the floods were mapped and uploaded to the website. Since 2006, as flood events occurred or as information was submitted to OPW from different sources, including information from the public, new floods and reports were added to the website on an ongoing basis. Past Flood Event information, which has been submitted to and approved by the OPW, is currently accessible for events which occurred pre Autumn 2014. Information on floods that have occurred since then will be uploaded to the website in due course.[1]

The OPW's online National Flood Hazard Mapping database (floodmaps.ie) does not provide any record of flood events occurring at the proposed development site (see Figure 2.1).

Figure 2.1 - Extract from National Flood Hazard Mapping database



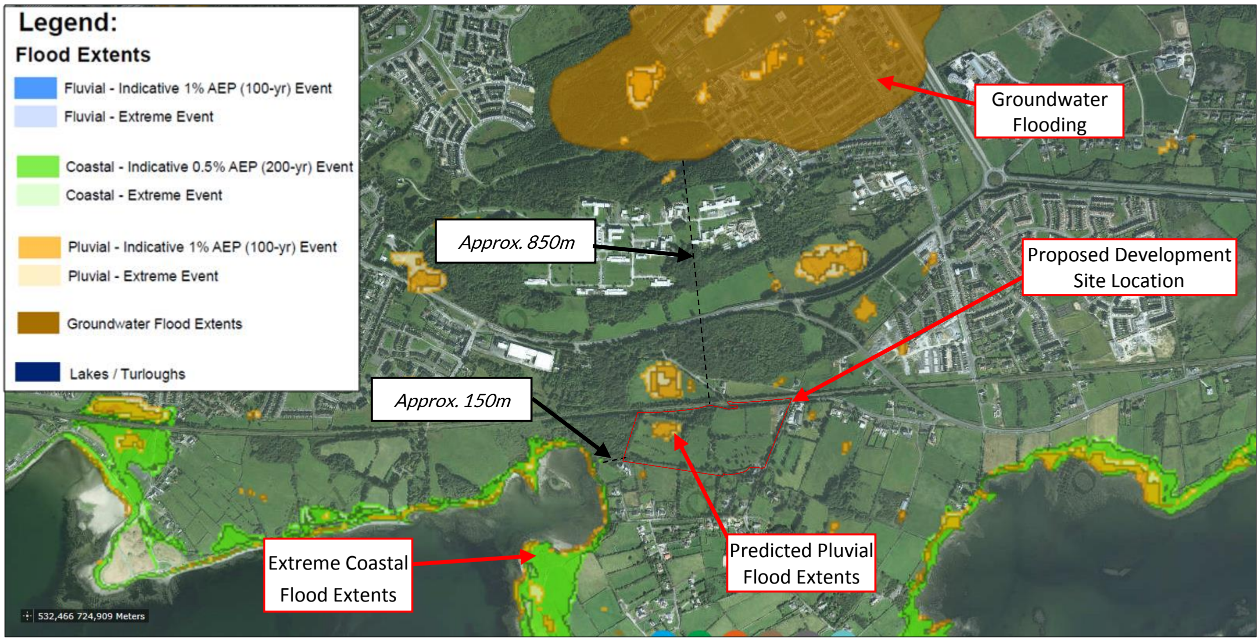
[1] www.floodmaps.ie

2.2 OPW Preliminary Flood Risk Assessment (PFRA) Maps

In 2009 the OPW produced a series of maps to assist in the development of a Preliminary Flood Risk Assessment (PFRA) throughout the country. These maps were produced from a number of sources. It should be noted that *"the flood extents shown on these maps are based on broad-scale simple analysis and may not be accurate for a specific location"*[2].

Figure 2.2 gives an overview of the indicative flood extents in the vicinity of the subject site.

Figure 2.2 - Indicative Flood Mapping from OPW PFRA Study



<u>Fluvial Flood Risk</u>

The predicted flood extents at the subject site are shown in Figure 2.2. It should be noted that these flood extents are for the current probability of flooding and specifically exclude any allowance for climate change.

The PFRA indicative flood mapping of the area does not identify any areas as being liable to fluvial (river) flooding in the vicinity of the proposed site.

<u>Pluvial Flood Risk</u>

Pluvial modelling was carried out by HR Wallingford in November 2010 as part of the PFRA study. The 100- and 1000-year flood extents were generated by analysing 1, 3, 6, and 24-hour rainfall events. The design storm rainfall was applied to the National Digital Terrain Model (DTM) with an allowance for infiltration based on the soil type in the area.

The DTM used for the PFRA study's flood plain mapping was generated from RADAR based technology in 2007 and is stated to have a 5m horizontal resolution (re-sampled to 10m resolution) and 0.01m vertical resolution, to a quoted vertical accuracy of 0.5m RMSE [3]. The accompanying report to the PFRA notes that the process *"due to the scale of analysis, has not taken into account local drainage structures such as culverts through embankments or other local drainage that would not be resolved in the DTM at a national scale".*

---

[2] The National Preliminary Flood Risk Assessment (PFRA) Overview Report, OPW (March 2012)

[3] National Pluvial Screening Project for Ireland (HR Wallingford, November 2012)

The PFRA pluvial flood maps were also adapted by the OPW to show only the extents where the flood depths were greater than 200mm (on the basis that depths lower than this would not cause significant damage given door-step levels above ground level) [4].

The analysis carried out by HR Wallingford as part of their PFRA study indicates that pluvial flooding (ponding of surface water) may occur within the proposed residential development site following an extreme rainfall event (see Figure 2.2).

<u>Groundwater Flood Risk</u>

As part of the PFRA study indicative groundwater flood mapping was produced by Mott Mac Donald Ltd. A model-based approach to generate groundwater flood extents was not possible due to the lack of available data. Therefore, the following methods were used:

1) *"The use of existing mapping of past groundwater flood events (e.g., from 1994/95, and late 2009), developed from ground-based observation, aerial photography or satellite imagery and the maximum extents observed";*
2) *"The delineation of flood extents around turloughs based on an assumed height of flooding of 4m above the base elevation of the turlough (the median of observed ranges) using the OPW's national DTM, with manual adjustment to ensure pragmatic extents";*
3) *"The use of records of past groundwater flood events to validate or adjust the flood extents derived using the other approaches".*

"It should be noted that due to the absence of a model-based approach, only one set of flood extents were generated, with no specific event probability (although where observed flood data was used, these are likely to represent quite extreme events)." [5]

The PFRA mapping did not indicate any sources of groundwater flooding in the vicinity of the proposed residential development site. The indicative flood mapping shows the proposed site is located approximately 850m from the nearest groundwater flood extents (see Figure 2.2).

<u>Coastal Flood Risk</u>

The PFRA study indicates coastal flood extents in Galway Bay. Based on the PFRA flood mapping (Figure 2.2), the proposed development is located approximately 150m outside of the extreme coastal flood event extents. More detailed analysis and mapping of coastal flooding is available from the Irish Coastal Protection Strategy Study and the Western CFRAM Study; refer to section 2.3 and section 2.4 of this report.

---

[4] The National Preliminary Flood Risk Assessment (PFRA) Overview Report (OPW, March 2012)

[5] The National Preliminary Flood Risk Assessment (PFRA) Overview Report (OPW, March 2012)

2.3 Irish Coastal Protection Strategy Study

RPS Consulting Engineers, in conjunction with the OPW, undertook a project to develop maps indicating coastal and estuarine areas prone to flooding from the sea. The predicted flood extents which were produced under the Irish Coastal Protection Strategy Study (ICPSS)[6] are based on analysis and modelling. The project included:

- *"Numerical Modelling of combined storm surges and tide levels which was used to estimate extreme water levels along the coastline "*
- *"Statistical extreme value analysis and joint probability analysis to both historic recorded tide gauge data and data generated by numerical modelling, which allowed an estimation of the extreme water levels of defined annual exceedance probability (AEP) to be established along the coastline Calculation of the extent of the predictive flooding, by comparing calculated extreme tide and surge waters levels along the coast with ground level based on a Digital Terrain Model (DTM). "*
- *"Definition of the plan extent of the predictive floodplain, by use of a Digital Terrain Model (DTM) commissioned by the Office of Public Works"*

The ICPSS flood mapping was produced by combining the results of the surge and tide level modelling, the statistical analysis, the DTM. The mapping also incorporates future allowances for both mean sea level rise and glacial isostatic adjustment (GIA). The maps have been produced at a strategic level to provide an overview of coastal flood hazard and risk in Ireland, and minor or local features may not have been included in their preparation.[7]

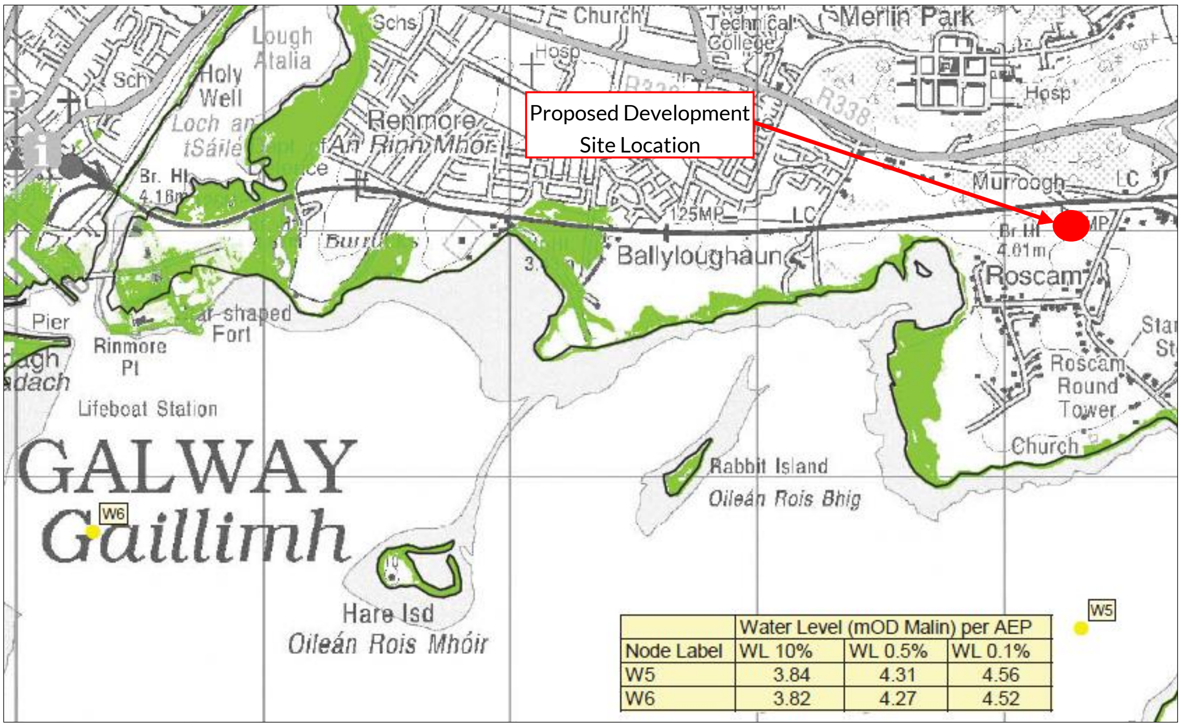
The ICPSS flood mapping for the Mid-Range Future Scenario is shown in Figure 2.3 (see also Appendix A). The proposed development site is located on existing ground with an elevation of between 6.70mOD and 22.62mOD, 1.98 meters above the estimated 1000-year MRFS coastal flood level in Galway Bay of 4.56mOD (Node W5). The mapping indicates that the proposed development site is not likely to be affected by coastal flooding.

---

[6] Irish Coastal Protection Strategy Study, Work Package 9A - Strategic Assessment of Coastal Flooding Extents – Future Scenario

[7] *"The maps have been produced at a strategic level to provide an overview of coastal flood hazard and risk in Ireland, and minor or local features may not have been included in their preparation. A DTM is used to generate the maps, which is a 'bare earth' model of the ground surface with the digital removal of man-made and natural landscape features such as vegetation, buildings, bridges and embankments. The mapping process can show some of these man-made features, such as bridges and embankments, as flooded on the flood maps, when in reality they do not flood."* [Extract from Irish Coastal Protection Strategy Study, Work Package 9A - Strategic Assessment of Coastal Flooding Extents – Future Scenario]

Figure 2.3 – Irish Coastal Protection Strategy Study Flood Extent Mapping



	Water Level (mOD Malin) per AEP		
Node Label	WL 10%	WL 0.5%	WL 0.1%
W5	3.84	4.31	4.56
W6	3.82	4.27	4.52

2.4 Western CFRAM Study

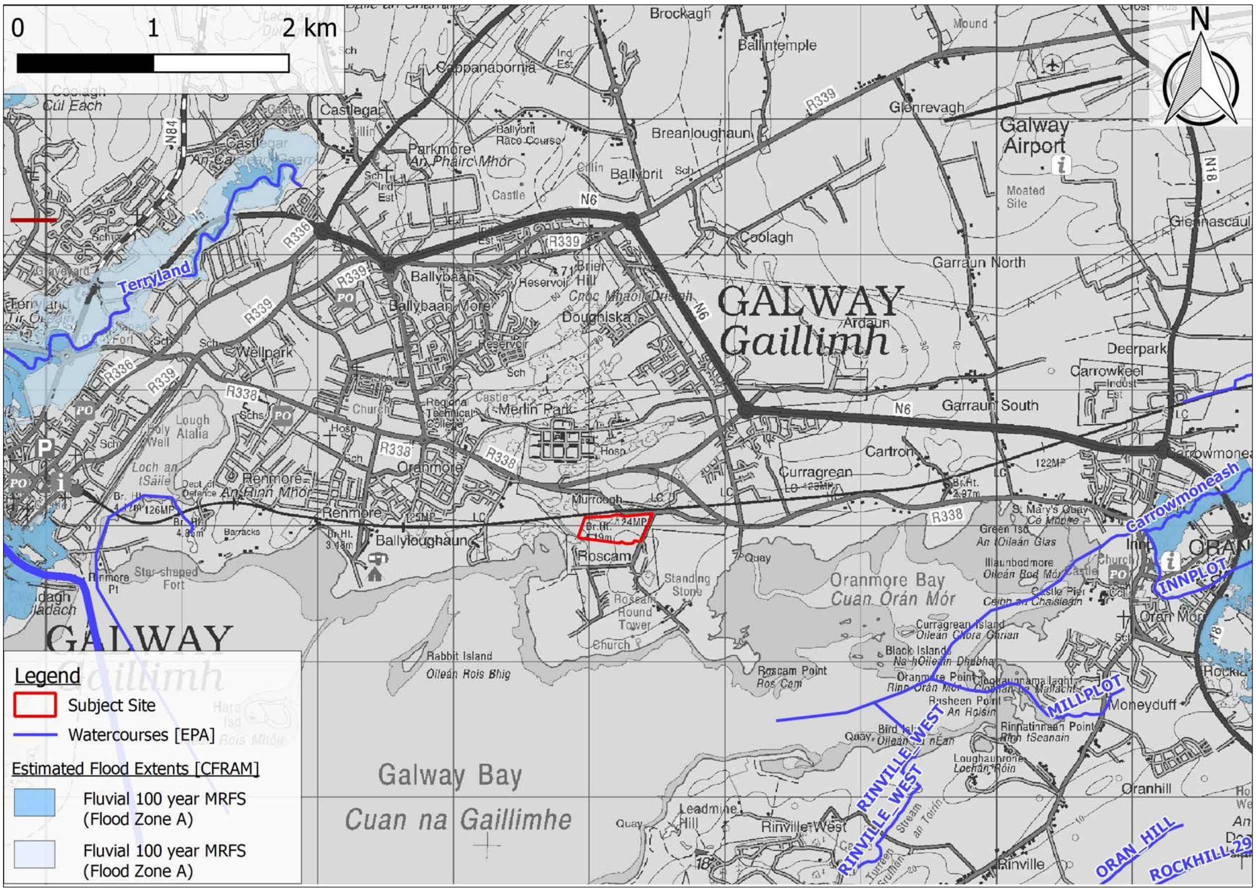
As part of the Western Catchment Flood Risk Assessment and Management (CFRAM) programme, hydraulic modelling of Galway Bay and Galway City's watercourses was carried out by JBA Consulting in 2015. Joint probability analysis was carried out to assess fluvial and coastal flood risk in combination. The final flood extents mapping was published in October 2016.

<u>Western CFRAM - Fluvial flood risk</u>

The predicted fluvial flood extents during the 100- and 1000-year Mid-Range Future Scenarios (MRFS) are shown in Figure 2.4.

The CFRAM Study flood mapping (see Figure 2.4 and Appendix A) does not identify any fluvial (river) flooding in the vicinity of the proposed site.

Figure 2.4 – Predicted Fluvial Flood Extents, Mid Range Future Scenario (Western CFRAM Study)



Western CFRAM - Coastal flood risk

The predicted coastal flood extents during the 200- and 1000-year Mid-Range Future Scenarios (MRFS) are shown in Figure 2.5 (see also Appendix A).

It is our understanding that this mapping was produced using a digital terrain model based on a combination of LiDAR and other ground elevation data. The OSI quote the vertical accuracy of LiDAR data as being +/-25cm.

Based on the results of the CFRAM study (Figure 2.5), the proposed residential development site is unlikely to be affected by flooding during the 1000 year MRFS.

Figure 2.5 - Predicted Coastal Flood Extents, Mid Range Future Scenario (Western CFRAM Study)

3 Planning & Flood Risk Management Guidelines

This section of the report considers the following plans and guidance documents:

- The Planning System and Flood Risk Management Guidelines (OPW & DOEHLG 2009)
- The Flood Risk Management Climate Change Adaptation Plan (OPW 2015)
- The Galway County Development Plan 2017-2023
- The Galway City Development Plan 2011-2017

3.1 The Planning System & Flood Risk Management Guidelines

The *'The Planning System and Flood Risk Management'* (PSFRM) guidance document, published in 2009 by The Department of Environment, Heritage and Local Government (DoEHLG) and the Office of Public Works (OPW), discuss flood risk in terms of three flood zones. It also identifies vulnerability classes for development in order to define what type of development is suitable within what flood zone and when the Justification Test should be applied.

The flood zones, vulnerability classes and requirement for the Justification Test are summarised in Table 1.

Table 1 Matrix of vulnerability versus flood zone to illustrate appropriate development and that are required to meet the Justification Test (Extract from the PSFRM Guidelines)

Flood Zone	Probability of Flooding (Return Period)	Recommendation based on Vulnerability of Development		
		Highly Vulnerable or Essential Infrastructure	Less Vulnerable	Water Compatible
A	High Probability (more frequent than 1% or 1 in 100-yr for river flooding or 0.5% or 1 in 200 for coastal flooding)	Justification Test	Justification Test	Appropriate
B	Moderate Probability (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding)	Justification Test	Appropriate	Appropriate
C	Low Probability (less frequent than 1 in 1000-yr)	Appropriate	Appropriate	Appropriate

The PSFRM Guidelines state that 'dwelling houses', such as the proposed development subject of this flood risk assessment, are classified as "highly vulnerable" development in terms of their sensitivity to flooding. The proposed development has been assessed using the 1000-yr flood event.

3.2 The Flood Risk Management Climate Change Adaption Plan

The Flood Risk Management Climate Change Adaptation Plan (published May 2015) has been prepared under the remit of the National Climate Change Adaptation Framework. It sets out the policy on climate change adaptation of the Office of Public Works (OPW), the lead agency for flood risk management in Ireland, based on a current understanding of the potential consequences of climate change for flooding and flood risk in Ireland, and the adaptation actions to be implemented by the OPW and other responsible Departments and agencies in the flood risk management sector.

The document recommends two future flood risk scenarios for considering future implications of factors, including climate change, in relation to future flooding. The Mid-Range Future Scenario (MRFS) recommends a "likely" future scenario while the High-End Future Scenario (HEFS) represents a more "extreme" future scenario. Table 2 sets out the allowances for both scenarios.

Table 2 Allowances in Flood Parameters for the Mid-Range and High-End Future Scenarios

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+ 20%	+ 30%
Peak Flood Flows	+ 20%	+ 30%
Mean Sea Level Rise	+ 500 mm	+ 1000 mm
Land Movement	- 0.5 mm / year[1]	- 0.5 mm / year[1]
Urbanisation	*No General Allowance – Review on Case-by-Case Basis*	*No General Allowance – Review on Case-by-Case Basis*
Forestation	- 1/6 Tp[2]	- 1/3 Tp[2] + 10% SPR[3]

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this)

Note 2: Reduction in the time to peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage of afforested land

Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

For the purpose of this flood risk assessment, we have assessed the proposed development against the Mid-Range Future Scenario as it represents a likely future scenario.

3.3 Galway County Development Plan (2015-2021)

Chapter 8 of the 2015-2021 County Development Plan (CDP) deals with the area of flood risk.

The following are the key policies described in the CDP pertaining to flood risk:

Policy FL 1 *"It is the policy of Galway County Council to support, in co-operation with the OPW, the implementation of the EU Flood Risk Directive (2007/60/EC), the Flood Risk Regulations (SI No. 122 of 2010) and the DEHLG/OPW publication The Planning System and Flood Risk Management Guidelines (2009) (and any updated/superseding legislation or policy guidance). Galway County Council will also take account of the Shannon International and Western Catchment Flood Risk Assessment and Management Studies."*

Policy FL 4 *"The Council shall implement the key principles of flood risk management set out in the Flood Risk Management Guidelines as follows:*

(a) Avoid development that will be at risk of flooding or that will increase the flooding risk elsewhere, where possible;

(b) Substitute less vulnerable uses, where avoidance is not possible; and

(c) Mitigate and manage the risk, where avoidance and substitution are not possible.

Development should only be permitted in areas at risk of flooding when there are no alternative, reasonable sites available in areas at lower risk that also meet the objectives of proper planning and sustainable development.

Development in areas which have the highest flood risk should be avoided and/or only considered in exceptional circumstances (through a prescribed Justification Test) if adequate land or sites are not available in areas which have lower flood risk."

A Stage 1 Strategic Flood Risk Assessment (SFRA) was carried out as part of the 2015-2021 Galway County Development Plan. The SFRA notes that the Western CFRAM study identified Galway City as one of the areas for further study. The findings of the CFRAM study are detailed in Section 2.4 of this Flood Risk Assessment report.

3.4 Galway City Development Plan

Sections 9.3 of the 2017-2023 Galway City Development Plan deal with the assessment of flood risk.

The key policies in the City Development Plan relevant flood risk assessment are given below:

Support, in co-operation with the OPW, the implementation of EU Flood Risk Directive (2007/60/EC), the Flood Risk Regulations (SI no. 122 of 2010), the DECLG and OPW Guidelines for Planning Authorities, the Planning System and Flood Risk Management (2009), updated/superseding legislation or departmental guidelines and have regard to the findings and relevant identified actions of the future Corrib Catchment Flood Risk Assessment and Management (CFRAM) Study, as the study progresses and incorporate these into the Development Plan, where appropriate.

Have regard to the recommendations of the Strategic Flood Risk Assessment (SFRA) for the Galway City Development Plan 2017-2023 in the assessment of development in identified areas of flood risk (See Figure 3.1).

Restrict the location of structures other than structures with essential links to the waterway and public utilities within 10 metres of the River Corrib in G agricultural zoned lands.

Protect and promote sustainable management and uses of water bodies and watercourses from inappropriate development, including rivers, streams, associated undeveloped riparian strips, wetlands and natural floodplains.

Ensure flood risk is addressed in any future local area plans, framework plans and masterplans in the city and have regard to the findings of the Strategic Flood Risk Assessment for Three Local Area Plans 2012 in the preparation of LAPs for Ardaun, Headford Road area, and Murrough.

Require a site-specific Flood Risk Assessment (FRA) for planning applications in identified areas at risk of flooding, where appropriate, in accordance with the recommendations of the Strategic Flood Risk Assessment (SFRA) for the Galway City Development Plan 2017-2023.

Facilitate sustainable flood defence and coastal protection works in order to prevent flooding and coastal erosion, subject to environmental, visual and built heritage considerations.

Ensure any proposal aimed at alleviating flooding will be subject to Appropriate Assessment in accordance with Article 6 of the EU Habitats Directive, where appropriate.

Ensure the use of SUDS, sustainable urban drainage systems, wherever practical, in the design of development to reduce the rate and quantity of surface water run-off.

Ensure new development, where appropriate, is designed and constructed to meet the flood design standards outlined under Section 11.27 Flood Risk Management and the recommendations of the Strategic Flood Risk Assessment (SFRA) for the Galway City Development Plan 2017-2023.

Have regard to the findings of the OPW's Irish Coastal Protection Strategy Study (2013) of the west coast.

Continue to protect the coastal area and foreshore and avoid inappropriate development in areas at risk of coastal erosion and/or would cause and escalate coastal erosion in adjoining areas.

Protect and maintain, where feasible, undeveloped riparian zones and natural floodplains along the River Corrib and its tributaries.

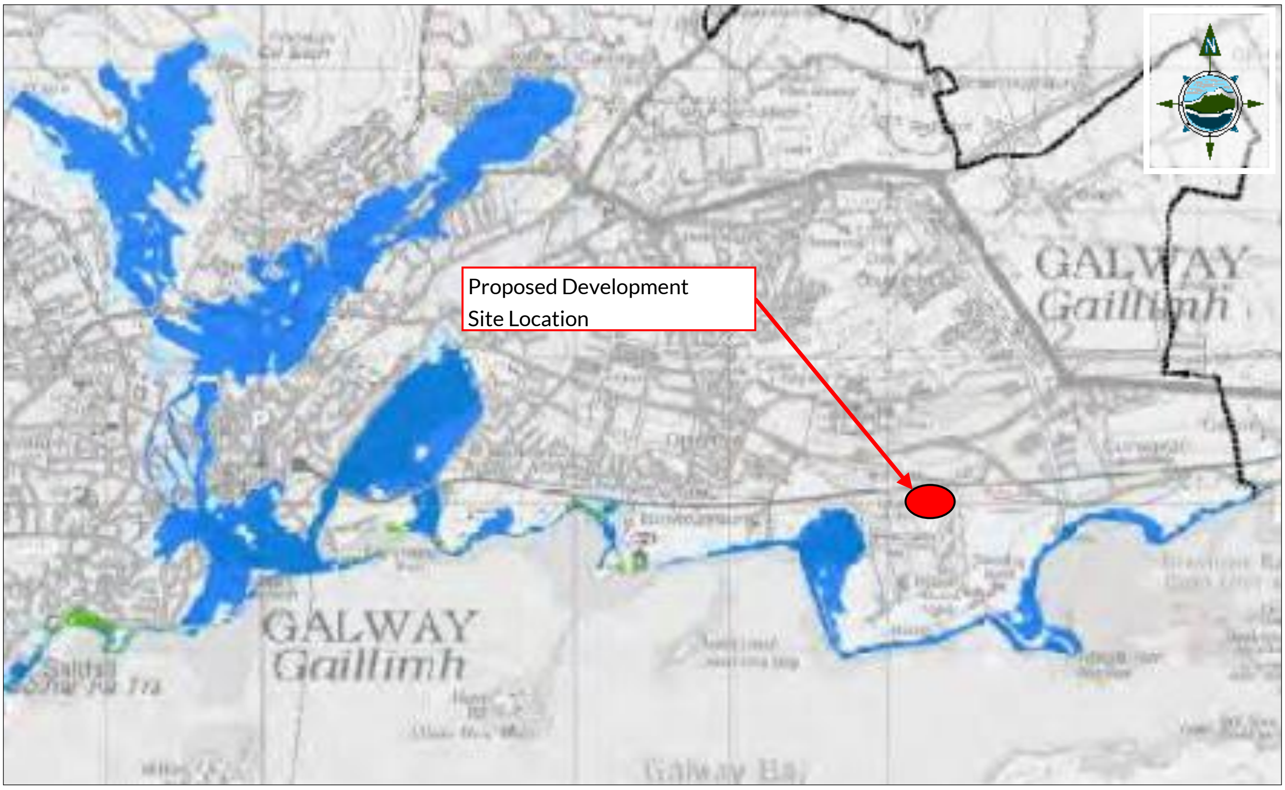
The design standards outlined under Section 11.27 Flood Risk Management in the Galway City Development Plan (as referenced above) are as follows:

- *Where development is proposed in identified flood risk areas under Western CFRAM, the type or nature of the development needs to be carefully considered and the potential risks mitigated and managed through on-site location, layout and design of the development to reduce flood risk to an acceptable level.*
- *Development shall have regard to the flood resilient design guidance and flood mitigation measures in the City Council's Strategic Flood Risk Assessment for Galway City Development Plan 2017-2023*
- *In identified flood risk areas, Flood Zone A or B, it will be necessary to carry out a Site-Specific Flood Risk Assessment (FRA), appropriate to the scale and nature of the development and the risks arising. Proposals shall demonstrate appropriate mitigation and management measures in the layout and design of development.*
- *All proposed development must consider the impact of surface water flood risk in drainage design. Consideration should be given in the design of new development to the incorporation of SUDS. The drainage design should ensure no increase flood risk to the site or downstream catchment.*

- *Development proposals in identified flood risk areas shall consider and incorporate the potential impacts of climate change and residual risk into development layout and design.*
- *In areas of identified flood risk all developments including minor works and changes of use should include an appropriate level of FRA. This assessment must demonstrate that the development would not increase flood risk in the context of use, emergency access and infrastructure. Development should demonstrate principles of flood resilient design.*

A Strategic Flood Risk Assessment (SFRA)[8] was completed by JBA in 2015 to accompany the City Development Plan. The SFRA largely summarises the recommendations of the OPW's Planning System and Flood Risk Management guidance document. The SFRA Flood Zone mapping (Figure 3.1) was taken from the Western CFRAM Study, which has been reviewed in Section 2.4 of the report.

Figure 3.1 - Galway City SFRA "Flood Zone Mapping"



[8] Galway City Development Plan, Strategic Flood Risk Assessment, JBA Consulting (December 2015)

4 Flood Risk Assessment

Referring to Section 3.1 of this report, the proposed residential development is classified as "highly vulnerable" in terms of its sensitivity flooding. The PSFRM guidance document recommends that such developments be constructed in flood zones C, i.e. that there is less than a 0.1% probability of the site flooding. Accordingly, the proposed development has been assessed against a 1,000-year flood event (i.e. 0.1% Annual Exceedance Probability).

4.1 Fluvial Flood Risk

There are no rivers or streams evident in the vicinity of the site.

The Western CFRAM Study indicative flood mapping of the area does not show the subject site as being liable to fluvial (river) flooding.

4.2 Groundwater Flood Risk

Based on a review of the PFRA study and GSI mapping of karst features in the area (Figure 4.1), there is no evidence to suggest groundwater flooding at the proposed development site.

Figure 4.1 - Karst features in vicnity of proposed site [GSI database]

4.3 Pluvial Flood Risk

Pluvial modelling carried out by HR Wallingford as part of the PFRA study indicated that the proposed site may be liable to pluvial flooding, see Figure 2.2. Potential mitigation measures to minimize the risk of pluvial flood flooding are outlined in Section 4.7.

4.4 Coastal Flood Risk

Based on the coastal flood mapping produced by the Irish Coastal Protection Strategy Study (see Figure 2.3) and the Western CFRAM Study (see Figure 2.5) the estimated risk of coastal flooding to the site is minimal.

The ICPSS flood mapping for Mid-Range Future Scenario is shown in Figure 2.3. The proposed development site is located on existing ground with an elevation of between 6.70mOD and 22.62mOD. The finished floor levels of the proposed development are between 9.30mOD and 20.65mOD.

The predicted 1000-year MRFS coastal flood level in Galway Bay is 4.56mOD (Figure 2.3), 4.74 meters below the finished floor level of the proposed residential development.

Due to the proximity of the site to Galway Bay, coastal flooding was examined as a potential risk to the proposed development. Modelling of coastal flood risk along the west coast has been carried out as part of the following studies:

- Irish Coastal Protection Strategy Study (ICPSS) (see Section 2.3)
- Western Catchment Flood Risk Assessment and Management (CFRAM) Study (see Section 2.4)

Irish Coastal Protection Strategy Study (ICPSS)

As part of the *Irish Coastal Protection Strategy Study* (ICPSS) in 2012, RPS carried out hydraulic modelling of tidal and storm surge flooding along the west coast of Ireland, including Galway Bay. For a mid-range future scenario (MRFS), the study predicted 200 year and 1000 year water levels of 4.31mOD and 4.56mOD respectively. This includes a 500mm allowance for rise in sea level due to climate change. The ICPSS flood extents map indicates that the 1,000 year MRFS flood remains approximately 150m from site (see Figure 2.3).

The proposed development site is located on existing ground with an elevation of between 6.70mOD and 22.62mOD, which are at least 2.14mOD above the 1,000-year MRFS flood level of 4.56mOD predicted by the ICPSS. The finished floor levels of the proposed development are between 9.30mOD and 20.65mOD.

The ICPSS model calibration report also states that "the overall tolerance for the south west, west, north west and Shannon Estuary extreme water levels is considered to be ±180mm".

Western Catchment Flood Risk Assessment and Management (CFRAM) Study

JBA Consulting developed coastal models of the floodplain beyond the coastline as part of the modelling phase of the Western CFRAM Study.

A 2D cell size of 4m was used to represent the coastal domain. The active model area was determined using the LIDAR data for the Area for Further Analysis (AFA). Areas of high ground were deemed 'natural boundaries' and serve well as model extents.[9]

Figure 2.5 shows the flood extents predicted by the Western CFRAM Study at the proposed residential development site. The coastal flood extents shown by the CFRAM mapping adjacent to the proposed site location is comparable with that shown by the ICPSS mapping (see Figure 2.3). The CFRAM study predicts that coastal flooding will not extend to the proposed site during the 1,000 year event.

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[9] Western CFRAM UoM 30 – Corrib Hydraulic Modelling Report: Volume 2c – Galway City

Coastal Flood Level

The flood level based on the 1,000-year flood event, as recommended for residential developments (i.e. "Highly Vulnerable Developments"), is summarised in Table 3. An estimate of the 200 year flood level is also provided.

Table 3 Estimated Design Coastal Flood Level

Description	200-year flood	1,000-year flood
Flood Level[1]	3.81mOD	4.06mOD
Allowance for 95% Confidence[1]	0.18m	0.18m
Allowance for MRFS Mean Sea Level Rise[2]	0.5m	0.5m
Estimated Flood Level	**4.49mOD**	**4.74mOD**
Allowance for MRFS Land Movement[2]	0.03m	0.03m
Freeboard[3]	0.30m	0.30m
Estimated Flood Level + Freeboard	**4.82mOD**	**5.07 mOD**

Note 1: Design flood level, and allowance for 95% confidence, is taken from Irish Coastal Protection Strategy Study (ICPSS) (see Section 2.3).

Note 2: Allowance for mean sea level rise and land movement taken from the Flood Risk Management Climate Change Adaptation Plan (May 2015) (see Section 3.2). Allowance for land movement was taken as 0.5mm per year for 60 years.

Note 3: Freeboard taken from the Multi-Coloured Manual (2010) produced by the Flood Hazard Research Centre (FHRC), Appendices to Chapter 4: Flood damage to residential properties and related social impacts. The manual indicates damage is incurred for residential properties for flood levels at and above 0.3m below ground floor level.

The minimum existing ground levels on the Rosshill site are 6.54mOD, i.e. 1.47m above the proposed 1,000-year MRFS coastal flood level of 5.07mOD (see Table 3). It is proposed that road levels within the Rosshill site will be raised to at least 7.20mOD, and finished floor levels will be raised to at least 9.30mOD.

Based on the proposed levels at the site, the development is not predicted to flood during a 1 in 1,000 year MRFS coastal flood event.

It should be noted that the above levels relate to coastal flooding only. Other flood sources (i.e. pluvial and groundwater) are discussed in the relevant sections of this report.

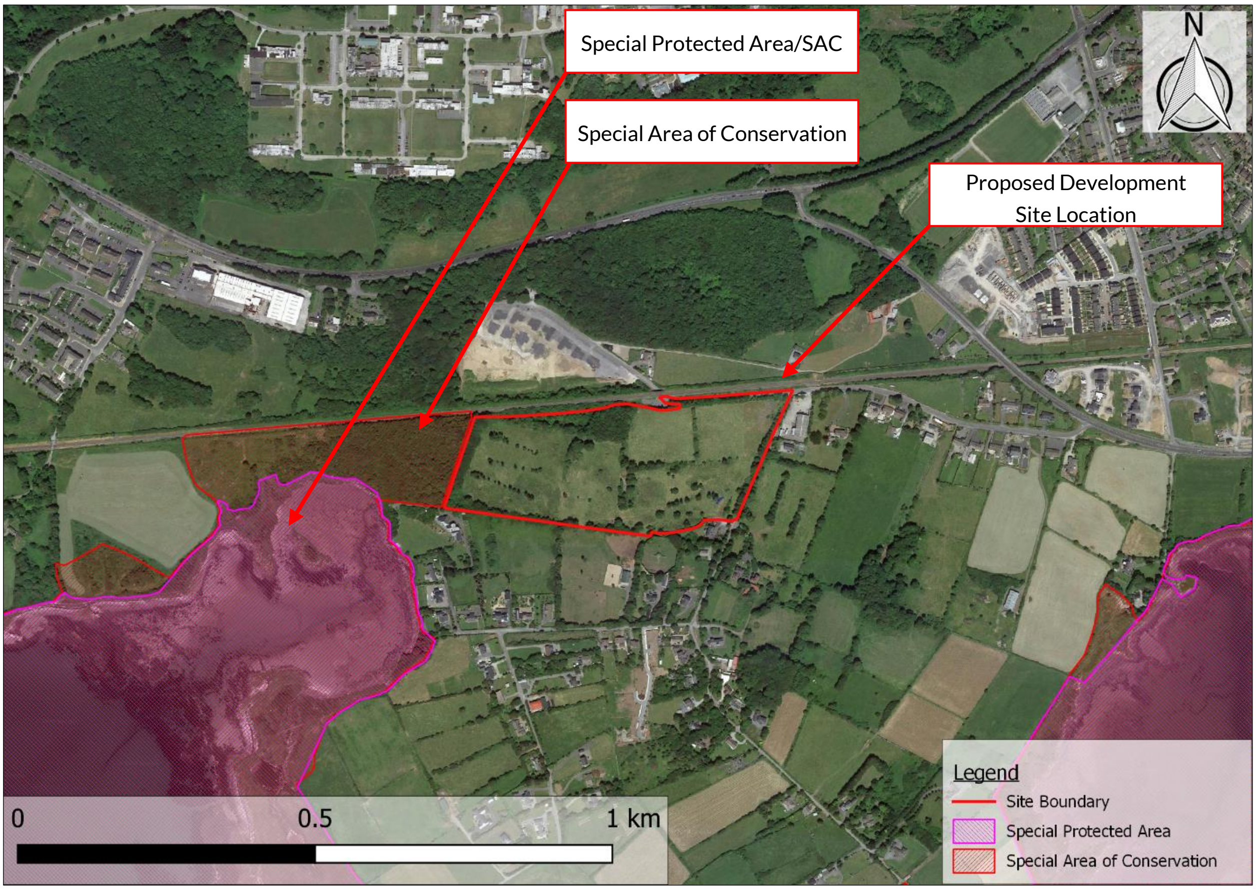
4.5 Impact of the Development Elsewhere

The proposed residential development is located along the Rosshill Road, just off the Old Dublin Road (Figure 4.2). The Galway-Dublin railway line passes along the northern boundary of the site and a Special Area of Conservation is located on the western side of the site (Figure 4.2).

It is predicted that the proposed development is not at risk from fluvial flooding during the 1000-year mid-range future scenario. Therefore, the development will not affect floodplain storage or obstruct the flow path of any existing watercourses.

Surface water arising onsite will be managed by a dedicated storm water drainage system designed by TOBIN Consulting Engineers. The site drainage will include measures in accordance with the requirements of SUDS to limit runoff from the development to greenfield runoff rates. On this basis, it is predicted that the proposed development will not contribute towards flood risk elsewhere in the area.

Figure 4.2 - SAC/SPA Mapping (Extract from National Parks and Wildlife Services)



4.6 The Justification Test

The Planning System and Flood Risk Management Guidelines set out guidance for the application of the Justification Test to assess the appropriateness of developments being proposed in areas of flood risk.

Based on the results of this flood risk assessment, it is predicted that the proposed development site may be liable pluvial flooding (ponding of surface water) following an extreme rainfall event (see Figure 2.2).

Box 5.1 in Section 5.15 of the Planning and Flood Risk Management Guidelines for Planning Authorities, 2009 states that *"When considering proposals for development, which may be vulnerable to flooding, and that would generally be inappropriate as set out in Table 3.2, the following criteria must be satisfied:"*

1. *The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines*
2. *The proposal has been subject to an appropriate flood risk assessment that demonstrates:*

I. *The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;*
II. *The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;*
III. *The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and*
IV. *The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.*

3. *The acceptability or otherwise of levels of residual risk should be made with consideration of the type and foreseen use of the development and the local development context.*

Justification Test

1. The subject lands have been zoned or otherwise designated for the particular use as per the Galway City Development Plan 2017-2023
2. Referring specifically to the flood risk issues, this flood risk assessment demonstrates that:
   I. The development proposed will not increase flood risk elsewhere (see Section 4.5).
   II. The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as described in Section 4.7.
   III. The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level (see Section 4.7).

4.7 Flood Risk Mitigation Measures

Pluvial flooding has been identified as the primary cause for potential flooding at the proposed development site location. As per Section 6.9.1 of the Strategic Flood Risk Assessment developed as part of the Galway City Development Plan 2017-2023; *"To address flood risk in the design of new development a risk based approach should be adopted to locate more vulnerable land use i.e. residential housing to higher ground while water compatible development i.e. car parking, recreational space can be located in higher flood risk areas.*"

Appendix A (Drawing no. 3 and drawing no. 4) of this report shows the topography of the proposed development site. Existing levels show a low point within the development site which corresponds with the area indicated as potentially liable to pluvial flooding on the PFRA Flood Mapping, Figure 2.2.

Mitigation measures

- Site drainage and storm water storage will be provided to cater for surface water runoff for a design return period 100-year storm event. The storm networks on the western section have been designed to a 1 in 1000 year flood event.
- Surface water runoff from the site will be limited to greenfield runoff rates by the proposed surface water management system in accordance with the SUDS design principals.
- The landscaping and topography of the developed site shall provide safe exceedance flow paths in the event of extreme flood events or in the case of a blockage of the drainage system, to minimise risks to people and property.
- In an extreme weather event, overflow from the attenuation tank will exit via a high-level overflow to a detention basin located at the north west corner of the proposed development site. During extreme rainfall events, any surface water runoff which exceeds the underground site drainage capacity shall be permitted to flow through a defined flow path to the detention.

5 Conclusion

TOBIN Consulting Engineers were appointed in May 2019 to provide engineering and environmental consultancy services for the proposed residential development at Rosshill, in Galway City (Figure 1.1 & Figure 1.2).

The Flood Risk Assessment (FRA) undertook a review of:

- OPW Flood Hazard mapping
- OPW Preliminary Flood Risk Assessment (PFRA) Study
- The Planning System & Flood Risk Management (PSFRM) Guidelines
- Flood Risk Management Climate Change Adaptation Plan
- Galway County Development Plan (2015-2021);
- Galway City Development Plan (2017-2023);
- Western CFRAM Study;
- Irish Coastal Protection Strategy Study;

With reference to the PSFRM guidelines, the proposed residential development is classified as a "highly vulnerable development" in terms of its sensitivity to flooding. Such developments are considered appropriate within Flood Zone C, i.e. in areas not liable to flooding during a 1-in-1000 year Mid-Range Future Scenario.

The outcome of the Flood Risk Assessment is summarised as follows:

<u>Fluvial Flooding</u>

Based on the results of the PFRA (Figure 1.1) and Western CFRAM study (Figure 2.4) it is predicted that the subject site is not liable to fluvial (river) flooding during a 1000 year MRFS.

It is therefore estimated that the risk of fluvial flooding to the development is minimal.

<u>Groundwater Flooding</u>

Based on a review of the PFRA study and GSI mapping of karst features in the area, there is no evidence to suggest groundwater flooding at the site. It is estimated that the risk of groundwater flooding to the proposed development is minimal.

<u>Pluvial Flooding</u>

Pluvial modelling carried out by HR Wallingford as part of the PFRA study indicated that the proposed site may be liable to pluvial flooding, see Figure 2.2. Potential mitigation measures to minimize the risk of pluvial flood flooding are as follows.

- Site drainage and storm water storage will be provided to cater for surface water runoff for a design return period 100-year storm event. The storm networks on the western section have been designed to a 1 in 1000-year flood event.
- Surface water runoff from the site will be limited to greenfield runoff rates by the proposed surface water management system in accordance with the SUDS design principals.
- The landscaping and topography of the developed site shall provide safe exceedance flow paths in the event of extreme flood events or in the case of a blockage of the drainage system, to minimise risks to people and property.
- In an extreme weather event, overflow from the attenuation tank will exit via a high-level overflow to a detention basin located at the north west corner of the proposed development site. During extreme rainfall events, any surface water runoff which exceeds the underground site drainage capacity shall be permitted to flow through a defined flow path to the detention.

Coastal Flooding

The minimum existing ground levels on the Rosshill site are 6.70mOD, i.e. 1.63m above the estimated 1,000-year MRFS coastal flood level of 5.07mOD (Table 3). It is proposed that road levels within the Rosshill site will be raised to at least 7.2mOD, and finished floor levels will be raised to at least 9.30mOD.

Based on the proposed levels at the site, the development is not predicted to flood during a 1 in 1,000 year MRFS coastal flood event.

It is estimated that the risk of flooding the proposed residential development will be minimal, and it is predicted that the development will not increase the risk of flooding elsewhere.

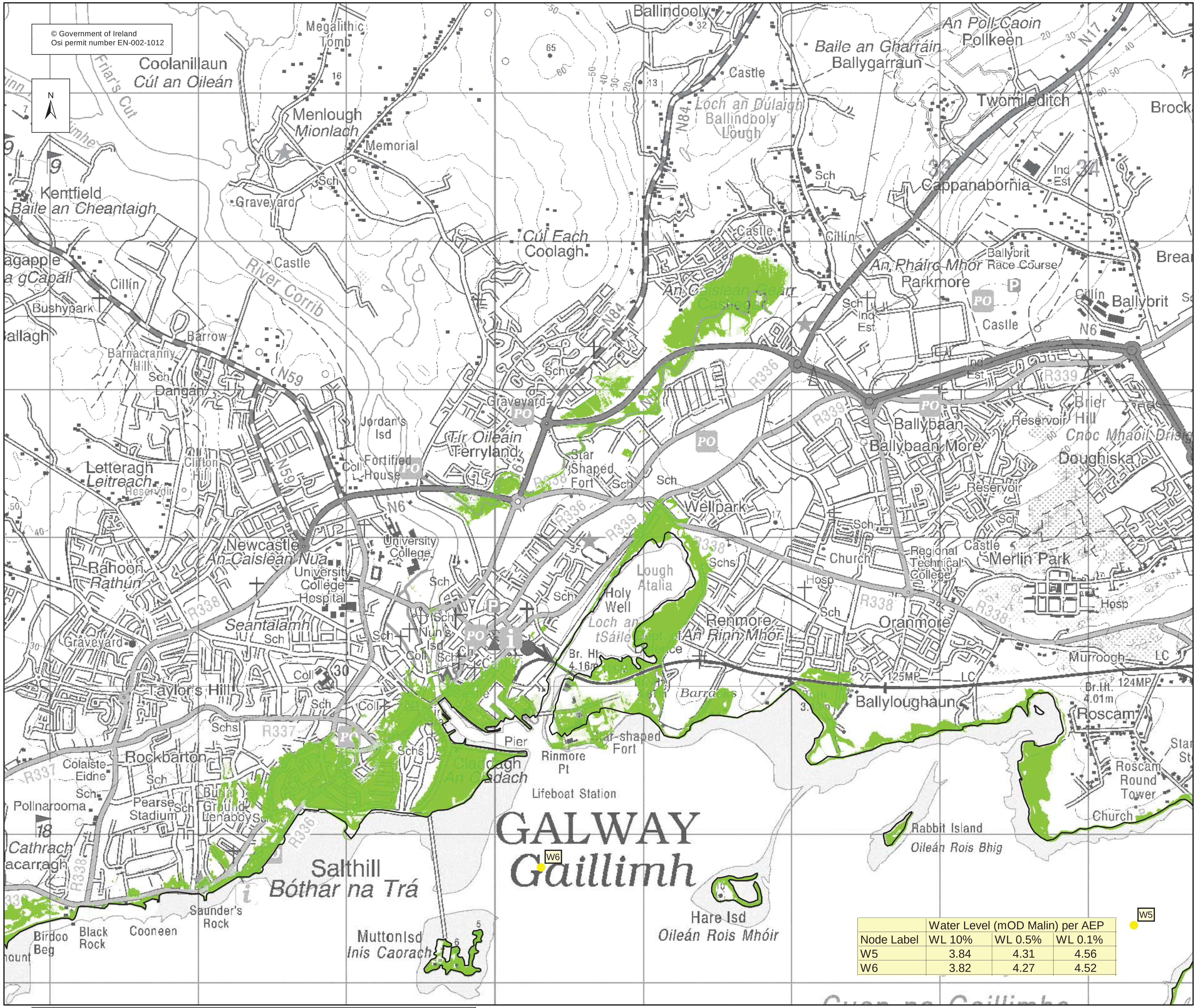
Appendix 1 - Drawings

Irish Coastal Protection Strategy Study Flood Extent Mapping

Predicted Coastal Flood Extents, Mid Range Future Scenario (Western CFRAM Study)

Part 1 Site Layout Plan

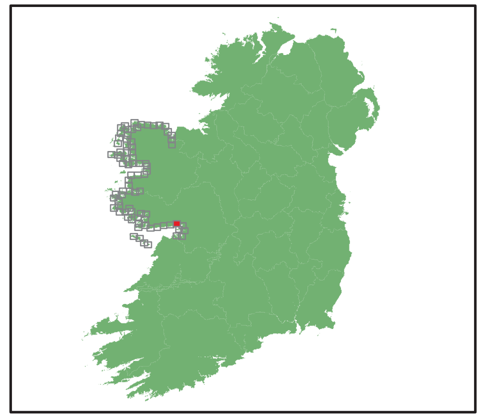
Part 2 Site Layout Plan



Node Label	Water Level (mOD Malin) per AEP WL 10%	WL 0.5%	WL 0.1%
W5	3.84	4.31	4.56
W6	3.82	4.27	4.52

0.5 0.25 0 0.5 1 1.5 2 Kilometers

Location Plan :



EXTENT MAP

Legend:

- 0.5% AEP FLOOD EXTENT (1 in 200 chance in any given year)
- 0.1% AEP FLOOD EXTENT (1 in 1000 chance in any given year)
- High Water Mark (HWM)
- Node Point
- W 15 Node Label (refer to table)

USER NOTE :

USERS OF THESE MAPS SHOULD REFER TO THE DETAILED DESCRIPTION OF THEIR DERIVATION, LIMITATIONS IN ACCURACY AND GUIDANCE AND CONDITIONS OF USE PROVIDED AT THE FRONT OF THIS BOUND VOLUME. IF THIS MAP DOES NOT FORM PART OF A BOUND VOLUME, IT SHOULD NOT BE USED FOR ANY PURPOSE.

RPS
Elmwood House
74 Boucher Road
Belfast
BT 12 6RZ
Northern Ireland

OPW
Office of Public Works
17-19 Lower Hatch Street
Dublin 2
Ireland

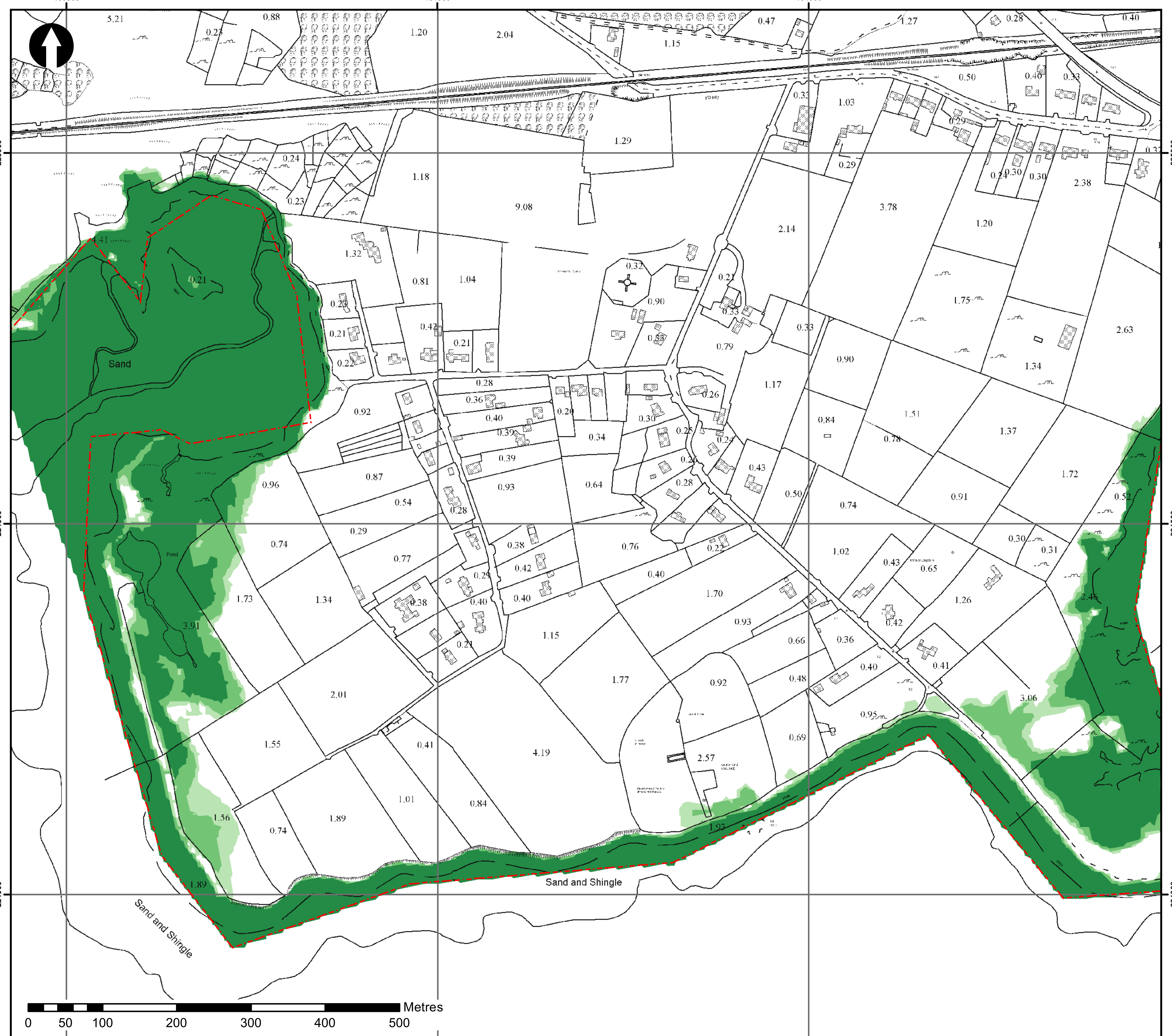
Project :
IRISH COASTAL PROTECTION STRATEGY STUDY - PHASE IV

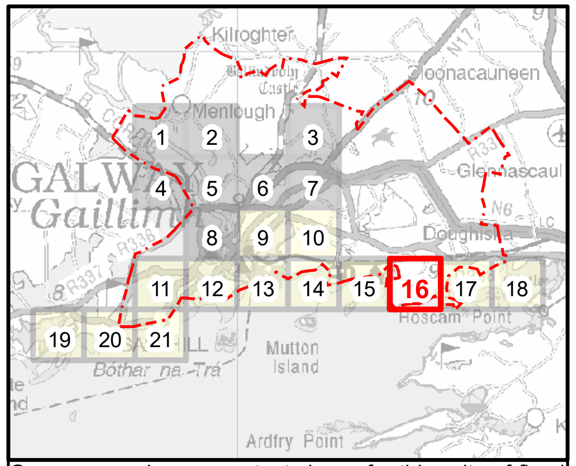
Map :
WEST COAST FLOOD EXTENT MAP

Map Type : FLOOD EXTENT
Source : TIDAL FLOODING
Map area : RURAL AREA
Scenario : MID RANGE FUTURE SCENARIO
Figure By : PJW Date : Dec 2012
Checked By : JMC & JR Date : Dec 2012

Figure No. : W / RA / EXT / MRFS / 10
Revision 1

Drawing Scale : 1:25,000 Plot Scale : 1:1 @ A3





Grey squares have no extent shown for this suite of flood maps so no maps have been produced.

AFA Boundary

Modelled River Centreline

10% AEP Tidal Extent

0.5% AEP Tidal Extent

0.1% AEP Tidal Extent

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

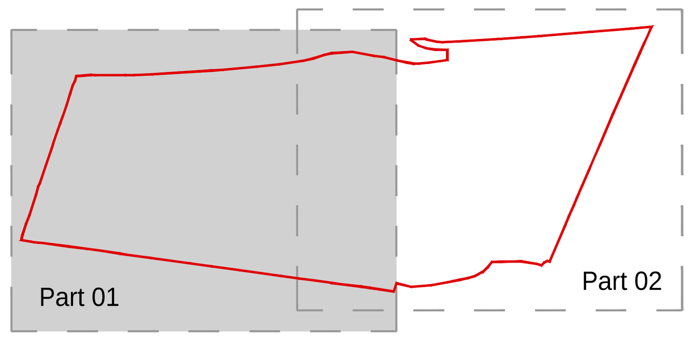
The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

JBA Consulting
24 Grove Island
Corbally
Limerick, Ireland

WESTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

Map: Galway City Flood Extent		Final	
Map Type: Flood Extent			
Map Area: HPW		Source: Coastal	Scenario: Current
Drawn by: KF	Date: Apr 2017	Scale: 1:5,000	
Checked by: TS	Date: Apr 2017		
Approved by: JC	Date: Apr 2017	Original @ A3	
Map No: W30GLW_EXCCD_F1		Sheet: 16 of 21	

PART 01- SITE LAYOUT PLAN



02 Location key
Scale: n.t.s

NOTE : PLEASE REFER TO ENGINEERS DRAWINGS & REPORTS FOR SERVICE CONNECTION DETAILS

LEGEND

Site boundary outlined in red

OVERALL SITE AREA : **100,693 sqm :- 10.069HA :- 24.881 Acre**
Verges to Old Dublin Road & Rosshill Rd. **: 3,381 sqm :- 0.338 HA**
Junction area **: 628 sqm :- 0.063 HA**
RA zoned Land to west boundary **: 1,292 sqm :- 0.129 HA**
Developable Area : 95,392 sqm :- 9.539 HA :- 23.572 Acre

Galway City Council Development plan 2017-2023:
Site zoned Low Density Residential (LDR)

RESIDENTIAL TOTAL NO. OF UNITS = 342

Density:
35.8 Units per Ha - Residential Density (342 total units on 9.539 ha.)
14.5 Units per Acre - Residential Density (342 total units on 23.572 acre)

Plot ratio **: 0.36 :1** (max allowable 0.46:1)
Site Coverage **: 15.34%**

45.9% Apartments = 157 Units
54.1% Houses = 185 Units

Residential Dwelling Units:

Type 'A-A6'	- 4 bed	Semi -Detached	- Circa 125.4 sqm	TOTAL 36 UNITS
Type 'A2'	- 4 bed	Detached	- Circa 125.4sqm	TOTAL 02 UNITS
Type 'B-B7'	- 3 bed	Semi -D	- Circa 110.4 sqm	TOTAL 24 UNITS
Type 'C-C8'	- 3 bed	Semi -D	- Circa 108.2 sqm	TOTAL 44 UNITS
Type 'C-C10'	- 3 bed	Terrace	- Circa 108.2 sqm	TOTAL 63 UNITS
Type 'D'	- 2 bed	Terrace	- Circa 84.4 sqm	TOTAL 06 UNITS
Type 'E'	- 3 bed	Long semi-D	- Circa 107 sqm	TOTAL 05 UNITS
Type 'F'	- 4 bed	Long semi-D	- Circa 129.8 sqm	TOTAL 05 UNITS

TOTAL UNITS ON SITE = 185 UNITS

Apartment Units:

Type '1A- 1D'	- 1 bed	Apartment	- Circa 49.2sqm (varies)	TOTAL 038 UNITS
Type '2A - 2N'	- 2 bed	Apartment	- Circa 78sqm(varies)	TOTAL 119 UNITS

TOTAL UNITS ON SITE = 157 UNITS

Public open space requirement over developable area: 15% - 14,309sqm
Public open space provided- Over 21,533sqm - 22.57%
(above 10m wide/ 200sqm & reasonably level usable space)
Overall Green and landscaped space across the site: 25,130sqm - 25.8%

Overall site Mix:	
038 no. 1 Bedroom units	11.1%
125 no. 2 Bedroom units	36.5%
136 no. 3 Bedroom units	39.8%
043 no. 4 Bedroom units	12.6%
	100%

Mix by type:	
157 Apartments	45.9%
069 Terraces	20.2%
114 Semi-Detached	33.3%
002 Detached	00.6%
	100%

01 PART 01 Site Layout Plan
Scale: 1:500

PART 01- SITE LAYOUT PLAN

No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:500
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019
Drawn by: sor
Checked by: JOM
Paper size:
CTB file:
LTScale:
File path:

File Ref. 3.09
Subject: PART 01 - SITE LAYOUT PLAN - FINALISED RED LINE
Project No. 18128
Drawing No. 3003
Rev. -

O'Neill | O'Malley Ltd.
Architecture + Project Management
Ground Floor, Block 3,
Galway Technology Park,
Parkmore, Galway.
Republic of Ireland
T: +353 (0)91 771033
E: info@onom.ie
W: onom.ie

PART 02- SITE LAYOUT PLAN

NOTE : PLEASE REFER TO ENGINEERS DRAWINGS & REPORTS FOR SERVICE CONNECTION DETAILS

PART 02- SITE LAYOUT PLAN

01 PART 02 Site Layout Plan
Scale: 1:500

LEGEND

Site boundary outlined in red

OVERALL SITE AREA : **100,693 sqm :- 10.069HA :- 24.881 Acre**
Verges to Old Dublin Road & Rosshill Rd. **: 3,381 sqm :- 0.338 HA**
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		TOTAL UNITS ON SITE =		**185 UNITS**

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Type '1A- 1D'	- 1 bed	Apartment	- Circa 49.2sqm (varies)	TOTAL 038 UNITS
Type '2A - 2N'	- 2 bed	Apartment	- Circa 78sqm(varies)	TOTAL 119 UNITS
		TOTAL UNITS ON SITE =		**157 UNITS**

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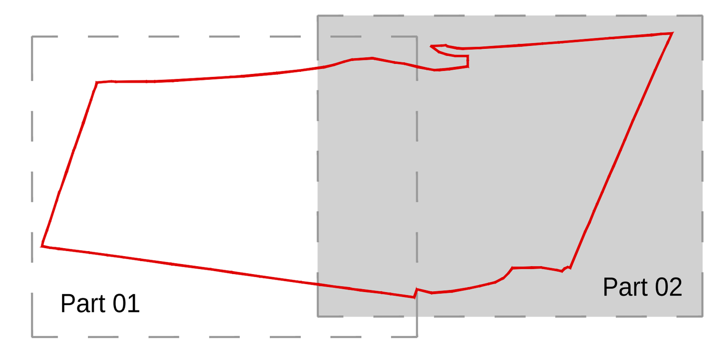
002 Detached	00.6%
	100%



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No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:500
Drawing Purpose: PLANNING
Project: Proposed Development at Rosshill, Galway City
Client: Kegata Ltd.
Date: December 2019 Drawn by: sor Checked by: JOM
Paper size: CTB file: LTScale:
File path:

File Ref.	Subject:	Project No.	Drawing No.	Rev.
3.09	PART 02 - SITE LAYOUT PLAN - FINALISED RED LINE	18128	3004	-

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MOLONEYFOX
CONSULTING ENGINEERS

19.1849

MECHANICAL AND ELECTRICAL SERVICES REPORT
ROSSHILL, CO. GALWAY
FOR KEGATA LTD.

DATE: 12/11/2019

Moloney Fox Consulting Limited
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MOLONEYFOX
CONSULTING ENGINEERS

Contents

1.0 ESB SERVICES

The local ESB medium voltage infrastructure has the capacity to cater for the proposed development. The medium voltage infrastructure shall be extended via underground ducts from the Rosshill Road and Old Dublin Road direction. This extension of the ESB infrastructure has been agreed in consultation with the developer and ESB Network Engineers.

The development shall be served using ground mounted transformers, mini pillars and micro pillars. The residential units shall be fed from local mini pillars, with public lighting fed from micro pillars. This is a typical arrangement for residential projects.

The ESB Infrastructure including ESB mini pillars shall cater for electric car charging points in car park areas.

There are currently 10/20kv cables and 3 phase cables crossing the site. These overhead cables shall be re-routed to allow the site development. The re-routing of these cables shall be agreed with ESB Networks prior to commencement on site.

With regards to the local ESB services to each dwelling and apartment, provision shall be made to deliver adequate services to each dwelling and apartment to cater for both the electrical needs of the unit in terms of power for heat pumps and electrical car charging facilities.

2.0 EIR SERVICES

The existing EIR infrastructure currently runs both along the north and east boundaries via underground ducts and overhead cables, however this system needs to be extended.

The local EIR Services infrastructure has the capacity to cater for the proposed development. From consultation with EIR Services, the existing network along Rosshill Road shall be extended to the proposed development via new underground ducts.

This service shall provide both voice and broadband communications to the development to cater for residents needs.

Within the development, the ducting system shall be brought to each dwelling and apartment block.

3.0 NZEB REQUIREMENTS

The Definition: 'Nearly Zero Energy Buildings', nZEB means a building that has a very high energy performance where the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources including energy from renewable sources produced on-site or nearby".

In order to achieve this, a target of 20% Renewables Energy Ratio (RER) has been set as the NZEB energy from renewable sources onsite or nearby target. The software tool provided by SEAI will be provided to support the calculation of the RER. It is recognised that in certain confined situations it may not be possible to achieve the full 20% RER.

In addition to the reduced energy usage, all new buildings must generate 20% of their energy from renewable energy sources, although this may be reduced to 10% where the energy performance of the building is more than 10% better than the reference building. This option of further reducing energy use is likely to be selected for most buildings.

As part of the design process, consideration shall be taken in account with regards to the requirements of nZEB to ensure the building meets with its requirements.

The 20% or 10% requirement can be provided by Heat Pumps or Heat pumps / PV's.

The building will be constructed to meet the latest building regulations and U-Values for each element of the envelope:

Building Fabric / Specification

Floor	0.12 W/m²k
Walls	0.18 W/m²k
Roof	0.15 W/m²k
Doors	1.6 W/m²k
Windows	1.2 W/m²k
Thermal Bridging Factor	0.08 (ACDs must be adhered to)

Ventilation

Ventilation Method	Demand Controlled Ventilation (DCV)
Ventilation openings	-
Air Permeability Test Result	3ac/h | 0.15 adj (assumption)

These target values shall achieve an A2 rating dwelling using a heat pump solution with wither no or some PV panels.

4.0 DESIGN INTENT FOR HOUSES AND APARTMENTS

It is proposed that the houses will be heated by means of an air to water heat pump heating systems.

It is proposed to utilize a mono-block unit to heat each individual house. The mono-block unit is A+++ rated and uses the latest R32 refrigerant gas. The unit will provide heat energy for heating and hot water generation. Aluminium radiators will be provided in each space complete with thermostatic radiator valves (TRVs) as required.

These radiators are specifically designed to work with low temperature heating systems and have quicker heat up periods and transfer rates than standard steel panel radiators.

We estimate the houses will require either 9-12kw units depending on the house type and size.

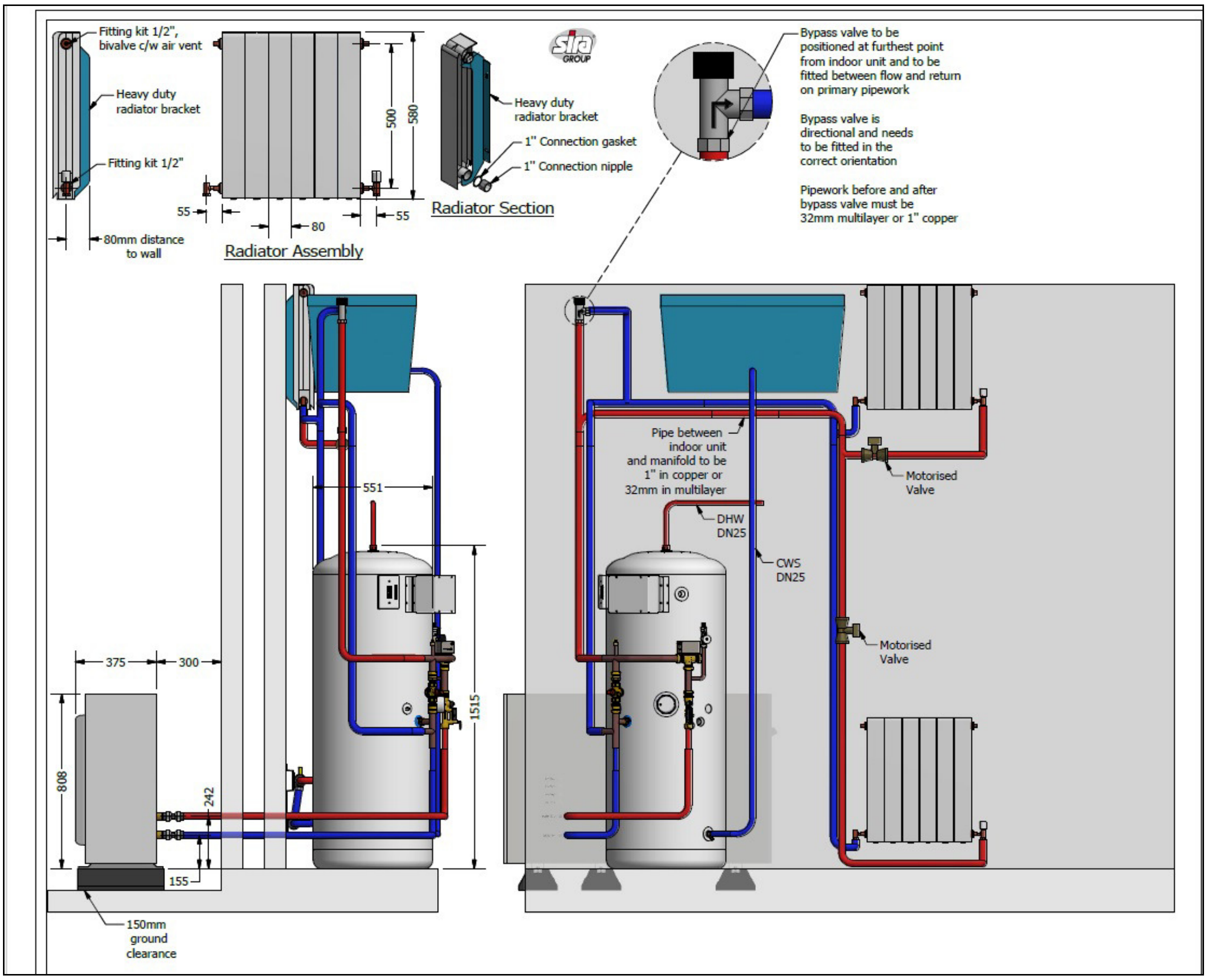

Figure 1: Proposed Heating System Schematic

The apartments will be heated by means of exhaust air heat pump systems. It is proposed to utilize exhaust air heat pumps. The unit is A++ rated. Aluminium radiators will be provided in each space complete with thermostatic radiator valves (TRVs) as required. These radiators are specifically designed to work with low temperature heating systems and have quicker heat up periods and transfer rates than standard steel panel radiators.

The unit is complete with an integral 210 litre hot water calorifier and will provide both domestic heat and hot water generation. We estimate the apartments will require a 3.5kw unit.

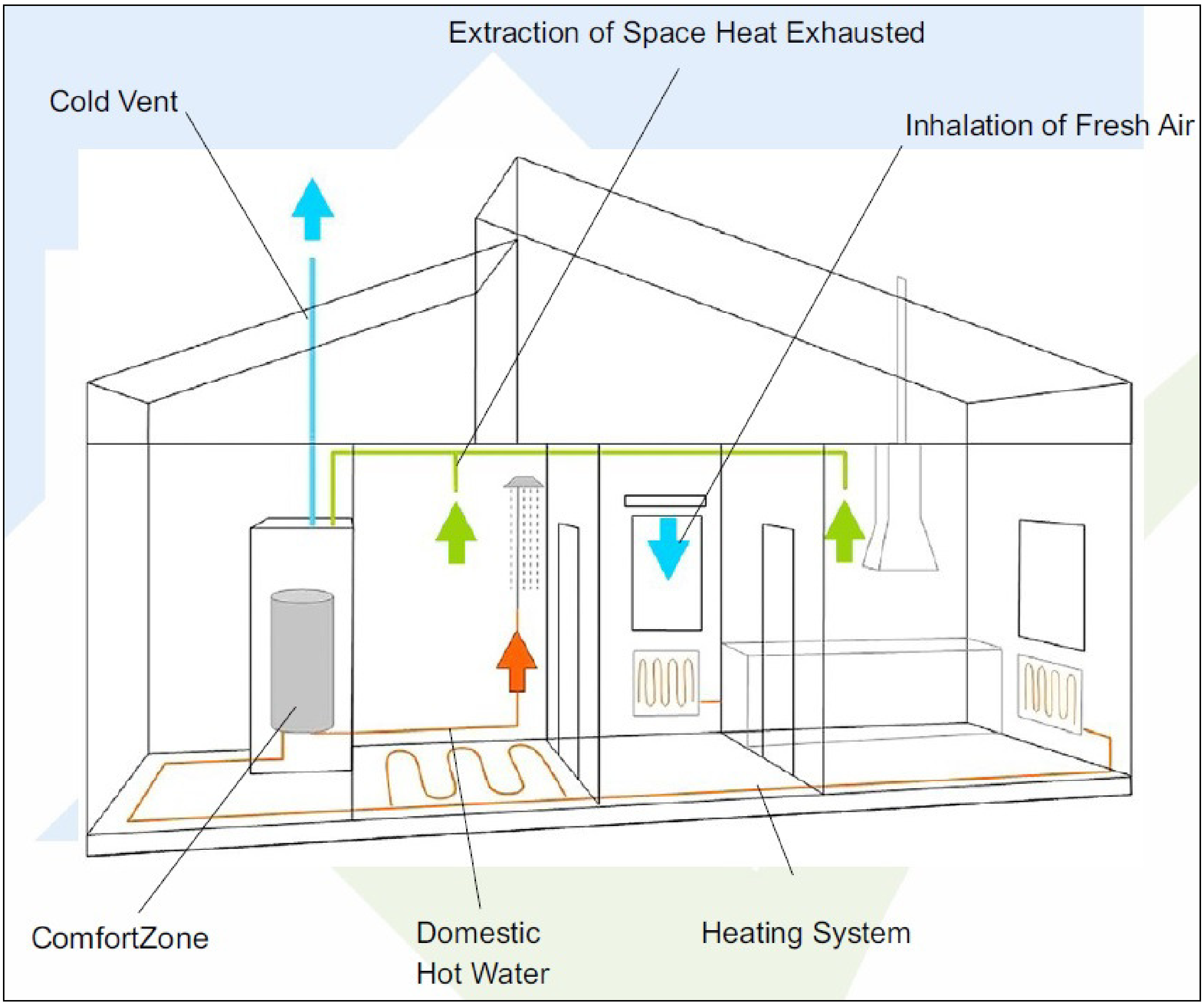

Figure 2: Proposed Heating System Schematic

We have carried out some preliminary BER calculations for some typical house types and we are achieving in general an A2 BER rating and compliance with Part L using a heat pump solution and in some cases PV's.

The water services installation in the houses will be gravity pressurized systems as requested by the client. Typical a Format 30 Cold water storage tank will be installed at high level in the attic space and this will service the cold-water outlets and cold feed to the hot water cylinder. Mains, cold and hot water shall be provided as required to all fixtures and fittings.

The hot water storage calorifier will be 210 litres in capacity and will be heated by the air to water heat pump c/w immersion back-up. Thermostatic Mixing Valves (TMVs) will be provided at all hot water outlets to comply with department regulations for the design of social housing.

The water services installations in the apartments will be pressurized systems. Domestic water storage tanks complete with integral pressurization pumps will be provided in each apartment. Mains, cold and hot water shall be provided as required to all fixtures and fittings.

Hot Water will be generated by the exhaust air heat pump unit which has a built in 210 litre hot water calorifier.

The ventilation requirements for the houses will be met using a low maintenance Aereco demand control ventilation system. This system utilizes an central house extract fan and passive supply vents with mechanical humidity control around the house. Each house will be individually serviced.

Ventilation in the apartments will be achieved the Exhaust air heat pump unit. This unit will extract air from the apartment bathroom and kitchen areas and will draw in fresh air to the unit via wall or window vents.

The electrical site services will include provisions for new EIR, ESB. Public lighting, Pedestrian Crossing Lighting.

The residential house and apartment units will be provided with a suitable number of electrical services to cater for today's needs.

External wall mounted lighting will be provided with specification to be agreed with architect.

The fire alarm system for the houses and Apartments will be a LD2 domestic type consisting of mains fed smoke, heat and carbon monoxide monitors with battery backup.

The LV distribution system in each unit will consist of a consumer unit in the hallway fed with a single phase 12KVA Enhanced supply to each dwelling. The new dwellings will be wired in 3C twin & earth cable.

There shall be 1no. incoming EIR supply to each unit to facilitate telephone and broadband services.

Project	
Microphone positions	Free field 1.5 m above ground level at N2 N3 N4 4 m above ground level at N1
Time	N1 & N3: Sunday 15.09.19 to Tuesday 17.09.19; N2 & N4: Monday 16.09.19 to Tuesday 17.09.19
Operator	Damian Brosnan BSc MSc MIOA MIEI
Standard	ISO 1996 (2016 & 2017)
Field calibrator	Bruel & Kjaer Type 4231 Serial 2342544 Laboratory verification 14.02.19 by Sonitus Systems

Weather	
Cloud cover	100 % at set up, clearing slowly to 0 % during afternoon of 16.09.19, remaining at 0 % thereafter
Precipitation	Light drizzle at set up, to 0300, this data discounted; 0 mm thereafter
Temperature	11 °C at set up and that night, rising to 15 ^{0}C afternoon of 16.09.19, falling to 5 ^{0}C that night
Wind direction	W on 15.09.19, veering NE before dawn 16.09.19 until that evening when veered NW
Wind speed	0-2 m/s until afternoon of 16.09.19 when decreased towards 0 m/s
Wind measurement	Anemo anemometer 2 m above ground level

Instrument 1	
Stations used	N1
Instrument	NTi XL2 ('xl1') IEC 61672-1:2013 Class 1
SLM serial	A2A-13658-E0
Microphone serial	A14735 + pre-amp 7066
Range	0-100 dB
Intervals	Logging at 1 s with audio Relevant intervals extracted
Time weighting	Fast
Frequency weighting	Broadband: A+C Spectrum: Z
Laboratory verification	14.02.19 by Sonitus Systems Compliance certificate available on request
Field calibration	15.09.19 2040 @ 39.6 mV/Pa

Post survey drift check	93.9 dB

Instrument 2	
Stations used	N3
Instrument	NTi XL2 ('xl2') IEC 61672-1:2013 Class 1
SLM serial	A2A-14337-E0
Microphone serial	A14972 + pre-amp 7266
Range	0-100 dB
Intervals	Logging at 1 s with audio Relevant intervals extracted
Time weighting	Fast
Frequency weighting	Broadband: A+C Spectrum: Z
Laboratory verification	14.02.19 by Sonitus Systems Compliance certificate available on request
Field calibration	15.09.19 2013 @ 43.0 mV/Pa
Post survey drift check	93.8 dB

Instrument 3	
Stations used	N4
Instrument	NTi XL2 ('xl3') IEC 61672-1:2013 Class 1
SLM serial	A2A-15392-E0
Microphone serial	A16340 + pre-amp 7956
Range	0-100 dB
Intervals	Logging at 1 s with audio Relevant intervals extracted
Time weighting	Fast
Frequency weighting	Broadband: A+C Spectrum: Z
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	16.09.19 1305 @ 43.2 mV/Pa

Post survey drift check	93.9 dB

Instrument 4	
Stations used	N2
Instrument	NTi XL2 ('xl4') IEC 61672-1:2013 Class 1
SLM serial	A2A-15429-E0
Microphone serial	A16329 + pre-amp 7945
Range	0-100 dB
Intervals	Logging at 1 s with audio Relevant intervals extracted
Time weighting	Fast
Frequency weighting	Broadband: A+C Spectrum: Z
Laboratory verification	13.12.18 by NTi Compliance certificate available on request
Field calibration	16.09.19 1357 @ 41.7 mV/Pa
Post survey drift check	93.9 dB

Uncertainty	
Residual noise	u_i = 0.5 dB c_i = 1 dB where source dominates, >20 dB where source becomes masked c_iu_i range = 0.5 to >10 dB
Weather conditions	Levels representative of contemporaneous conditions only c_iu_i = 2 dB at wind vector + or x Otherwise c_iu_i >2 dB
Anemometer height	Not possible to measure wind speed at 10 m Anemometer height of 2 m may increase meteorological uncertainty
Precipitation	Precipitation = 0 mm during reported intervals c_iu_i = 0 dB
Operating conditions	Levels representative of contemporaneous operating conditions only c_iu_i <1 dB
Location	c_iu_i = 0 dB at free field positions c_iu_i = 0.4 dB at near field & reflective field positions
Instrument	IEC 61672-1 class 1 specifications u = 0.5 dB.
Combined	3 dB to >10 dB, depending on position Variation chiefly to meteorology & residual noise intrusion

Expanded	6 dB to >10 dB, 95 % coverage

Station	Start Date and Time	$L_{Aeq\ 15\ min}$	L_{AFmax}	$L_{AF10\ 15\ min}$	$L_{AF90\ 15\ min}$
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N1	16/09/2019 03:15	32	43	34	29
N1	16/09/2019 03:30	35	46	38	28
N1	16/09/2019 03:45	41	60	41	30
N1	16/09/2019 04:00	34	50	37	29
N1	16/09/2019 04:15	35	45	38	30
N1	16/09/2019 04:30	41	59	41	31
N1	16/09/2019 04:45	36	48	39	31
N1	16/09/2019 05:00	37	46	41	31
N1	16/09/2019 05:15	39	56	41	33
N1	16/09/2019 05:30	52	76	43	35
N1	16/09/2019 05:45	43	57	44	39
N1	16/09/2019 06:00	44	62	44	38
N1	16/09/2019 06:15	51	74	45	39
N1	16/09/2019 06:30	52	73	52	41
N1	16/09/2019 06:45	50	66	51	44
N1	16/09/2019 07:00	52	64	56	46
N1	16/09/2019 07:15	56	67	60	48
N1	16/09/2019 07:30	58	79	61	49
N1	16/09/2019 07:45	55	64	59	48
N1	16/09/2019 08:00	52	78	53	47
N1	16/09/2019 08:15	49	58	51	47
N1	16/09/2019 08:30	52	72	52	46
N1	16/09/2019 08:45	55	74	59	46
N1	16/09/2019 09:00	54	65	59	46
N1	16/09/2019 09:15	56	78	59	47
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N1	16/09/2019 09:45	50	64	54	45
N1	16/09/2019 10:00	54	77	55	46
N1	16/09/2019 10:15	51	67	53	46

N1	16/09/2019 10:30	51	72	52	45
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N1	16/09/2019 13:45	55	77	56	46
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N3	16/09/2019 07:45	42	59	43	40
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N3	17/09/2019 07:15	45	58	46	43
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N4	16/09/2019 15:30	42	60	43	38
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N4	17/09/2019 06:45	47	63	49	44

N4	17/09/2019 07:00	46	55	47	44
N4	17/09/2019 07:15	46	65	47	44
N4	17/09/2019 07:30	47	62	48	44

CST Group
Chartered Consulting Engineers

Traffic and Transport Assessment

for **Proposed Development at Rosshill, Galway City**

On behalf of **Kegata Ltd.**

Prepared by:

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January 2020

Civil
Structural
Traffic

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Revision History

Revision History:		P0	P1	P2	P3	P4	R5	R6	R7		
Purpose of Issue:	P=Preliminary PG=Progress C=Comment I=Information FC=Fire Cert Q=Quotation PL=Planning T=Tender CN=construction CT=Contract	P	P	P	P	P	P	P	P		
Issue Date:		28 06 19	05 07 19	17 07 19	18 07 19	26 09 19	13 12 19	13 12 19	14 01 20		
Originator:		MR /JN	MR /JN	MR /FF	MR /FF	MR /FF	MR /FF	MR /FF	MR /FF		
Checked By:		FF	FF	FF	SS	FF	FF	FF	FF		
Approved By:		FF					SS	SS	SS		

Report By: .... Date: 14th January 2020

Francis Fidgeon
Chartered Engineer

Approved By: .... Date: 14th January 2020

Stuart Summerfield
Partner

1 Non-Technical Summary

Planning permission is being sought for a residential development consisting of 342 no. units comprising 185 no. houses and 157 no. apartments, including a ground-floor community space, office, cafe and retail unit.

Manual classified traffic counts and capacity analysis was carried out at the following junctions:

- Junction 1: R338 Dublin Rd.-Rosshill Rd. Junction
- Junction 2: R338 Dublin Road-R338 Coast Road Junction
- Junction 3: R921 Old Dublin Road-Doughiska Road
- Junction 4: R338 Coast Road-Rosshill Road Junction
- Junction 5: Rosshill Road-Rosshill Farm Stud Junction

Predicted development traffic and committed development traffic was added to the existing flows at the junctions as well as traffic growth figures up to a design year of 2039.

Traffic generation has been included on the road network assuming full occupation of permitted adjacent development. Some junctions will be above capacity before the design year. These junctions are predicted to be above capacity in any case without the development, but one will occur earlier.

The proposed Galway Bypass will ultimately reduce traffic flow at these junctions. The development is being phased and this will allow some additional time towards implantation of the bypass.

2 Introduction

2.1 Background

CST Group Chartered Consulting Engineers were commissioned by Tobin Consulting Engineers to carry out a TTA for a Residential Development at Rosshill, approximately 5km from Galway City Centre. The assessment has been carried out in accordance with TII's Traffic and Transport Assessment Guidelines PE-PDV-02045 (May 2014) and refers to the Design Manual for Urban Roads & Streets (DMURS), Smarter Travel – A Sustainable Transport Future (2009-2020). Sections from the Galway City Council Development Plan have been used to help describe the development location and its local context.

The purpose of the TTA report is to assess the potential impact of the proposed development on the existing local transport network and to ensure that the proposed site access and the existing junctions which fall within the scope of the study will have adequate capacity to carry the development traffic and the future growth in existing road traffic to the design year and beyond. An assessment of the accessibility of the site for cyclists, pedestrians and public transport users has also been made.

The first phase of the development is estimated to be completed and occupied by 2022. It is estimated that the construction of the final phase will be completed and ready for occupation in 2024.

2.2 Scoping

Tobin Consulting Engineers initially carried out a Traffic Scoping exercise with Galway City Council's Roads Department in relation to the proposed development in May 2019. Galway City Council requested that analysis be carried out at the following junctions (as shown on Figure 3.4):

- Junction 1: R338 Dublin Rd.-Rosshill Rd. Junction
- Junction 2: R338 Dublin Road-R338 Coast Road Junction
- Junction 3: R921 Old Dublin Road-Doughiska Road
- Junction 4: R338 Coast Road-Rosshill Road Junction
- Junction 5: Rosshill Road-Rosshill Farm Stud Junction

The outcomes of this exercise were incorporated into the draft Traffic and Transport Assessment and draft design drawings. The design and access options were further reviewed and discussed at the Stage 1 meeting held between the Client / Design Team and Galway City Council in May 2019. Again, the resulting comments were taken on board and amendments to the design were incorporated where possible.

Galway City Councils Roads Department had further comments on the final draft design submitted prior to the Pre-Application Consultation Meeting. These were discussed at the Pre-Application Consultation Meeting held on the 27th of September 2019. Following on from this, a second meeting was held between Galway City Council's Roads Department and Tobin Consulting Engineers to further discuss the items raised and to allow Tobin Consulting Engineers to pose solutions and provide mitigation measures to the items raised by the Roads Department.

The main items raised by the Roads Department (and Design Team responses as discussed) are outlined as follows:

- A lack of pedestrian, cycling and public transport in the area resulting in high levels of commuting by car causing further traffic congestion in the area.
    - Tobin Consulting Engineers identified the pedestrian, cycling and public transport linkages to the site on drawings 10690-2013 and 2014. This information was tabled at the second meeting with Galway City Council's Roads Department. The information is also included in this final revision of the Traffic and Transport Assessment (refer to Section 14 of this Report). This shows that currently, there are public transport links within 1.1 km (a 12-minute walking time from the proposed development) with plans for future upgrading of the Dublin Road to incorporate bus lanes on both sides as part of the strategy to provide a better bus service in Galway City. Cycle lanes will also be provided on both sides of the road which will further enhance the linkages of the site to the City centre.
    - To further enhance the linkage to the site, the Developer has proposed to carry out maintenance works on the existing footpath network linking the site with the Dublin Road and the existing Bus Stops.
    - Consultation has also commenced between the Developer and the City Direct Bus Company in relation to the provision of a new bus service in the vicinity of the proposed development to serve the proposed development and surrounding residential developments in the area. A letter stating same is provided from City Direct and is appended to this Report.

- Clarification required regarding the proposed realignment of the Rosshill Stud Farm Road and its relationship with the existing road alignment.
    - The realignment of the access road has been clarified and is now clearly shown on drawing number 10690-2014 and the Architect's layout drawings. These identify the section of existing road which is to be decommissioned and closed off. The proposed realigned section of road is also identified on this drawing. The procedure to close this section of road will be undertaken and carried out in accordance with Galway City Council's requirements.

- That the proposed cycle parking facilities have not been given due consideration during the design process.
    - The rationale behind the bicycle parking was to provide ample parking for the apartment blocks to facilitate cyclists living in and people visiting these apartments. The cycle parking to be provided will be of a high standard and in accordance with the City Council's guidelines. It is envisaged that those living in houses can utilise their back gardens to store their bicycles.

- There is concern that the traffic analysis, particularly in relation to the Doughiska Rd / Dublin Road junction, is inadequate and doesn't reflect the current or expected situation in the area.
    - The analysis which was carried out for the draft revision of the Traffic and Transport Assessment reflected the queue lengths averaged out over the peak hour, not the peak 15 min period. This resulted in the outputs which were obtained from the LinSig analysis and the discrepancy with the expected outcomes. The analysis has been updated to reflect the current situation more accurately and the timeframes have also changed to reflect 15 min periods.
    - Also, the analysis has assumed the trip distribution will match current patterns and has not yet incorporated an allowance for traffic which will utilise the Oranmore Train Station to commute into the City.

3 Existing Conditions

3.1 Site Location

The development site is located 5km to the East of Galway City Centre. The proposed development site is an existing greenfield site located immediately to the south of the Galway-Dublin Rail Line. The site location in relation to the wider road network is detailed in Figure 3.1 & Figure 3.2 below. The area of the proposed development, Rosshill, falls within the boundary of the Galway City Development Plan (2017-2023), in which it has been zoned low density residential.

Figure 3.1: Location map of Proposed Development and surrounding road network ***©OpenStreetMap contributors***

3.2 Existing Road Network

The layout of the local road network is presented in Figures 3.1 and 3.2. The proposed development is bounded to the north by the Rosshill Road and the Galway Dublin Rail Line, and to the East by the Rosshill Farm Stud Road. A brief description of the local road network and associated junctions is provided below:

3.2.1 Rosshill Road

The Rosshill road is a single carriageway road with one lane in each direction. The Rosshill Road connects to the R338 Coast Road at its eastern end and the R338 Dublin Road at its western ends. Both junctions are priority-controlled T-Junctions that include right turning lanes on the regional road. There is a footway along the majority of the Northern Side of the Rosshill Road. It is constructed from an unbound material and is in a state of disrepair.

3.2.2 R338 Coast Road

The R338 Coast Road is a single carriageway road with one lane in each direction. The R338 links to the R338 Dublin Road via a signalised T-Junction at its western end and to the Oranmore region to the East. There are no footways provided on the Coast Road. There is a hard-shoulder along both sides of the R338 Coast Road.

3.2.3 R338 Dublin Road

The R338 Dublin Road is a single carriageway road with one lane in each direction and a segregated bus lane on the westbound (citybound) direction. The R338 Dublin Road links to the City Centre to the west and to the R338 Coast Road and R921 Old Dublin Road to the east (via a signalised T-Junction). There is a footway provided along the southern side of this road which connects to pedestrian infrastructure to the west (city centre) and to the east (Roscam and Doughiska residential areas).

3.2.4 Rosshill Farm Stud Road

The Rosshill Farm Stud Road is a single carriageway county lane that runs southerly from the Rosshill Road via a Priority-Controlled T-Junction. There are no pedestrian or cyclist facilities provided on this road. The existing road meets Rosshill Road at an angle more than 70 degrees and is not ideal for the increased usage as motorist are required to undertake a sharp turn at this junction. Also, elderly users can experience difficulty when attempting to look over their shoulder to observe oncoming traffic when exiting at such a sharp junction. As a result of this, the existing Rosshill Farm Stud/Rosshill Road Junction is to be realigned as part of the proposed development. This will involve construction of new carriageway from the proposed entrance to the development to the intersection with the Rosshill Road. A footway and cycleway will be provided along this new section of roadway as shown on Figure 3.3.

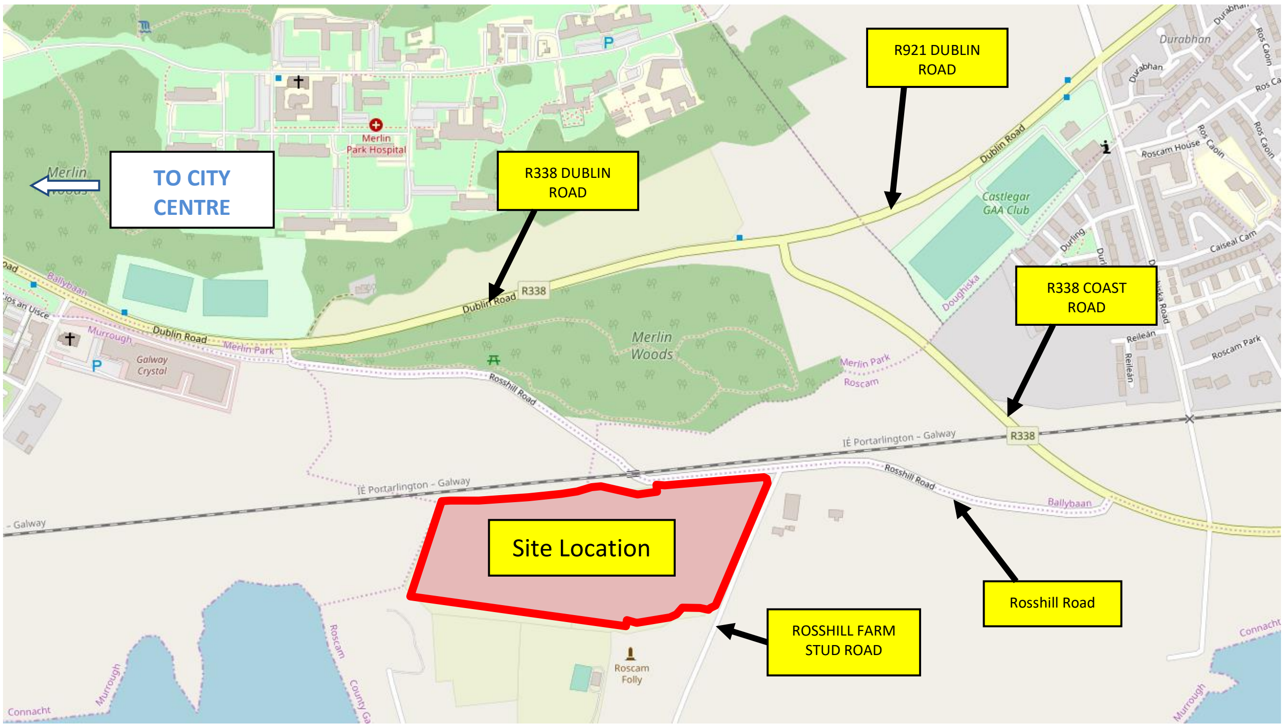


Figure 3.2: Site location and surrounding road network ***©OpenStreetMap contributors***

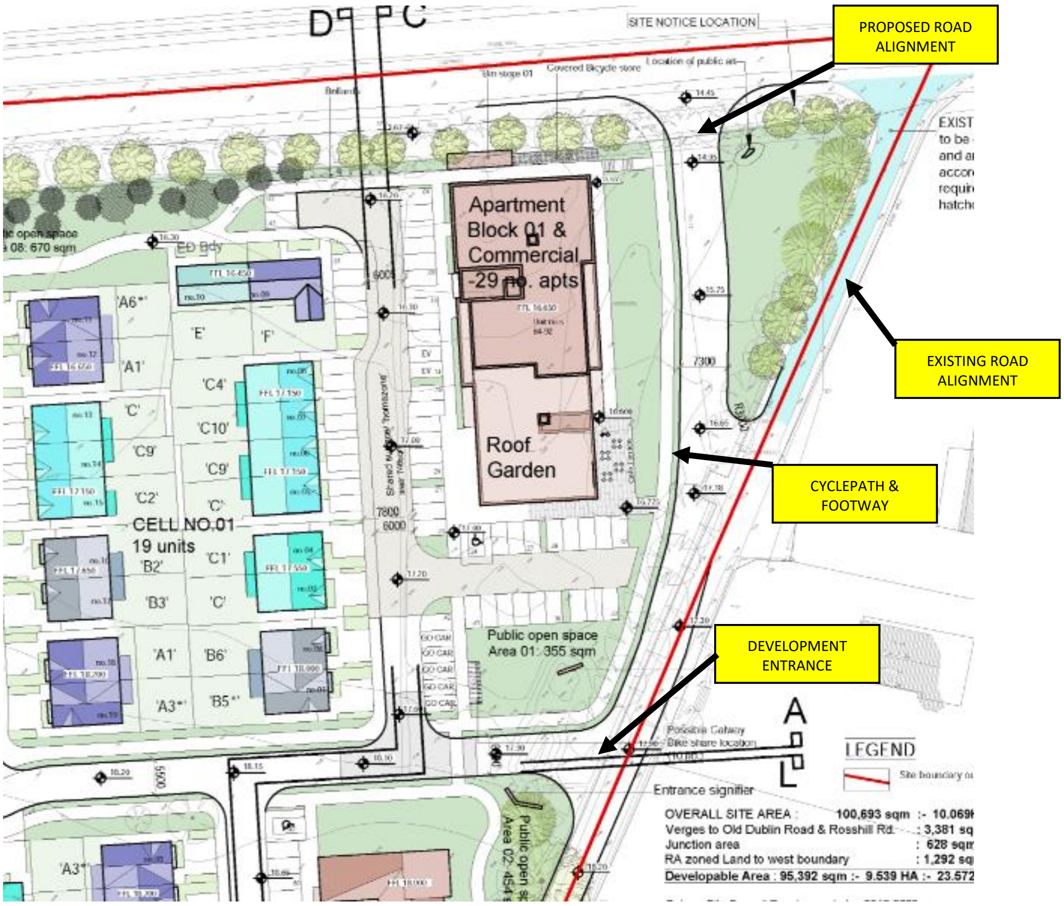


Figure 3.3: Realignment of Rosshill Farm Stud Road

3.3 Existing Traffic Flows

As mentioned in Section 2.2, the TTA was scoped with Galway City Council Roads and Transportation Dept on the 22nd of May 2019. The junctions to be analysed are:

- Junction 1: R338 Dublin Rd.-Rosshill Rd. Junction
- Junction 2: R338 Dublin Road-R338 Coast Road Junction
- Junction 3: R921 Old Dublin Road-Doughiska Road
- Junction 4: R338 Coast Road-Rosshill Road Junction
- Junction 5: Rosshill Road-Rosshill Farm Stud Junction

The location of these Junctions is shown on Figure 3.4. To determine the existing traffic volumes on the road network in the vicinity of the proposed development a manual classified traffic turning count survey was carried out at these junctions.

These counts were undertaken by IDASO on 20th September 2018 for a 12-hour period from 7.00am to 7.00pm, and on the 15th of November 2018 for a 24-hour period from 00:00 to 24:00. The surveys found that the mean morning peak hour traffic flow at Junction 1 occurred between 07:30am and 08:30am and the evening peak hour occurred between 5:15pm and 6:15pm. The surveys found that the mean morning peak hour traffic flow at Junction 2 occurred between 07:45am and 08:45am and the evening peak hour occurred between 4:45 and

5:45pm. The surveys found that the mean morning peak hour traffic flow at Junction 3 occurred between 08:15am and 09:15am and the evening peak hour occurred between 5:15pm and 6:15pm. The surveys found that the mean morning peak hour traffic flow at Junction 4 occurred between 07:30am and 08:30am and the evening peak hour occurred between 5:00pm and 6:00pm. Junction 5 occurred between 07:30am and 08:30am and the evening peak hour occurred between 5:00pm and 6:00pm.

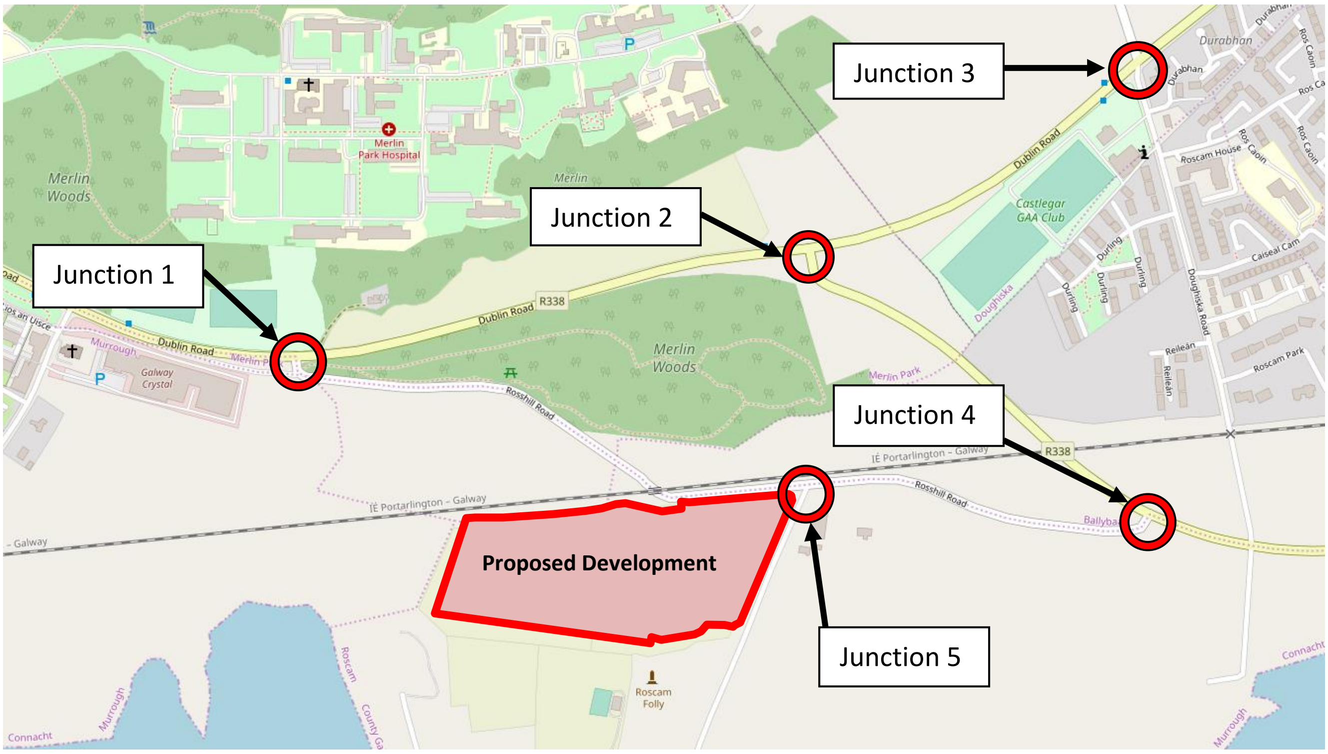


Figure 3.4: Identified Junctions for Analysis **(© OpenStreetMap contributor)**

The results of the surveys have been reproduced in full as **Appendix A** to this report. The calculated morning and evening peak hour turning count flows at the development are detailed in the traffic flow diagrams presented in **Appendix C**.

3.4 Transport Proposals

As part of the traffic and transport assessment for the proposed development, a study of the transport proposals that could impact on the development was undertaken. These are outlined below.

3.4.1 N6 Galway City Ring Road

The N6 Galway City Ring Road (GCRR) comprises the construction of approximately 6km of a single carriageway from the western side of Barna Village as far as Ballymoneen Road and approximately 12km of dual carriageway from Ballymoneen Road to the eastern tie-in with the existing N6 at Coolagh, Briarhill, and associated link roads, side roads, junctions and structures. The Application for the N6 Galway City Ring Road (GCRR) was lodged with An Bord Pleanála (ABP) in October 2018. Following that, approximately 300 submissions/objections were received by ABP. The N6 GCRR Project Team are now assessing these and preparing responses. In addition, ABP have requested further information seeking clarifications and again the N6 GCRR Project Team are preparing a response to this.

It is expected that this scheme will have significant beneficial impact on the traffic distribution throughout the Galway City and Environs. It should reduce through traffic on the roads in the vicinity of the proposed development.

A schematic of the scheme is shown in Figure 3.5 below.

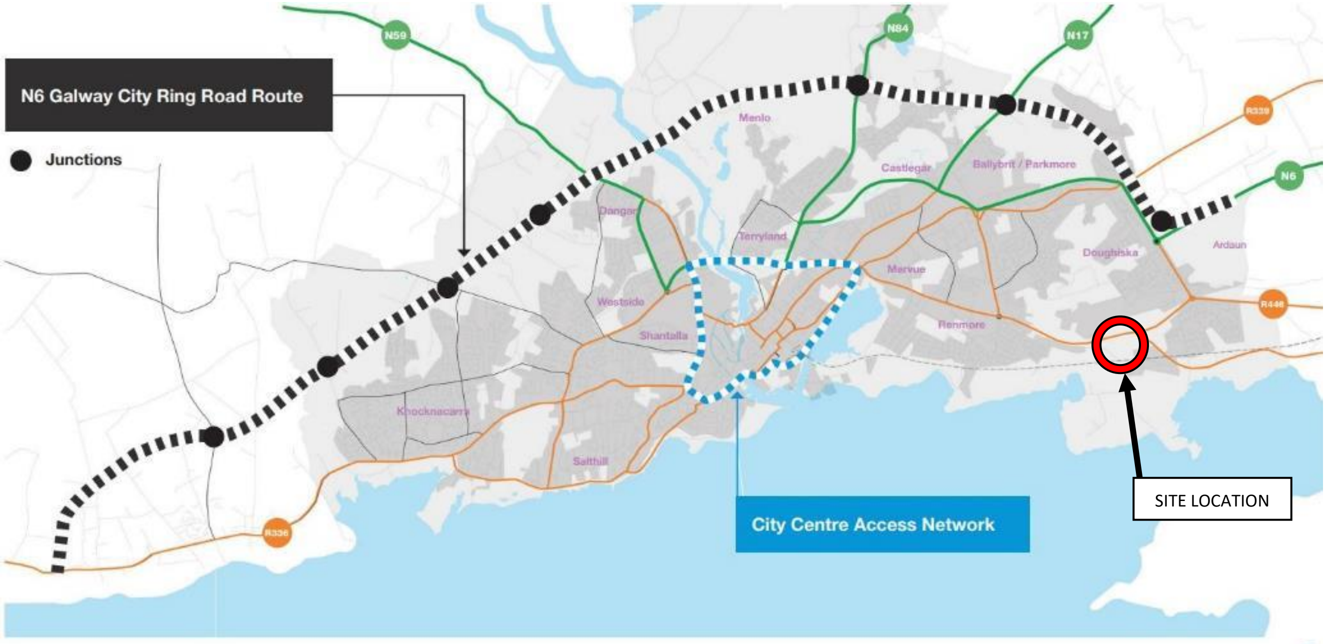


Figure 3.5: Proposed N6 Galway Ring Road Route **(© Galway Transport Strategy)**

4 Proposed Development

4.1 Description

The application is for a residential development consisting of 342 no. units comprising 185 no. houses and 157 no. apartments, including a ground-floor community space, office, cafe and retail unit. The residential dwelling units are a combination of 2-bed, 3-bed and 4-bed terraced, semi and detached houses. The apartment units consist of a combination of 1-bed and 2-bed apartments. A two-storey childcare facility is also included. The provision of public realm landscaping including shared public open space and play areas, public art, public lighting, resident and visitor parking including car rental bays, electric vehicle charging points and bike rental spaces. There are pedestrian, cyclist and vehicular links throughout the development. Access road and junction improvements at Rosshill Road/Old Dublin Road. Provision of all associated surface water and foul drainage services and connections including pumping station. All associated site works and ancillary services. A Natura Impact Statement ('NIS') and Environmental Impact Assessment Report ('EIAR') have been prepared and accompany the application. The application is also accompanied by a Statement of Material Contravention of the Development Plan.

The land surrounding the immediate site is mixed low-density residential, consisting primarily of one-off housing. Rosshill Farm Stud is located to the south of the proposed development site, with the Galway-Dublin Rail line bounding the north of the site.

The proposed layout for the development has been reproduced in sketch format in Figure 4.1 and is detailed in the series of drawings as submitted with this application.

Figure 4.1: Proposed Site Layout

4.2 Internal Layout

The site is very near Galway Bay and is a relatively level site. It is immediately south of the Dublin-Galway railway line which has a railway bridge over the Rosshill Road. The site is 10 ha and approximates to a rectangle measuring 500m east/west and 200m north/south. The existing access point is off Rosshill Farm Stud Road. The proposed access point is also off Rosshill Farm Stud Road, which is to be realigned and upgraded from Rosshill Road to the proposed access. DMURS principles and best practice has been used for the layout design.

The scheme has a spine road running east-west for a large part from the site access. However, this road has been designed not to form a long straight but rather is deviated slightly through sharp curves at various intervals to provide traffic calming and so that it does not appear as a long road. Buildings thus come into view at the end of sections of the road.

Some homezone areas are provided where pedestrians and motorists share the carriageway to slow speeds.

Secondary roads either loop with each other so not turning/reversing is required or are provided with turning areas.

4.3 Service and Delivery Trips

Service and delivery trips to and from the development will be via the site entrance at the east of the development. It is envisaged that most delivery and service trips for the commercial element will occur during off-peak times.

An AutoTrack swept path analysis for the largest delivery vehicle type (16.5m articulated vehicle) accessing the development from the entrance junction and the realigned junction with the Rosshill Road should be carried out. The swept path of the maximum legal vehicle should not cross any proposed parking spaces.

5 Cumulative Impacts

Pre-planning discussions were held with Galway City Council in relation to the proposed development. There is one proposed development to the northwest of the site that was highlighted – Merlin Park.

5.1 Development at Merlin Park

5.1.1 Housing Development

The proposed Merlin Park development consists of 16 No. 2-storey, 5-bedroom, detached houses, together with individual garages. This development was granted planning permission in 2017. The Merlin Park development will be accessed via a new priority junction along the Rosshill Road to the northwest of the site. Work has commenced on this development. A new footway is also being constructed along the road frontage of the site.

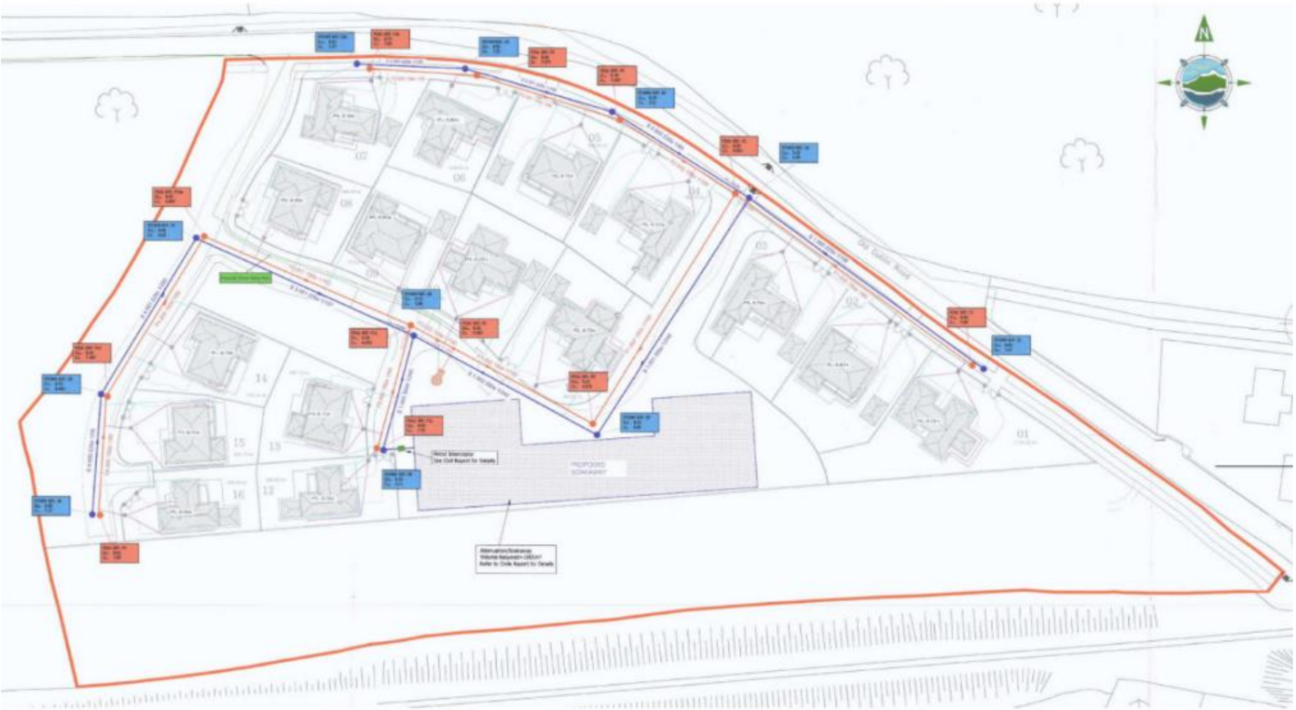


Figure 5.1: Proposed Merlin Park Layout

6 Trip Generation

6.1 General

The purpose of this section is to determine the overall number of trips that will be generated by the proposed development and adjacent committed developments. Following the quantification of the trip generation, these trips will be distributed onto the adjoining roads in order to provide the necessary traffic flows to allow an assessment of the traffic impact by the proposed development to be undertaken.

In order to estimate the likely volumes of traffic that will be generated by the proposed development, Galway City Council indicated that trip rates recommended by TRICS (Trip Rate Computer Information System) were not acceptable for the proposed development. Therefore, a traffic count was undertaken at a similar development (An Réileán Development) to calculate the turn-in rates at the proposed development. The similar development consists of 82 housing units and 2 apartment blocks (24 apartments). These figures were applied pro-rata to the relevant number of housing and apartment units within the proposed development. The estimated total number of vehicular trips generated by the proposed development is shown in **Table 6.1.**

TRICS was used to estimate the volume of traffic that will be generated by the recently commenced housing nearby (Merlin Park) and is also included in Table 6.1.

Landuse		Number of Trips			
	Residential Units	AM Arrivals	AM Departures	PM Arrivals	PM Departures
Proposed Mixed Residential (Apartments & Houses) Ph 1	51	8	27	20	8
Proposed Mixed Residential (Apartments & Houses) Ph 2	53	8	28	21	8
Proposed Mixed Residential (Apartments & Houses) Ph 3	143	22	76	57	22
Proposed Mixed Residential (Apartments & Houses) Ph 4	95	14	50	38	14
Adjacent Development Houses Privately Owned (TRICS)	*16*	*4*	*9*	*8*	*5*
TOTAL		**56**	**190**	**143**	**57**

Table 6.1: Predicted Traffic Generated by Proposed Development & Merlin Park

7 Traffic Forecasting

7.1 Future Baseline Traffic Growth

In the absence of any specific local traffic growth information it was assumed that baseline traffic will continue to grow at the levels recommended by TII in the Project Appraisal Guidelines (PAG) – Unit 5.3 'Travel Demand Projections' publication (PE-PAG-02017). The Project Appraisal Guidelines describe three levels of transport model functionality. The simple model, which reflects traffic volumes on the basis of link flows, is best suited to the proposed development. Such models do not attempt any route assignment, and hence are applicable for networks where no change in traffic flows will result from a proposed scheme. Growth rates recommended in PAG – Unit 5.3 have been used to determine future traffic flows on the road network within the vicinity of the development. We have used figures from it for the Mid-West area which includes Galway City.

The year of opening of the scheme was assumed to be 2024. The central growth factors from the Project Appraisal Guidelines – Unit 5.3 publication were used and are detailed below: -

- TII Link Based Growth Rates: Annual Growth Factor for 2013-2030 = 1.0099 (LVs) and 1.0237 (HVs);
- TII Link Based Growth Rates: Annual Growth Factor for 2030-2050 = 1.0000 (LVs) and 1.0176 (HVs).

The annual growth factors for Light Vehicles (LVs) and Heavy Vehicles (HV) were applied to surveyed values of vehicles counted.

With regards to the volume of traffic using the road, the passenger car is adopted as the standard unit and other vehicles are assessed in terms of PCU's. Cars and Light Goods Vehicles are grouped together as Light Vehicles (LV). All other Goods Vehicles, Buses and Coaches are defined as Heavy Vehicles (HV).

The classification of vehicles in PCU's is shown below:

Vehicle	PCU
Car	1
Light Goods Vehicle	1
Other Goods Vehicle (2 – 3 axle)	1.5
Other Goods Vehicle (4 – 5 axle)	2.3
Bus	2
Cycle	0.4

Table 7.1: Classification of Passenger Car Units

Estimated future baseline traffic flows on the road network in the vicinity of the proposed development were calculated by applying these factors to the 2019 surveyed flows. The resulting projected flows are detailed in the traffic flow diagrams in **Appendix C**.

8 Construction Stage Traffic

8.1 Introduction

As with any construction project, the contractor will be obliged to prepare a comprehensive traffic management plan for the construction phase. The purpose of such a plan is to outline the measures to manage the expected construction traffic activity during the construction period. In the interim, however, this section will provide an overview of the likely volume and routing of construction vehicles, based on a most likely scenario of construction.

8.2 Likely Construction Programme

The site as proposed would be expected to require approximately 5 years to complete from occupation of the site. It is planned that the development will be complete over 3 Phases as shown on the phasing drawings accompanying this application. Activities would include:

- Site Clearance;
- Excavation and Spoil Removal;
- Construction of Substructure;
- Construction of Superstructure; and
- Fitting and finishing.

The site will exhibit distinct characteristics during each stage of the construction programme, with varying demands for site deliveries, spoil removal, and car parking by site operatives. A phasing plan for the development has been prepared by the architect and accompanies this application. An indicative construction compound arrangement has been included as part of the phasing plan accompanying this application.

8.3 Parking and Construction Staff

Parking for site operatives will be a requirement throughout the contract. It would be expected that a site of this size would generate a requirement for in the region of 40-50 site operatives during the peak period of construction, and which would lead to a parking requirement for about 30 vehicles.

During the early stages parking will be available on the areas of site where construction of blocks has yet to begin. Due to the large area of the site the parking demand will be accommodated wholly within the site.

A Traffic Management Plan for the construction stage would include parking arrangements and be agreed with Galway City Council prior to commencement of the works on site.

8.4 Deliveries to Site

The Traffic Management Plan for the construction stage would identify haulage routes and restrictions as appropriate in discussion with the Local Authority. There is a height restriction where the railway line goes over Rosshill Road.

8.5 Spoil Removal

It is anticipated that spoil removal from the site will be minimal.

8.6 Mitigation Measures

Construction debris (particularly site clearance, spoil removal and dirty water runoff such as dewatering or 'wash' from concreting activities) can have a significant impact on footpaths and roads adjoining a construction site, if not adequately dealt with. There will, therefore, be a requirement for comprehensive measures as part of the construction management, such as:

- Routine sweeping/cleaning of the road and footpaths in front of the site; and
- No uncontrolled runoff to the public road from dewatering/pumping carried out during construction activity.

The mitigation measures will therefore ensure that the presence of construction traffic will not lead to any significant safety concerns in the vicinity of the proposed works.

9 Modal Split

Government policy stated in the document published by the Department of Transport entitled, 'Smarter Travel, A Sustainable Transport Future 2009-2020' sets targets for modal split. The first goal is to achieve a mode split of 45% trips by car drivers (maximum) and 55% trips by walking, cycling and public transport and other sustainable modes (minimum targets) for persons in the proposed development who are travelling to work.

The Central Statistics Office (CSO) has previously established a modal split in the Galway City Area as shown below.

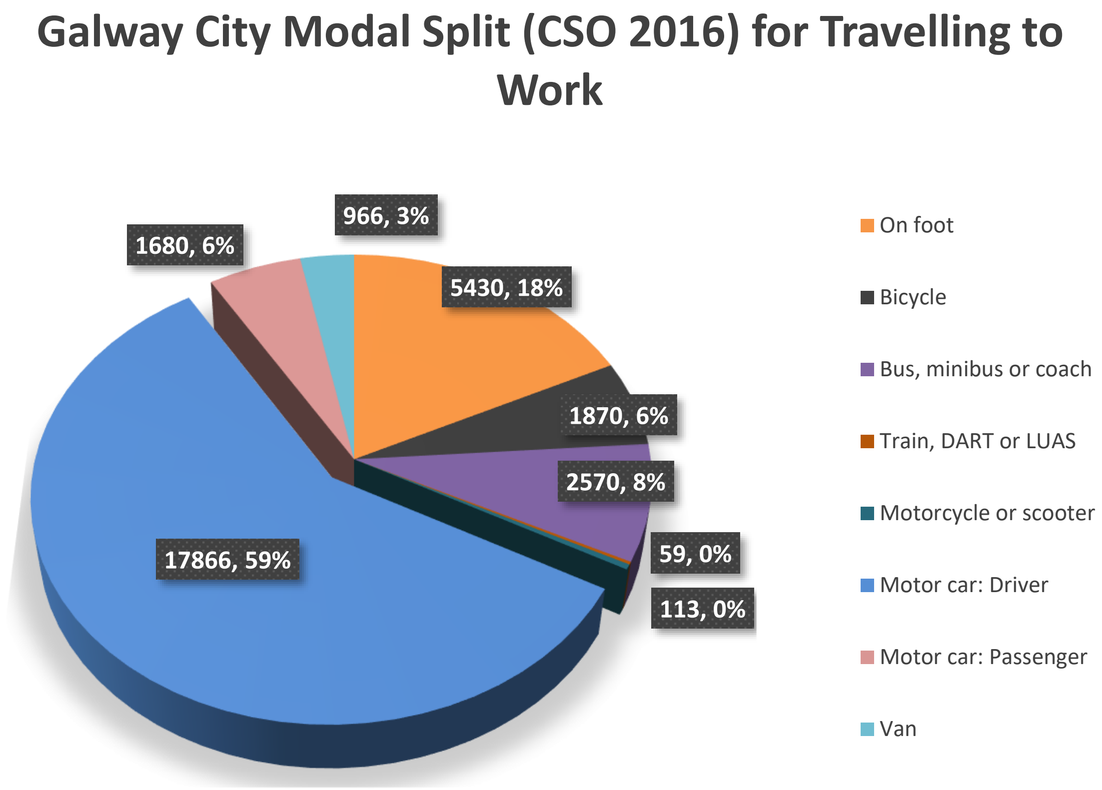


Figure 9.1: 2016 Modal Split

As shown in the above chart, car is the dominant mode of transport in Galway City, accounting for 65% of all trips. Walking provides for a high proportion of trips, amounting to nearly 18% overall mode share. It should be noted that the proposed development is located 5km from Galway City Centre, so the numbers of walking commuters could be expected to be less than shown on the CSO data due to the distance of the development from the City Centre. However, the aim should be to provide adequate cycling and public transport commuting through the provision of appropriate infrastructure.

9.1 Existing Site Infrastructure Audit

A site audit was carried out on the existing infrastructure in the vicinity of the development and established the following:

- Existing Sustainable Transport Infrastructure: There is an existing bus stop located at the junction of the development access and the Rosshill Road. However, there are no public bus routes servicing this stop at present. The nearest bus stop to the proposed development that is currently in use is the Dublin Road Coast Road Bus Stop which is serviced by the 404 & 409 bus routes which service the City Centre. This stop is a 1.2km walk from the proposed development and as discussed above, the route is not serviced with footways. There is another stop located 1.3km to the west of the development, on the R338 Dublin road, which is also serviced by the 404 & 409 routes. There is a footway along the majority of the route from the proposed development to this bus stop, along the northern side of the Rosshill Road, however it is unbound, and sections of the footway are missing.
  The existing Oranmore train station on the Galway-Dublin line is 2.8km away from the site and is accessed via the R338 Coast Road. There are no pedestrian facilities from the development to this train station. See Chapter 14 for further details on Public Transport.

- Existing Cycling facilities: There are no existing cycle lanes on the Rosshill Road. Cyclists are required to share the carriageway with vehicular traffic. There are no existing cycling facilities along the R338 Dublin Road. However, there is a bus lane along the westbound carriageway which cyclists are permitted to use. There are no existing cycling facilities along the R338 Coast Road, however there is a hard shoulder in both directions which cyclists are permitted to use.

- Existing Pedestrian facilities: There is an existing footway along the northern boundary of the Rosshill Road at the junction of the development. However, it is unbound and in a poor condition. From the junction between the Rosshill Farm Stud-Rosshill Road junction this footway runs easterly along the Rosshill Road towards the R338 Coast Road. It terminates before the junction with the R338 Coast Road. In a westerly direction, the footway runs until terminating at the railway underbridge on the Rosshill Road. A footway then re-emerges 260m west of the Railway underbridge and continues to the intersection with the R338 Dublin Road, before terminating around 40m from the junction. A footway is provided along the southern boundary of the R388 Dublin Road which connects in a westerly direction with the city centre and in an easterly direction where it links with Doughiska/Roscam.

9.2 Proposed Development

As part of the proposed development it is proposed to implement the following changes to encourage a modal split in line with the Smarter travel objectives.

- **Proposed Sustainable Infrastructure:** Preliminary discussions have been held by the applicant with local Bus Operators to ascertain the feasibility of the commencement of an active route servicing the development via the existing bus stop. A letter from "City Direct" reproduced in **Appendix D** confirms their interest in this.

- **Proposed Cycling facilities:** It is proposed to provide an off-road cycle track from the proposed development to the realigned junction with the Rosshill Road. From this intersection, cyclists travelling along the Rosshill Road will then share the carriageway with vehicular traffic to the intersection of the R338 Dublin Road, where a bus lane is available for cyclists, or the R338 Coast Road, where a hard shoulder is provided. Furthermore, bike rental stands are being provided within the development.
- **Proposed Pedestrian Facilities:** It is proposed to provide a pedestrian footway from the development to the junction with the Rosshill Road. Pedestrians can then cross this roadway to use the existing Pedestrian Footway along the Northern Boundary of the Rosshill Road. This footway is under the control of Galway City Council. As noted above, sections of this footway are in a state of disrepair and some key linkages are missing. It is proposed to improve these pedestrian facilities as part of the development by providing a full continuous footpath and repairing existing paths. This would provide access to the existing pedestrian facilities provided on the R338 Dublin Road.
- **GoCar Scheme:** The development management company will include a GoCar scheme on the apartment blocks.
- **Electric Vehicles:** Charging points for electric vehicles are being provided for the apartments.

9.3 Neighbouring Development

Existing local shops are located to the east and north of the proposed development, some 12 minutes walking (approx. 1km). A café/restaurant/homewares area is located a 10-minute walk away (800m). Roscam residential estate is 1km to the east and Murrough residential estate 1.2km west. Merlin Park University Hospital is just over 2km from the site. The existing Oranmore train station on the Galway-Dublin line is 2.8km away. Figure 9.2 overleaf provides contextual analysis of the site in relation to surrounding developments.

Figure 9.2: Contextual Analysis

10 Trip Assignment and Distribution

The trips generated by the proposed development were distributed on the study area road network typically using existing turning proportions observed from the traffic surveys at the junctions in the area. One exception is that all traffic arriving at the Dublin Road from the Coast Road is assumed to turn right and vice versa all traffic arriving at this junction is expected to turn left off the Dublin Road.

The assumed percentage distributions at the existing junctions and proposed junction in the vicinity of the development site and the resulting AM and PM peak hour traffic turning flows generated by the proposed development are detailed in the diagrams presented in **Appendix C.**

11 Assessment and Road Impact

11.1 Description

The impact on the local road network has been assessed by examining the projected traffic flows on the local road network both 'with' and 'without' the proposed development in place. The morning peak period and the evening peak period have been examined in order to assess the busiest case in terms of local traffic on the road network and traffic generated by the proposed development.

11.2 Junction Analysis

Capacity analysis was carried out using the JCT Consultancy Traffic Signal Design & Analysis Software package LinSig and also with the TRL software package PICADY.

LinSig was used to carry out an analysis of traffic signal controls at the existing junctions:

- Junction 2: R338 Dublin Road-R338 Coast Road Junction
- Junction 3: R921 Old Dublin Road-Doughiska Road

PICADY was used for the following existing priority-controlled T-Junctions:

- Junction 1: R338 Dublin Rd.-Rosshill Rd. Junction
- Junction 4: R338 Coast Road-Rosshill Road Junction
- Junction 5: Rosshill Road-Rosshill Farm Stud Junction

These 5 No. junctions are shown in Figure 11.1 and were analysed for the following traffic flow scenarios:

- 2024 Opening Year AM and PM peak hour flows without proposed development in place;
- 2024 Opening Year AM and PM peak hour flows with proposed development in place;
- 2029 Opening Year + 5 Years AM and PM peak hour flows without proposed development in place;
- 2029 Opening Year + 5 Years AM and PM peak hour flows with proposed development in place.
- 2039 Opening Year + 15 Years AM and PM peak hour flows without proposed development in place;
- 2039 Opening Year + 15 Years AM and PM peak hour flows with proposed development in place.

The existing junctions were also analysed in the current year, 2019, without the development in place.

Estimated turning movements for each of the above scenarios were calculated by summing the predicted generated flows and the expanded baseflows. Total traffic turning flow diagrams for each analysis scenario have been reproduced in the traffic flow diagrams in Appendix B. The following sections summarise the findings of the junction capacity modelling for each of the junctions within the study area.

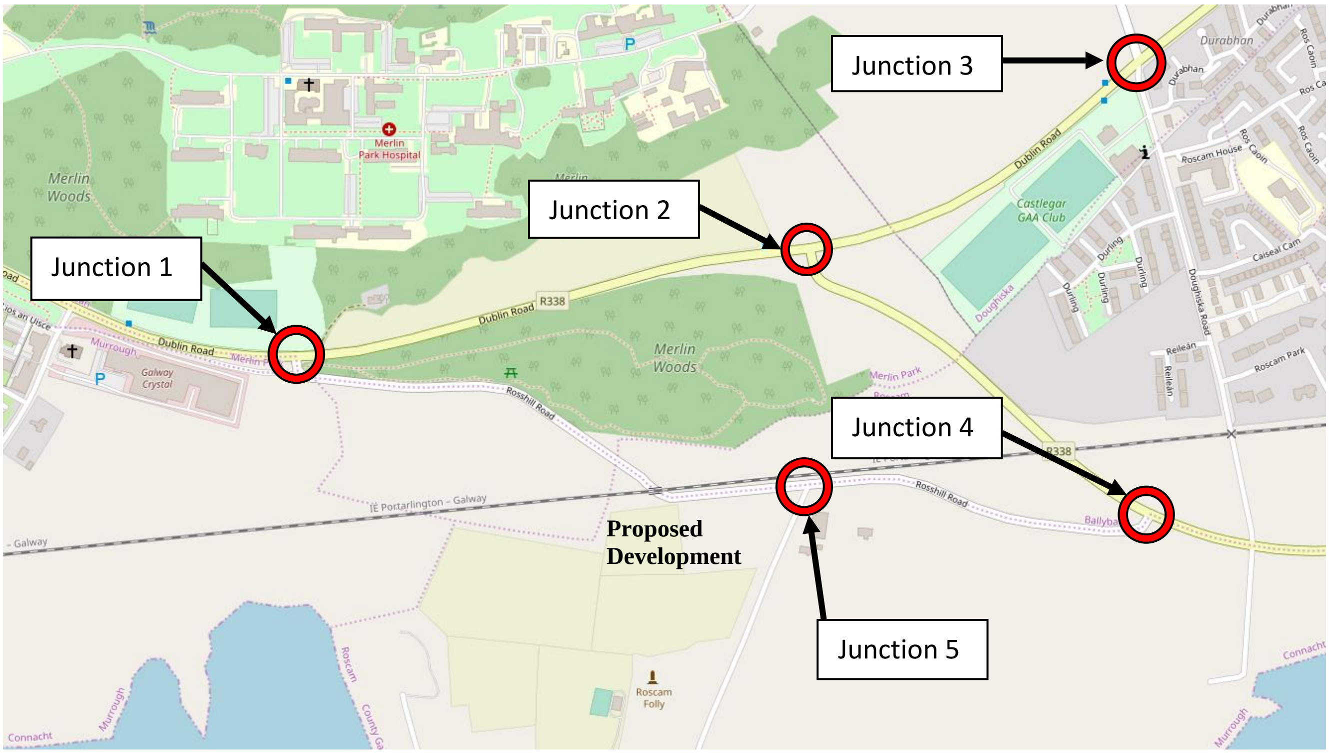


Figure 11.1: Identified Junctions for Analysis **(© OpenStreetMap contributor)**

PICADY Note:

The ratio of flow to capacity (RFC) is an indicator of the likely performance of a junction under design year loading. Due to site to site variation, there may be a standard error of prediction of the entry capacity by the formulae of + or - 15% for any site. Thus, queuing should not occur in the various turning movements in the chosen design year peak hour in 5 out of 6 peak hour periods or sites if a maximum RFC of about 85% is used.

LinSig Analysis Note:

The Degree of Saturation (DOS) is defined as the ratio of demand flow to the maximum flow which can be passed through the intersection from a particular approach.

Practical Capacity is the level of capacity above which the junction is assumed to work inefficiently (90% saturated).

Practical Reserve Capacity (PRC) is the amount by which traffic demand can grow before Practical Capacity is reached.

11.2.1 Junction between Old Dublin Road R338-Rosshill Rd. (Junction 1)

This Junction is the first junction accessing the development that is encountered by traffic travelling from Galway City Centre along the R338 (in an easterly direction) and takes the form of a priority-controlled T-Junction. The main road through the junction is the R338 which runs in an east-west direction linking Galway City Centre to the N67.

There is a right turn lane on the eastbound carriageway of the R338 which provides a safe dwell area for right turners into Rosshill Rd. from the R338. There is a bus lane on the westbound carriageway of the R338 from which a dedicated left turn lane onto the Rosshill Rd. is developed 40m from the junction. There is one exit lane from the Rosshill Rd.

Figure 11.2: Existing Junction (Looking Eastward)

The results of the PICADY analysis for the junction have been summarised in the tables overleaf and are reproduced in full in **Appendix E1**.

Approach Arm/Turning Movement	RFC (%)	Delay (s)	Max. Queue (PCU)
	Without Dev.	Without Dev.	Without Dev.
Rosshill Road	90.1	63	6.9
Old Dublin Road West	5.1	9	0.1

Table 11.1: 2019 AM Peak Period – Junction between Old Dublin Road R338-Rosshill Rd

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road	101.9	122.3	136	402	17.5	59.3
Old Dublin Road West	5.9	11.7	9	10	0.1	0.2

Table 11.2: 2024 AM Peak Period – Junction between Old Dublin Road R338-Rosshill Rd

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road	116.0	137.3	289	714	42.4	96.9
Old Dublin Road West	6.7	12.8	10	11	0.1	0.2

Table 11.3: 2029 AM Peak Period – Junction between Old Dublin Road R338-Rosshill Rd

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road	137.7	161.4	596	1262	88.3	152.7
Old Dublin Road West	8.1	14.6	11	10	0.1	0.2

Table 11.4: 2039 AM Peak Period – Junction between Old Dublin Road R338-Rosshill Rd

Approach Arm/Turning Movement	RFC (%)	Delay (s)	Max. Queue (PCU)
	Without Dev.	Without Dev.	Without Dev.
Rosshill Road	10.4	10	0.1
Old Dublin Road West	34.0	14	0.5

Table 11.5: 2019 PM Peak Period – Junction between Old Dublin Road R338-Rosshill Rd

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road	12.2	16.8	11	12	0.1	0.2
Old Dublin Road West	38.5	55.1	15	21	0.6	1.3

Table 11.6: 2024 PM Peak Period – Junction between Old Dublin Road R338-Rosshill Rd

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road	16.7	***	14	937	0.2	26.5
Old Dublin Road West	44.3	61.9	17	25	0.8	1.6

Table 11.7: 2029 PM Peak Period – Junction between Old Dublin Road R338-Rosshill Rd

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road	***	***	655	1456	28.2	36.0
Old Dublin Road West	53.6	72.4	23	39	1.2	3.0

Table 11.8: 2039 PM Peak Period – Junction between Old Dublin Road R338-Rosshill Rd

*** No result given

This analysis demonstrates that the existing priority-controlled junction in its current format is predicted to operate at 161.4% RFC in the AM peak hour in the design year 2039 with a delay of 1262 seconds and queues of approximately 153 vehicles on the Rosshill Road. The junction is predicted to operate at >200% RFC in the PM peak hour with a 1456 second delay and queues of 36 vehicles on the Rosshill Road. Albeit the queue in the PM is smaller than the AM the analysis does not produce results as the delay becomes significant. It is noteworthy that the junction would fail without the development, but the development traffic will mean this failure occurs earlier.

It is noteworthy that we have used an existing housing estate for traffic generation, as per the local authority request, which we understand does not implement a Mobility Management Plan (MMP). A MMP will be operational for this development and hence the traffic results above are a worst case scenario. Also, the number of residential units in the estate counted is smaller than the proposed development and larger developments generate a smaller percentage of traffic. Finally, the Galway Bypass will reduce flows on this and other junctions in the area.

The development access will be off Rosshill Farm Stud Road from where all traffic must use the Rosshill Road/Rosshill Farm Stud Road junction (proposed to be upgraded as part of this development) before splitting to use the Dublin Road/Rosshill Road or R338/Rosshill Road junctions. These latter junctions are at a remove from the development and outside the development planning application redline and improvements are not proposed as part of this application.

11.2.2 Signal-controlled Junction between R338 Dublin Road-R338 Coast Road (Junction 2)

The junction is a signalised T-Junction. This is the second access to the development that is encountered by traffic travelling from Galway City Centre along the R338 (in an easterly direction).

The R338 Approach (Eastbound) is a single lane approach which flares into two lanes on approach to the junction, a straight ahead and right turn lane. The 'Old Dublin Road' Approach (Westbound) is a single lane approach with a dedicated bus lane. A left turn lane is developed from this bus lane approximately 40m from the junction. The R338 Coast Road, to the south of the junction, is a single lane approach flaring into two lanes, a segregated right turn and left turn.

There is a signalised pedestrian crossing on the southern arm of the junction. There are no signalised pedestrian facilities on the eastern or western arms of the junction. There are advanced stop lines for cyclists on all arms of the junction.

Figure 11.3: Existing Junction (Looking Eastward)

The cycle time used during the analysis of this junction is 120 seconds which includes the pedestrian stage which has been set to run every cycle (120s).

The results of the LINSIG analysis for the Signal-controlled Junction between R338 Dublin Road-R338 Coast Road (Junction 2) have been summarised in the tables below and are reproduced in full in **Appendix E2**.

Approach Arm/Turning Movement	Degree of Saturation (%)	Average Delay per Vehicle (s/pcu)	Queue (pcu)
	Without Dev.	Without Dev.	Without Dev.
Dublin Rd East/Left/Ahead	60.0	41.3	10.9
R338 Coast Road Right/Left	60.7	38.5	8.1
Dublin Rd West Ahead/Right	60.9	23.3	6.4

Table 11.9: 2019 AM Peak Period – Signal-controlled Junction between R338 Dublin Road-R338 Coast Rd (Junction 2)

Approach Arm	Degree of Saturation (%)		Average Delay per Vehicle (s/pcu)		Queue (pcu)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Dublin Rd East/Left/Ahead	65.6	67.3	43.2	44.7	12.4	12.6
R338 Coast Road Right/Left	65.9	66.7	39.8	39.4	9.1	9.0
Dublin Rd West Ahead/Right	65.9	64.7	24.2	24.1	7.1	7.1

Table 11.10: 2024 AM Peak Period – Signal-controlled Junction between R338 Dublin Road-R338 Coast Road

Approach Arm	Degree of Saturation (%)		Average Delay per Vehicle (s/pcu)		Queue (pcu)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Dublin Rd East/Left/Ahead	71.7	73.6	45.8	47.6.	14.0	14.3
R338 Coast Road Right/Left	71.7	72.4	41.6	41.2	10.3	10.2
Dublin Rd West Ahead/Right	71.5	69.9	25.4	25.2	8.0	8.0

Table 11.11: 2029 AM Peak Period – Signal-controlled Junction between R338 Dublin Road-R338 Coast Road

Approach Arm	Degree of Saturation (%)		Average Delay per Vehicle (s/pcu)		Queue (pcu)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Dublin Rd East/Left/Ahead	80.6	80.6	51.5	51.5	17.0	17.0
R338 Coast Road Right/Left	76.9	81.6	45.2	46.7	13.0	13.3
Dublin Rd West Ahead/Right	79.0	79.0	27.9	27.9	9.5	9.5

Table 11.12: 2039 AM Peak Period – Signal-controlled Junction between R338 Dublin Road-R338 Coast Road

Approach Arm/Turning Movement	Degree of Saturation (%)	Average Delay per Vehicle (s/pcu)	Queue (pcu)
	Without Dev.	Without Dev.	Without Dev.
Dublin Rd East/Left/Ahead	80.7	41.8	21.2
R338 Coast Road Right/Left	37.0	39.9	5.1
Dublin Rd West Ahead/Right	81.6	24.1	11.2

Table 11.13: 2019 PM Peak Period – Signal-controlled Junction between R338 Dublin Road-R338 Coast Rd (Junction 2)

Approach Arm	Degree of Saturation (%)		Average Delay per Vehicle (s/pcu)		Queue (pcu)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Dublin Rd East/Left/Ahead	87.9	89.0	49.2	50.6	25.3	26.0
R338 Coast Road Right/Left	40.2	40.2	40.5	40.5	5.6	5.6
Dublin Rd West Ahead/Right	89.0	89.0	29.8	29.8	13.8	13.8

Table 11.14: 2024 PM Peak Period – Signal-controlled Junction between R338 Dublin Road-R338 Coast Road

Approach Arm	Degree of Saturation (%)		Average Delay per Vehicle (s/pcu)		Queue (pcu)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Dublin Rd East/Left/Ahead	95.9	96.9	70.3	75.4	33.1	34.7
R338 Coast Road Right/Left	43.7	43.7	41.2	41.2	6.2	6.2
Dublin Rd West Ahead/Right	96.8	96.8	48.9	48.9	20.9	20.9

Table 11.15: 2029 PM Peak Period – Signal-controlled Junction between R338 Dublin Road-R338 Coast Road

Approach Arm	Degree of Saturation (%)		Average Delay per Vehicle (s/pcu)		Queue (pcu)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Dublin Rd East/Left/Ahead	107.2	108.2	193.5	208.6	67.7	71.9
R338 Coast Road Right/Left	48.5	48.5	42.3	42.3	7.0	7.0
Dublin Rd West Ahead/Right	107.7	107.7	166.9	166.9	62.1	62.1

Table 11.16: 2039 PM Peak Period – Signal-controlled Junction between R338 Dublin Road-R338 Coast Road

The LinSig analysis predicts that by 2039 the junction could be operating at 22.6% PRC (cycle time = 120s) during the morning peak hour and 1.7% PRC (cycle time = 120s) during the evening peak hour. For the purposes of our analysis a full pedestrian stage has been called every cycle. This may not happen in practice which will increase the capacity of the junction.

As the next traffic signals further from the city at Doughiska Road is over capacity, and causes queuing in the morning that is likely suppressing the demand at this junction, this junction may appear to work better than it would if the Duoghiska signals were improved.

11.2.3 Junction between R921 Old Dublin Road-Doughiska Road (Junction 3)

This Junction is a signalised crossroads. This Junction is encountered by traffic travelling from the development to access Oranmore and the Oranmore Business Park and the M6/M18 intersection. The eastbound approach is a single lane which flares into three lanes on approach to the junction, a left turn, straight ahead and right turn lane. The Westbound approach is a single lane carriageway which glares into three lanes on approach to the junction, a left turn, straight ahead and right turn lane.

The northbound approach is a single lane carriageway which flares into two lanes on approach to the junction, a left turn and a straight ahead/right turn lane. The Southbound approach is a single carriageway which flares into two lanes on approach to the junction, a left turn and straight ahead/right turn lane.

There are advanced stop lines for cyclists provided at three arms of the junction, the northern, eastern and western arms.

Signal Controlled pedestrian crossings are provided on the northern, southern and eastern arms of the junction. There are no pedestrian crossing signals on the eastern arm of the junction.

The Old Dublin Road continues eastwards to the ‘Martin Roundabout’ located 190m to the east of the development.

Figure 11.4: Existing Junction (Looking Northwards)

The cycle time used during the analysis of this junction is 120 seconds which includes pedestrians.

The results of the LinSig analysis for the junction have been summarised in the tables overleaf and are reproduced in full in **Appendix E3**.

Approach Arm/Turning Movement	RFC (%)	Delay (s)	Max. Queue (PCU)
	Without Dev.	Without Dev.	Without Dev.
Old Dublin Rd East Left	11.6	22.9	1.1
Old Dublin Rd East Ahead/Right	91.7	59.9	17.7
Doughiska Rd South Right/Left/Ahead	92.0	99.5	13.5
Old Dublin Rd West Ahead/Left	66.0	39.4	8.7
Old Dublin Rd West Right	31.2	67.2	1.8
Doughiska Rd North Left/Ahead/Right	90.0	85.3	7.5

Table 11.17: 2019 AM Peak Period – Junction between R921 Old Dublin Road-Doughiska Road

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Old Dublin Rd East Left	12.8	12.8	23.0	23.0	1.3	1.3
Old Dublin Rd East Ahead/Right	100.0	100.0	103.6	103.6	29.1	29.1
Doughiska Rd South Right/Left/Ahead	100.2	100.2	150.6	150.6	19.4	19.4
Old Dublin Rd West Ahead/Left	72.0	73.0	41.5	42.0	10.4	10.6
Old Dublin Rd West Right	33.7	34.3	67.9	68.1	1.9	2.0
Doughiska Rd North Left/Ahead/Right	98.2	98.2	127.6	127.6	12.0	12.0

Table 11.18: 2024 AM Peak Period – Junction between R921 Old Dublin Road-Doughiska Road

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Old Dublin Rd East Left	13.9	13.9	23.1	23.1	1.4	1.4
Old Dublin Rd East Ahead/Right	108.9	108.9	222.5	222.5	57.1	57.1
Doughiska Rd South Right/Left/Ahead	109.0	109.0	261.0	261.0	31.8	31.8
Old Dublin Rd West Ahead/Left	78.4	79.4	44.9	45.6	12.5	12.8
Old Dublin Rd West Right	36.8	37.4	68.9	69.1	2.1	2.2
Doughiska Rd North Left/Ahead/Right	107.2	107.2	224.7	224.7	22.2	22.2

Table 11.19: 2029 AM Peak Period – Junction between R921 Old Dublin Road-Doughiska Road

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Old Dublin Rd East Left	15.9	15.9	23.3	23.3	1.6	1.6
Old Dublin Rd East Ahead/Right	121.6	121.6	398.6	398.6	104.0	104.0
Doughiska Rd South Right/Left/Ahead	121.2	121.2	427.2	427.2	53.8	53.8
Old Dublin Rd West Ahead/Left	87.9	88.9	54.5	56.2	16.7	17.3
Old Dublin Rd West Right	41.1	41.8	70.4	70.6	2.4	2.5
Doughiska Rd North Left/Ahead/Right	119.9	119.9	389.4	389.4	42.3	42.3

Table 11.20: 2039 AM Peak Period – Junction between R921 Old Dublin Road-Doughiska Road

Approach Arm/Turning Movement	RFC (%)	Delay (s)	Max. Queue (PCU)
	Without Dev.	Without Dev.	Without Dev.
Old Dublin Rd East Left	40.5	23.4	4.7
Old Dublin Rd East Ahead/Right	79.5	48.8	17.4
Doughiska Rd South Right/Left/Ahead	77.4	72.9	6.7
Old Dublin Rd West Ahead/Left	75.2	41.6	16.3
Old Dublin Rd West Right	65.5	84.1	4.3
Doughiska Rd North Left/Ahead/Right	77.7	50.7	10.0

Table 11.21: 2019 PM Peak Period – Junction between R921 Old Dublin Road-Doughiska Road

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Old Dublin Rd East Left	44.0	43.0	24.0	23.2	5.3	5.2
Old Dublin Rd East Ahead/Right	86.6	85.8	55.5	53.7	20.8	20.7
Doughiska Rd South Right/Left/Ahead	84.2	84.3	82.9	83.0	8.1	8.2
Old Dublin Rd West Ahead/Left	81.8	80.0	46.3	44.0	19.0	18.6
Old Dublin Rd West Right	71.1	71.1	89.9	89.9	4.8	4.8
Doughiska Rd North Left/Ahead/Right	84.6	87.4	58.1	63.9	12.2	13.0

Table 11.22: 2024 PM Peak Period – Junction between R921 Old Dublin Road-Doughiska Road

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Old Dublin Rd East Left	48.0	46.8	24.7	23.9	5.8	5.7
Old Dublin Rd East Ahead/Right	94.4	93.4	73.1	68.6	26.9	26.5
Doughiska Rd South Right/Left/Ahead	91.6	91.7	103.3	103.7	10.6	10.7
Old Dublin Rd West Ahead/Left	89.3	87.3	55.8	51.6	22.9	22.1
Old Dublin Rd West Right	77.3	77.3	98.8	98.8	5.6	5.6
Doughiska Rd North Left/Ahead/Right	92.1	95.1	74.2	87.9	16.0	17.8

Table 11.23: 2029 PM Peak Period – Junction between R921 Old Dublin Road-Doughiska Road

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Old Dublin Rd East Left	53.3	52.0	25.8	24.9	6.7	6.6
Old Dublin Rd East Ahead/Right	105.5	104.3	178.0	159.6	53.9	50.7
Doughiska Rd South Right/Left/Ahead	101.5	101.7	170.0	171.3	17.3	17.5
Old Dublin Rd West Ahead/Left	99.6	97.4	100.3	83.0	35.2	31.8
Old Dublin Rd West Right	85.4	85.4	117.4	117.4	6.9	6.9
Doughiska Rd North Left/Ahead/Right	102.6	106.0	148.7	193.7	29.5	36.2

Table 11.24: 2039 PM Peak Period – Junction between R921 Old Dublin Road-Doughiska Road

The LinSig analysis predicts that by 2039 the junction could be operating at -6.5% PRC (cycle time = 120s) during the morning peak hour and 5.0% PRC (cycle time = 120s) during the evening peak hour. For the purposes of our analysis a full pedestrian stage has been called every cycle. This may not happen in practice which will increase the capacity of the junction.

This junction has been modelled with the actual flows currently going through the junction. Any suppressed demand within the morning peak hour has not been added. Furthermore, the analysis results are for the average peak hour and peaks within the peak hour will result in less capacity than depicted.

In any case, the primary focus is to determine the impact of the development traffic on the junction, even though the junction is already operating above acceptable limits. As this is a residential development most of the AM generated traffic will route towards the city and the existing traffic distribution shows likewise. The model shows that the only morning peak hour traffic generated at this junction is 7 trips and these are all heading away from the city against the tidal traffic flow. The model results show that the overall capacity of the junction is not impacted by the development as there is some spare capacity away from the city.

As stated earlier a MMP will be operational for this development and hence the traffic results above are a worst case scenario. The Galway Bypass will also reduce flows at this junction. As per earlier this junction is also at a remove from the development and outside the development planning application redline and improvements are not proposed as part of this application.

11.2.4 Junction between R338 Coast Road-Rosshill Road (Junction 4)

This Junction takes the form of a priority-controlled T-Junction. The main road through the junction is the R338 Coast Road which runs in a northwest-southeast direction linking the Old Dublin road to Oranmore.
The eastbound carriageway of the R338 Coast Road is a single lane with a right turning pocket provided at the junction with the Rosshill Road.

The westbound carriageway of the R338 Coast Road is a single lane. The southern approach to the junction consists of a single exit.

Figure 11.5: Existing Junction (Facing Eastwards)

The results of the PICADY analysis for the junction have been summarised in the tables overleaf and are reproduced in full in **Appendix E4**.

Approach Arm/Turning Movement	RFC (%)	Delay (s)	Max. Queue (PCU)
	Without Dev.	Without Dev.	Without Dev.
Rosshill Road Left	10.0	0	13.2
Rosshill Road Right	0.6	0	10.8
Coast Road R338	0.9	0	9.6

Table 11.25: 2019 AM Peak Period –Junction between R338-Rosshill Rd. (Junction 1)

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road Left	11.4	50.5	14	26	0.1	1.0
Rosshill Road Right	0.7	3.9	11	15	0.0	0.0
Coast Road R338	0.9	0.9	10	10	0.0	0.0

Table 11.26: 2024 AM Peak Period – Junction between Coast Road R338 and Rosshill Road

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road Left	13.5	55.5	16	31	0.2	1.2
Rosshill Road Right	0.7	4.9	12	17	0.0	0.1
Coast Road R338	1.3	1.4	11	11	0.0	0.0

Table 11.27: 2029 AM Peak Period – Junction between Coast Road R338 and Rosshill Road

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road Left	16.6	64.1	09	43	0.2	1.7
Rosshill Road Right	1.1	6.1	13	22	0.0	0.1
Coast Road R338	1.5	1.5	13	13	0.0	0.0

Table 11.28: 2039 AM Peak Period – Junction between Coast Road R338 and Rosshill Road

Approach Arm/Turning Movement	RFC (%)	Delay (s)	Max. Queue (PCU)
	Without Dev.	Without Dev.	Without Dev.
Rosshill Road Left	39.3	14	0.6
Rosshill Road Right	0.3	10	0.0
Coast Road R338	1.1	6	0.0

Table 11.29: 2019 PM Peak Period –Junction between R338-Rosshill Rd. (Junction 1)

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road Left	43.5	57.1	16	22	0.8	1.3
Rosshill Road Right	0.3	0.4	10	12	0.0	0.0
Coast Road R338	1.3	3.1	6	7	0.0	0.0

Table 11.30: 2024 PM Peak Period – Junction between Coast Road R338 and Rosshill Road

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road Left	48.6	62.5	18	26	0.6	1.6
Rosshill Road Right	0.3	0.4	10	13	0.0	0.0
Coast Road R338	1.3	3.4	6	7	0.0	0.0

Table 11.31: 2029 PM Peak Period – Junction between Coast Road R338 and Rosshill Road

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Road Left	55.8	70.8	22	34	1.2	2.3
Rosshill Road Right	0.4	1.0	12	17	0.0	0.0
Coast Road R338	1.6	3.4	7	7	0.0	0.0

Table 11.32: 2039 PM Peak Period – Junction between Coast Road R338 and Rosshill Road

This analysis demonstrates that the existing priority-controlled junction in its current format is predicted to operate at 64.1% RFC in the AM peak hour in the design year 2039 with a delay of 43 seconds and queues no greater than 2 vehicles occurring on the Rosshill Road. The junction is predicted to operate at 70.8% RFC in the PM peak hour with a 34 second delay and minimal queuing on the Rosshill Road in 2039 with the proposed development operational.

11.2.5 Development Junction (Junction between Rosshill Rd.-Rosshill Farm Stud Junction (Junction 5))

This is the main access road to the development. The existing junction is a priority-controlled T-Junction. The main road through the junction is the Rosshill Road which runs in a northwest-southeast direction and links the R338 old Dublin Road with the R338 Coast Road.

There are no pedestrian facilities provided at the junction.

As part of the proposed development this junction is to be realigned and pedestrian/cycling facilities are to be provided. The revised layout is shown on the drawings accompanying this application.

Figure 11.6: Existing Access Junction to Development (Facing Eastwards)

The results of the PICADY analysis for the junction have been summarised in the tables overleaf and are reproduced in full in **Appendix E5**.

Approach Arm/Turning Movement	RFC (%)	Delay (s)	Max. Queue (PCU)
	Without Dev.	Without Dev.	Without Dev.
Rosshill Farm Stud Road	7.8	10	0.1
Rosshill Road	1.9	8	0.0

Table 11.33: 2019 AM Peak Period – Development Junction (Junction between Rosshill Rd.-Rosshill Farm Stud Junction

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Farm Stud Road	8.6	62.9	10	25	0.1	1.6
Rosshill Road	2.2	7.8	8	9	0.0	0.1

Table 11.34: 2024 AM Peak Period – Development Junction (Junction between Rosshill Rd.-Rosshill Farm Stud Junction

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Farm Stud Road	9.7	65.7	10	28	0.1	1.8
Rosshill Road	2.3	8.3	8	9	0.0	0.1

Table 11.35: 2029 AM Peak Period – Development Junction (Junction between Rosshill Rd.-Rosshill Farm Stud Junction

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Farm Stud Road	11.3	69.9	11	33	0.1	2.2
Rosshill Road	2.6	8.9	9	10	0.0	0.1

Table 11.36: 2039 AM Peak Period – Development Junction (Junction between Rosshill Rd.-Rosshill Farm Stud Junction

Approach Arm/Turning Movement	RFC (%)	Delay (s)	Max. Queue (PCU)
	Without Dev.	Without Dev.	Without Dev.
Rosshill Farm Stud Road	6.8	8	0.1
Rosshill Road	3.4	7	0.0

Table 11.37: 2019 PM Peak Period – Development Junction (Junction between Rosshill Rd.-Rosshill Farm Stud Junction

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Farm Stud Road	7.5	22.1	8	9	0.1	0.2
Rosshill Road	3.6	16.1	7	8	0.0	0.1

Table 11.38: 2024 PM Peak Period – Development Junction (Junction between Rosshill Rd.-Rosshill Farm Stud Junction

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Farm Stud Road	8.1	23.0	8	11	0.1	0.3
Rosshill Road	4.0	16.4	7	8	0.0	0.2

Table 11.39: 2029 PM Peak Period – Development Junction (Junction between Rosshill Rd.-Rosshill Farm Stud Junction

Approach Arm/Turning Movement	RFC (%)		Delay (s)		Max. Queue (PCU)	
	Without Dev.	With Dev.	Without Dev.	With Dev.	Without Dev.	With Dev.
Rosshill Farm Stud Road	9.1	24.3	8	11	0.1	0.3
Rosshill Road	4.4	17.1	7	8	0.0	0.2

Table 11.40: 2039 PM Peak Period – Development Junction (Junction between Rosshill Rd.-Rosshill Farm Stud Junction

This analysis demonstrates that the proposed realigned priority-controlled T-junction is predicted to operate at 69.9% RFC in the AM peak hour in the design year 2039 with a delay of 33 seconds and queues no greater than 3 vehicles. The junction is predicted to operate at 24.3% RFC in the PM peak hour with minimal queuing and delays on all arms in 2039 with the proposed development operational.

11.3 Analysis Summary

- Junction 1: R338 Dublin Rd.-Rosshill Rd. Junction

This junction will fail where traffic from the minor arm (Rosshill Road) will find it very difficult to join the Dublin Road. The junction is predicted to fail without the development but will fail earlier due to it.

- Junction 2: R338 Dublin Road-R338 Coast Road Junction

This signalised junction is predicted to operate satisfactorily in the design year with the development operational.

- Junction 3: R921 Old Dublin Road-Doughiska Road

This junction currently experiences congestion in the morning. The analysis is based on the observed flows through the junction ion the morning peak hour and thus does not represent peak traffic within that hour and any suppressed demand. Even though the junction will fail our analysis shows that the 7 vehicles arriving in the AM peak hour will not decrease it further as they are opposing the predominant flow.

- Junction 4: R338 Coast Road-Rosshill Road Junction

This junction will operate satisfactorily in the design year with the development operational.

- Junction 5: Rosshill Road-Rosshill Farm Stud Junction

This junction will operate satisfactorily in the design year with the development operational.

The proposed Galway Bypass will ultimately reduce traffic flow at these junctions. The development is being phased and this will allow some additional time towards implementation of the bypass.

12 Road Safety

The only change to the network proposed is the provision of a realigned junction between the Rosshill Road and Rosshill Stud Farm Road. An element of the existing road will thus become redundant. This realignment has been agreed with Galway City Council.

Two major elements of road safety are visibility and provision for all users. The design team have ensured adequate sightlines are achieved and pedestrian and vulnerable users are adequately catered for.

A Road Safety Audit was carried out by CST Group Chartered Consulting Engineers as part of this planning application. Recommendations made as part of this Road Safety Audit have been included within the design submitted with this application.

13 Parking

13.1 Car Parking

Car parking serving the subject development is provided in front of the residential dwelling units and in the immediate vicinity of the apartment blocks.

The Galway City Development Plan outlines that the car parking provision for houses is 2. The Design Standards for New Apartments, published by the Department of Housing, Planning and Local Government is 1 space per apartment plus 1 visitor space per 4 apartments. For commercial development, the Galway City Development Plan requires 1 space per $15m^2$. For Childcare/Creche facilities, the Galway City Development Plan requires 1 space every $20m^2$.

It is proposed that each house is provided with 2 no. on curtilage car parking spaces at the front of the property. For the apartments, 1 space per apartment plus 1 visitor space per 4 apartments has been provided. 6 no. Spaces are being provided for the Crèche. The Galway City Development Plan requires 14 no. spaces for a premises of this size, however as there are apartment spaces adjacent that will be vacant during the day during normal business hours, i.e. similar hours to creche operation, the provision of spaces has been reduced from 14 to 6 by the developer. The shared spaces are adjacent the apartments and crèche. 23 no. spaces are being provided for the commercial premises. The Galway City Development Plan requires 23 no. spaces for a development of this size.

Type of Development	Car Parking Standard	GFA (m^2) of Dev. / No. of Res. Units within Dev.	Parking Required	Provision
Houses	2 spaces per unit	185 units	370	370
Apartments	1 space per unit plus 1 visitor space per 4 units	157 units	189	198
Office	1 space per $25m^2$	$90.9m^2$	3.63	2
Commercial Retail	1 space per $15m^2$	$185.1m^2$	12.34	6
Crèche	1 space per $20m^2$	$399m^2$	14.41	16
Café Space	1 space per $15m^2$	$67.8m^2$	4.52	2
Community Café Space	1 space per $15m^2$	$30m^2$	1	1
TOTAL			**595**	**595**

Table 13.1: Galway City Car Parking Standards for Residential/Commercial Development

The parking proposal for the proposed development meets the requirements of the Galway City Development Plan where relevant, and the Design Standards for New Apartments (March 2018) where relevant. It is noted that a percentage of these spaces will be allocated for wheelchair accessible use in accordance with the Development Plan.

A GoCar scheme and Galway Coke bike share scheme are proposed, and this should reduce the standard requirement for parking provision in any case.

13.2 Bicycle Parking

It is proposed that bicycle spaces are provided to the apartment and commercial blocks with houses storing in rear gardens. The Design Standards for New Apartments (March 2018) sets out the following Cycle Parking Standards:

Type of Development	Bicycle Parking Standard	GFA (m^2) of Dev / No. of Res. Units within Dev	Parking Standard	Provision
Apartments	1 cycle storage space per bedroom and 1 space per 2 residential units	157 units	355	361
Commercial	1 cycle stand (5 spaces) per 20 carpark spaces		7.25	10
Houses		185 units		370
TOTAL			**362.25**	**741**

Table 13.2: Bicycle Parking Standards

The Design Standards for New Apartments (March 2018) requires that 386 no. spaces be provided for cyclists as shown in Table 13.2 above. It is proposed that 398 no. spaces shall be provided. Bike parking shall be of a type that complies with the standard dictated in Section 4.17 of the Design Standards for New Apartments (March 2018). Cycle parking facilities are illustrated on the architect's site plans, submitted with this application.

A possible Bike Share location, as part of the Galway bike share scheme is shown adjacent to the commercial development at the entrance to the site and would consist of approximately 10 no. spaces. The location is shown on the drawings accompanying this application.

14 Mobility Management

To ensure future transport sustainability and to endeavour to make new developments as accessible as possible to travel by other modes of transport, an assessment has been made of the proposed and existing pedestrian, cyclist and public transport facilities.

14.1 Public Transport-Bus

Bus transport forms an important means of transport within the Galway region. The closest operating bus stop to the development is the Rosshill Cross Bus Stop, at the R338 Coast Rd/Rosshill Rd junction, which is served by the 434 bus route between the City Centre and Gort on weekdays by a morning bus to the city and an evening bus out. The next nearest bus stop is the Dublin Road Coast Road Bus Stop which is serviced by the 404 and 409 bus routes which service the City Centre (Newcastle-Eyre Square-Oranmore & Eyre Square-GMIT-Parkmore respectively). The 404 is a half hourly service. The 409 service runs every 10 minutes Monday to Saturday and quarter hourly on a Sunday. This stop is a 1.2km walk from the proposed development and as discussed above, the route is not serviced with footways. There is another stop located 1.3km to the west of the development, on the R338 Dublin Road, which is also serviced by the 404 and 409 routes. The footway from the proposed development to this bus stop, along the northern side of the Rosshill Road is unbound and sections are missing at present. The existing bus network in the Galway area is shown in Figure 14.1. Preliminary discussions have been held by the applicant with local Bus Operators to ascertain the feasibility of the commencement of an active route servicing the development via the bus stop on the Rosshill Road, which is immediately outside the development.

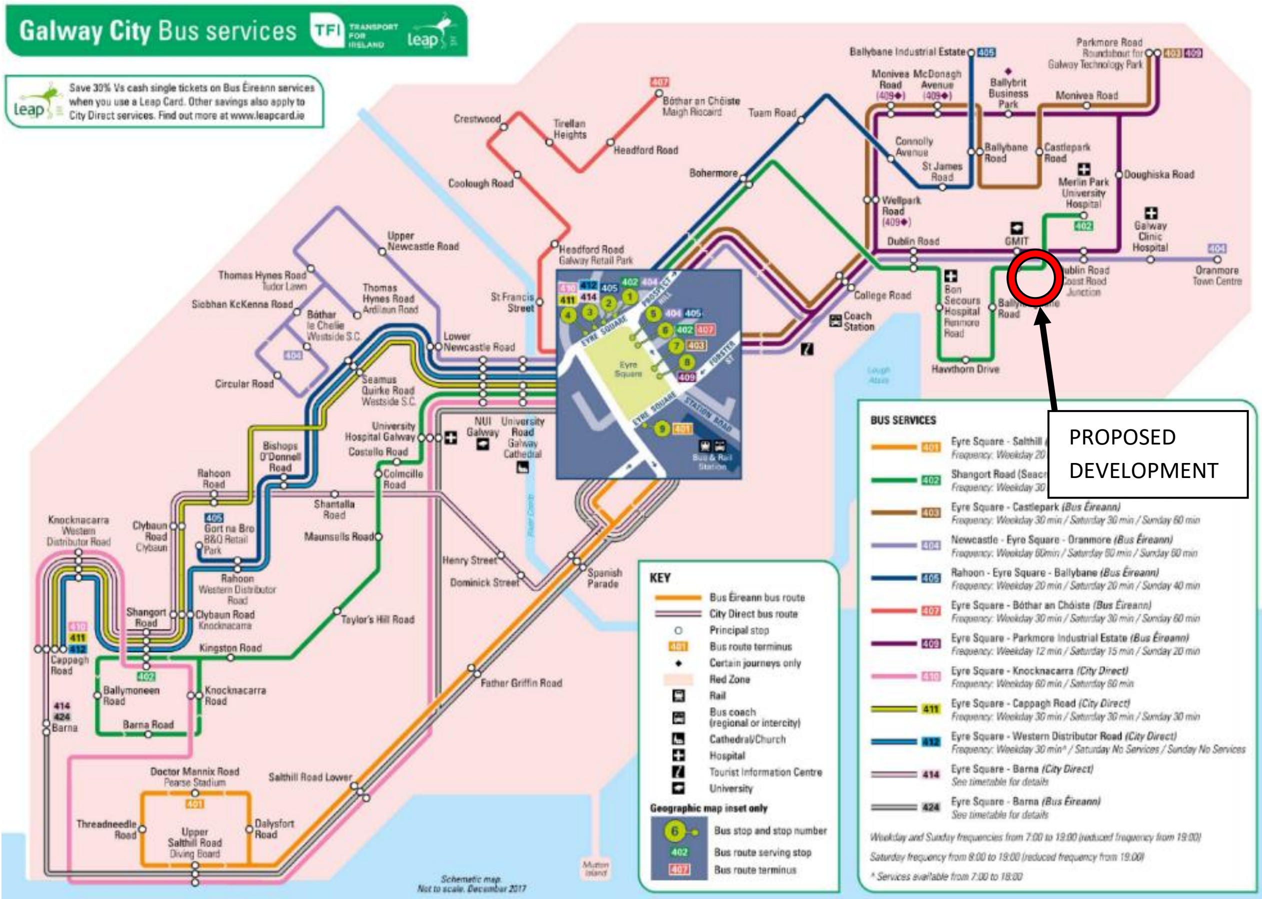


Figure 14.1: Galway City Bus Services ©TFI Transport for Ireland

14.2 Public Transport-Train

Oranmore Train station on the Galway-Dublin line is 2.8km away from the site and is accessed via the R338 Coast Road and there are regular train services between Galway and Dublin, as follows:

		Mon to Sat	Mon to Sat	Mon to Sat	Not on Fri	Fri Only	Fri Only	Mon to Sat	Mon to Sat	Mon to Sat	Mon to Sat	Mon to Sat	Mon to Sat	Mon to Sat	Mon to Sat	Mon to Sat	Mon to Sat	Not on Fri	Fri Only	Mon to Sat	Mon to Sat	Mon to Sat	Mon to Sat	Mon to Sat	Mon to Sat
DUBLIN Heuston B L A	Dep	....	....	....	07.35	07.35	....	....	09.25	11.25	12.45	13.25	....	....	14.45	15.35	16.30	17.10	17.10	17.30	....	18.15	18.30	....	19.35
Hazelhatch & Celbridge	Dep	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .
Sallins & Naas	Dep	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	17.47	....	....	....	....	....
Newbridge	Dep	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	16.51	17.31	17.31	17.55	. .	. .	. .	. .	. .
Kildare	Dep	....	....	....	08.00	08.00	....	....	....	....	....	....	....	....	....	....	16.58	17.38	17.38	....	....	....	....	....	....
Monasterevin	Dep	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	. .	17.45	17.45	. .	. .	. .	19.04	. .	. .
Portarlington	Dep	....	....	....	08.14	08.14	....	....	10.01	12.00	13.21	14.02	....	....	15.22	16.13	....	17.55	17.55	18.12	....	....	19.13	....	20.09
Tullamore	Dep	. .	. .	. .	08.31	08.31	. .	. .	10.18	12.17	13.38	14.19	. .	. .	15.41	16.31	17.26	18.12	18.12	18.29	. .	19.07	. .	. .	20.31
Clara	Dep	....	....	....	08.40	08.40	....	....	10.26	....	13.46	....	....	....	15.49	16.41	....	18.22	18.22	18.40	....	....	19.37	....	....
ATHLONE	Arr	. .	. .	. .	08.59	08.59	. .	. .	10.49	12.41	14.03	14.41	. .	. .	16.05	16.58	17.49	18.45	18.45	18.58	. .	19.29	19.52	. .	21.02
ATHLONE	Dep	From Limerick	07.30	....	09.05	To Westport	09.05	From Limerick	10.50	12.41	14.04	14.42	From Limerick	....	16.05	16.59	17.49	....	18.48	18.58	From Limerick	19.29	19.52	From Limerick	21.02
Ballinasloe	Dep		07.44	. .	09.20		09.20		11.05	12.58	To Westport	14.57		. .	To Westport	17.14	18.08	. .	To Westport	19.14		To Westport	20.08		21.18
Woodlawn	Dep		07.56	....	09.30		09.30		....	13.08		15.07		....		17.24	18.18	....		....			....		21.28
Attymon	Dep		08.08	. .	09.37		09.37		. .	. .		. .		. .		. .	. .	. .		. .			. .		. .
Athenry	Dep	07.48	08.17	09.05	09.48	....	09.48	10.54	11.27	13.22		15.21	15.54	16.55		17.38	18.32	....		19.36	20.07		20.29	21.23	21.41
Oranmore	Dep	08.00	08.28	09.16	09.59	. .	09.59	11.05	11.39	13.34	. .	. .	16.05	17.05	. .	. .	. .	. .	. .	19.49	20.18	. .	20.42	21.34	21.52
GALWAY Ceannt	Arr	08.10	08.35	09.25	10.08	....	10.08	11.14	11.48	13.43	....	15.40	16.14	17.15	....	17.58	18.50	....	....	19.57	20.28	....	20.50	21.45	22.00

Figure 14.2: Galway City Train Services © Iarnród Éireann

Tentative discussions have been held on locating a new rail stop outside the development at the location shown on the Drawings accompanying this application. At present there is no agreement in place.

14.3 Pedestrians

As the potential for pedestrian trips to and from the development is moderate it is important that the development is properly integrated into the existing footpath network as discussed in Chapter 9. As stated earlier there is a footway along the majority of the Northern Side of the Rosshill Road. However, there is no footway on Rosshill Farm Stud Road. The design includes the provision of a continuous footway that will link the Rosshill Road to the proposed site access road by inclusion of a footway in the realigned section of Rosshill Farm Stud Road. Pedestrians can then cross this Rosshill Road to use the existing Pedestrian Footway along the Northern Boundary of the Rosshill Road. As noted previously, sections of this footway are in a state of disrepair and some key linkages are missing. Improving this pedestrian footway is proposed as part of the development. This would provide access to the existing pedestrian facilities provided on the R338 Dublin Road which link to the City Centre and the Roscam/Doughiska residential areas.

As part of the proposed development, drop kerbs and tactile paving will be provided at points where the internal footpath joins the public network. Crossing points to the internal site footways and pedestrian crossing points are proposed.

The roads layout has been designed to DMURS, which has a strong focus on pedestrian safety. Signage throughout will be in accordance with the Traffic Signs Manual. Overall the Galway City Council development plan objectives have been adhered to and the Galway Transport Strategy referred to for roads – see the road drawings by Tobin Consulting Engineers as part of the application.

A network of footpaths throughout the proposed development will provide easy access to the commercial near the entrance and onwards to local facilities beyond the development via the proposed new path along Rosshill Road and the exiting public paths to be upgraded. The inclusion of these paths will encourage pedestrians to access the local facilities on foot as opposed to taking their personal vehicles.

The development is adjacent an old bus stop which is located on Rosshill Road. As stated earlier the developer is working with the local bus provider to get this reinstated. Irrespective, there are regular bus services that are accessible within the wider area.

It is proposed to provide a network of footpaths that will permeate through the residential area and provide a high degree of accessibility to the local facilities including bus transport.

14.4 Cycling

Cycling is to be encouraged as part of the development. The city centre has cycle lanes and designated routes for the use of cyclists in line with DMURS. Galway City Council propose that these will be extended to include combined bus/cycle lanes on the R338 Dublin Rd which is very close to the proposed development. Cyclists travelling along the Rosshill Road will share the carriageway with vehicular traffic to the intersection of the R338 Dublin Road, where a bus lane is available for cyclists travelling to the City Centre or the R338 Coast Road, where a hard shoulder is provided in both directions. Within the development cyclists share the carriageway with vehicles and this is in line with the National Cycle Manual.

Oranmore rail station is approximately 2.8km from the site. It is likely that a number of commuters to Galway City will use a combination of rail and cycling as a means of travelling. Cycling enthusiasts and regular cyclists will likely cycle rather than use vehicle transport.

The development will provide bike parking to the relevant standards as outlined in Section 13.2. A possible Bike Share location, as part of the Galway bikeshare scheme is shown adjacent to the commercial development at the entrance to the site and would consist of approximately 10 no. spaces. The location is shown on the drawings accompanying this application (see O'Neill O'Malley Part 02 Site Layout Plan for possible location).

15 Access for People with Disabilities

Parking facilities for disabled users is provided in line with the Galway City Development Plan. Disabled friendly accesses to the proposed development are designed to the Technical Guidance Document M of the Building Regulations.

16 Mitigation

16.1 As stated earlier the existing T-junction of Rosshill Farm Stud Road and Rosshill Road is not ideal for the proposed increased in usage. It is proposed to realign this junction.

16.2 Further to the above it is proposed to widen Rosshill Farm Stud Road from the realigned junction to the proposed development access.

16.3 A 2m wide footpath is proposed to connect from the proposed access to the footpath being constructed as part of the planning reference 16/228 on Rosshill Road.

16.4 The existing footpaths on Rosshill Road are in poor condition. It is proposed to repair these as part of the development.

16.5 See Figure 16.1 “Proposed Pedestrian, Cycle & Public Transport Linkage” which shows all of the mitigation measures.

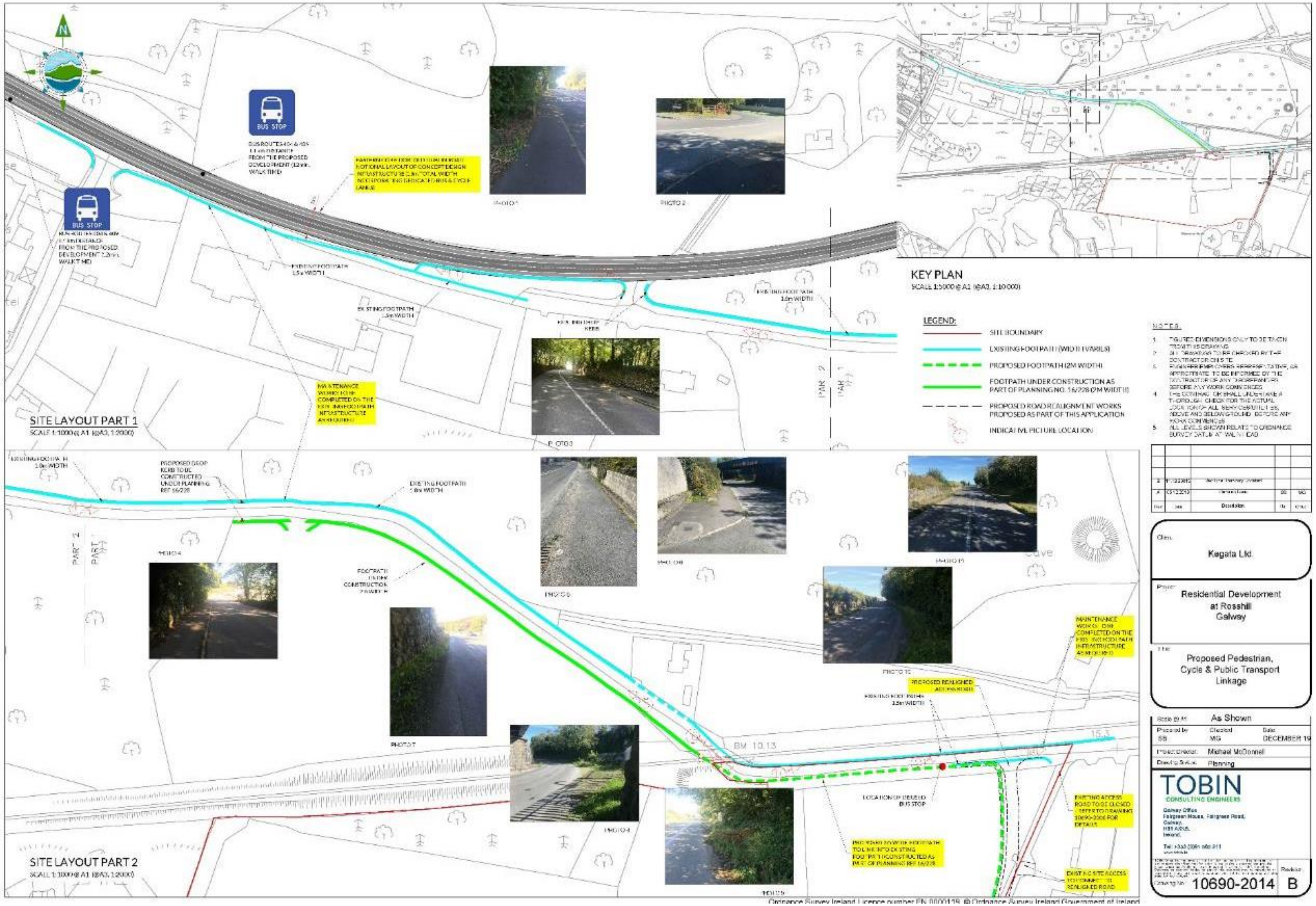


Figure 16.1: Proposed Pedestrian, Cycle & Public Transport Linkage

17 Summary and Conclusion

Planning permission is being sought for a residential development consisting of 342 no. units comprising 185 no. houses and 157 no. apartments, including a ground-floor community space, office, cafe and retail unit.

Manual classified traffic counts were carried out at the following junctions:

- Junction 1: R338 Dublin Rd.-Rosshill Rd. Junction
- Junction 2: R338 Dublin Road-R338 Coast Road Junction
- Junction 3: R921 Old Dublin Road-Doughiska Road
- Junction 4: R338 Coast Road-Rosshill Road Junction
- Junction 5: Rosshill Road-Rosshill Farm Stud Junction

The survey found that the peak hour traffic flow occurred between 7.30 and 9.15 in the AM and between 4.45 and 6.15 in the PM.

In order to estimate the likely volumes of traffic that will be generated by the proposed development, Galway City Council indicated that trip rates recommended by TRICS (Trip Rate Computer Information System) were not acceptable for the proposed development. Therefore, a traffic count was undertaken at a similar development (An Réileán Development) to calculate the turn-in rates at the proposed development. The similar development consists of 82 housing units and 2 apartment blocks (24 apartments). These figures were applied pro-rata to the relevant number of housing and apartment units within the proposed development.

The traffic generated by nearby permitted development was added to the existing flows as well as traffic growth figures for the opening year of 2024 as well as 2029 and 2039.

Some junctions will be above capacity before the design year. These junctions are predicted to be above capacity in any case without the development, but one will occur earlier. Whilst the Dublin Road/Doughika Road traffic signals is over capacity in the AM only 7 trips are added to it from the development and those are all away from the city. As they are going against the traffic entering the city they do not decrease the capacity. The Dublin Road/Rosshill Road priority junction will be above capacity earlier due to the development.

The proposed Galway Bypass will ultimately reduce traffic flow at these junctions. The development is being phased and this will allow some additional time towards implementation of the bypass.

Mitigation measures in relation to roads and footpaths are proposed including realignment of the Rosshill Farm Stud Road junction with Rosshill Road and footpath provision and repair on Rosshill Road.

APPENDIX A

Traffic Survey Results

SUMMARY SHEET

PROJECT TITLE Roshill Housing Development

DATE OF SURVEY 14/5/19 WEATHER Dry

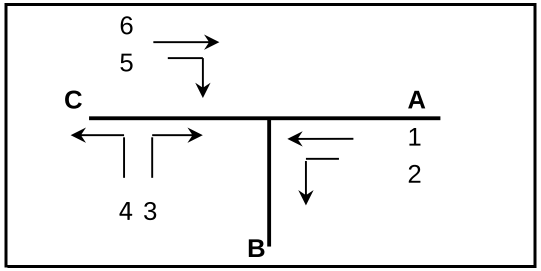
JUNCTION REF/LOCATION 1 - Roshill Rd

NAME S Fahy CHECKED BY MG

A:

B:

C:



Priority junction [3P]

	1		2		3		4		5		6		
TIME	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	**Totals**
7.30-7.45	0	0	1	0	3	0	4	0	0	0	0	0	**8**
7.45-8.00	0	0	5	0	4	0	3	0	0	0	0	0	**12**
8.00-8.15	0	0	3	0	3	0	4	0	1	0	0	0	**11**
8.15-8.30	0	0	5	0	6	0	2	0	2	0	0	0	**15**
8.30-8.45	0	0	0	0	3	0	5	0	1	0	0	0	**9**
8.45-9.00	0	0	4	0	4	0	2	0	4	0	0	0	**14**
9.00-9.15	0	0	1	0	0	0	0	0	0	0	0	0	**1**
9.15-9.30	0	0	3	0	1	0	0	0	1	0	0	0	**5**
TOTALS	**0**	**0**	**22**	**0**	**24**	**0**	**20**	**0**	**9**	**0**	**0**	**0**	**75**

	1		2		3		4		5		6		
TIME	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	**Totals**
16.30-16.45	0	0	4	0	5	0	2	0	3	0	0	0	**14**
16.45-17.00	0	0	1	0	2	0	2	0	3	0	0	0	**8**
17.00-17.15	0	0	5	0	3	0	1	0	6	0	0	0	**15**
17.15-17.30	0	0	4	0	6	0	3	0	3	0	0	0	**16**
17.30-17.45	0	0	9	0	9	0	2	0	5	0	0	0	**25**
17.45-18.00	0	0	6	0	4	0	1	0	3	0	0	0	**14**
18.00-18.15	0	0	0	0	0	0	2	0	3	0	0	0	**5**
18.15-18.30	0	0	2	0	0	0	1	0	2	0	0	0	**5**
TOTALS	**0**	**0**	**31**	**0**	**29**	**0**	**14**	**0**	**28**	**0**	**0**	**0**	**102**

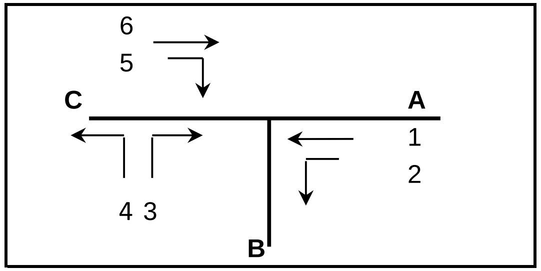
SUMMARY SHEET

PROJECT TITLE Roshill Housing Development A:

DATE OF SURVEY 29/5/19 WEATHER Wet B:

JUNCTION REF/LOCATION 2 - Réileán Estate C:

NAME S Fahy CHECKED BY MG



Priority junction [3P]

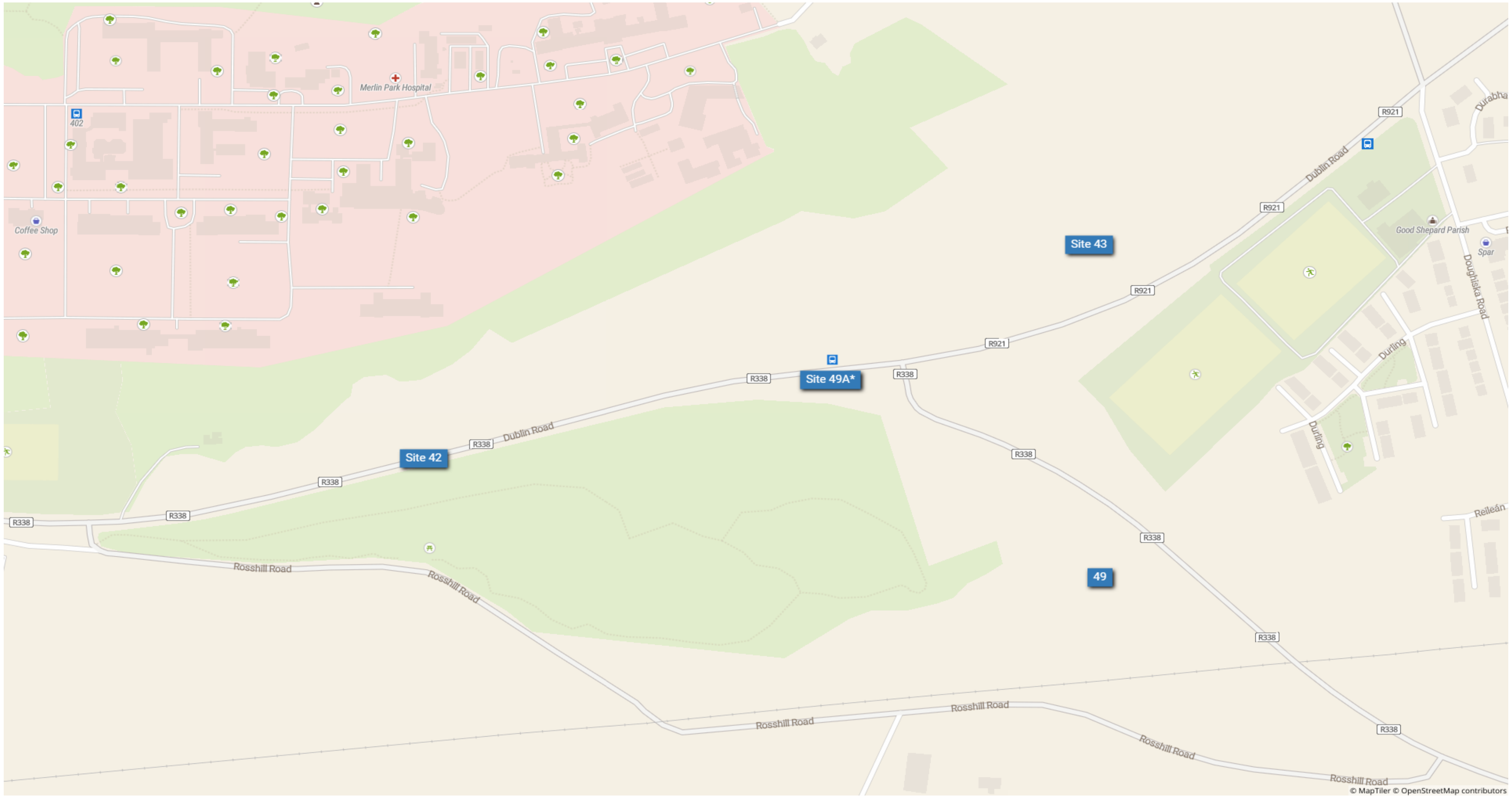
	1		2		3		4		5		6		
TIME	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	**Totals**
7.30-7.45	0	0	0	0	6	0	7	0	4	0	0	0	**17**
7.45-8.00	0	0	0	0	3	0	9	0	3	0	0	0	**15**
8.00-8.15	0	0	0	0	2	0	8	0	6	0	0	0	**16**
8.15-8.30	0	0	0	0	11	0	9	0	4	0	0	0	**24**
8.30-8.45	0	0	1	0	8	0	6	0	2	0	0	0	**17**
8.45-9.00	0	0	0	0	1	0	5	0	1	0	0	0	**7**
9.00-9.15	0	0	1	0	1	0	4	0	7	0	0	0	**13**
9.15-9.30	0	0	0	0	4	0	5	0	3	0	0	0	**12**
TOTALS	**0**	**0**	**2**	**0**	**36**	**0**	**53**	**0**	**30**	**0**	**0**	**0**	**121**

	1		2		3		4		5		6		
TIME	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	Cars	HGV	**Totals**
16.30-16.45	0	0	0	0	0	0	5	0	7	0	0	0	**12**
16.45-17.00	0	0	3	0	2	0	5	0	3	0	0	0	**13**
17.00-17.15	0	0	0	0	0	0	5	0	4	0	0	0	**9**
17.15-17.30	0	0	2	0	2	0	3	0	9	0	0	0	**16**
17.30-17.45	0	0	3	0	2	0	2	0	6	0	0	0	**13**
17.45-18.00	0	0	3	0	1	0	3	0	9	0	0	0	**16**
18.00-18.15	0	0	1	0	1	0	2	0	9	0	0	0	**13**
18.15-18.30	0	0	2	0	0	0	2	0	7	0	0	0	**11**
TOTALS	**0**	**0**	**14**	**0**	**8**	**0**	**27**	**0**	**54**	**0**	**0**	**0**	**103**

IDASO

Survey Name: Dublin Road, Galway Survey 2018 MCC Data

Date: 15 Nov 2018



IDASO

Survey Name:	Dublin Road, Galway Survey 2018 MCC Data
Site:	Site 42
Location:	Old Dublin Rd / Coast Rd
Date:	15-Nov-2018

	A => A										A => B										A => C									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	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
00:15	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	0
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00:45	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	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	0	0
01:00	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
01:15	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	0
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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	0	0
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02:45	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	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	0	0
03:00	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
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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	0	0
04:00	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
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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	0	0
06:00	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
06:15	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	0
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07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	18	2	0	0	0	0	0	20	20
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	53	6	0	2	0	2	0	63	63
07:30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	2	2	0	95	13	0	0	0	0	1	109	109
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	88	5	0	0	0	0	1	94	94
H/TOT	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	3	3	0	254	26	0	2	0	2	2	286	286
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	86	6	0	2	0	1	0	95	95
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	87	3	0	0	0	0	0	90	90
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	75	4	0	0	0	2	1	82	82
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	69	6	0	2	0	1	0	78	78
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	317	19	0	4	0	4	1	345	345
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	55	3	0	0	0	1	0	59	59
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	47	3	0	1	0	0	0	51	51
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	45	1	0	0	0	0	0	46	46
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	4	0	1	0	1	0	26	26
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	167	11	0	2	0	2	0	182	182
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	3	0	0	0	0	0	13	13
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	10	10
10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	11	11
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	1	0	0	0	0	0	15	15
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	44	5	0	0	0	0	0	49	49
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	1	0	0	0	0	1	9	9
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	11	11
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	6	6
11:45	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	10	3	0	0	0	0	0	13	13
H/TOT	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	32	6	0	0	0	0	1	39	39
12:00	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	8	0	0	0	0	0	0	8	8
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	1	10	10
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	9	9
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	4	4
H/TOT	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	27	3	0	0	0	0	1	31	31
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	1	2	13	13
13:15	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	6	0	0	0	0	0	0	6	6
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	2	0	0	0	0	0	12	12
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	1	0	0	1	18	18
H/TOT	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	42	2	0	1	0	1	3	49	49
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	3	0	0	0	0	0	11	11
14:15	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	11	1	0	1	0	0	0	13	13
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	12	12
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	0	0	0	0	0	9	9
H/TOT	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	39	5	0	1	0	0	0	45	45
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	4	0	0	0	0	0	1	5	5
15:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	5	1	0	0	0	0	0	6	6
15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	2	0	0	0	1	0	9	9
15:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	0	0	0	0	0	10	10
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2	2	0	24	4	0	0	0	1	1	30	30
16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	6	6
16:15	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	16	3	0	0	0	0	0	19	19
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	5	5
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	2	0	0	0	0	0	10	10
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1	0	34	6	0	0	0	0	0	40	40
17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	6	6
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	9	0	0	0	0	0	0	9	9
17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	0	0	0	0	0	9	9
17:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1	0	0	0	0	0	9	9
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	0	30	3	0	0	0	0	0	33	33
18:00	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	9	1	0	0	0	0	1	11	11
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	5
18:30	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	4	0	0	0	0	0	0	4	4
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	6	6
H/TOT	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	2	0	24	1	0	0	0	0	1	26	26
19:00	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
19:15	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	0
19:30	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	0	0
19:45	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	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	0	0
20:00	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
20:15	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	0
20:30	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	0	0
20:45	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	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	0	0
21:00	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
21:15	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	0
21:30	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	0	0
21:45	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	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	0	0
22:00	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
22:15	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	0
22:30	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	0	0
22:45	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	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	0	0
23:00	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
23:15	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	0
23:30	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	0	0
23:45	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	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	0	0
24 TOT	0	0	0	0	0	0	0	0	0	0	0	7	2	0	0	0	4	0	13	13	0	1034	91	0	10	0	10	10	1155	1155

	B => A										B => B										B => C									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	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
00:15	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	0
00:30	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	0	0
00:45	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	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	0	0
01:00	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
01:15	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	0
01:30	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	0	0
01:45	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	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	0	0
02:00	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
02:15	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	0
02:30	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	0	0
02:45	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	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	0	0
03:00	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
03:15	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	0
03:30	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	0	0
03:45	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	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	0	0
04:00	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
04:15	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	0
04:30	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	0	0
04:45	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	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	0	0
05:00	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
05:15	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	0
05:30	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	0	0
05:45	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	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	0	0
06:00	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
06:15	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	0
06:30	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	0	0
06:45	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	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	0	0
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	163	16	0	3	2	0	0	184	184
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	154	20	1	5	1	1	1	185	185
07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	135	13	0	4	1	2	7	167	167
07:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	129	12	1	2	1	5	2	155	155
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	581	61	2	14	5	8	10	691	691
08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	122	8	0	4	2	0	7	149	149
08:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	132	16	0	1	2	3	9	169	169
08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	86	13	2	2	0	1	6	118	118
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	129	16	0	1	1	4	12	171	171
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	28	469	53	2	8	5	8	34	607	607
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	137	16	0	2	4	2	4	169	169
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	139	13	0	3	3	2	6	168	168
09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	8	152	11	0	7	2	1	3	184	184
09:45	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4	176	22	0	1	0	2	6	211	211
H/TOT	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	1	1	1	18	604	62	0	13	9	7	19	732	732
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	142	19	0	1	1	0	7	173	173
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	147	15	0	1	0	0	7	178	178
10:30	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	7	135	12	0	1	1	1	7	164	164
10:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	111	11	1	2	0	0	7	135	135
H/TOT	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	21	535	57	1	5	2	1	28	650	650
11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	157	24	1	1	2	0	7	195	195
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	126	11	0	1	3	0	5	152	152
11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	136	15	1	4	2	0	6	170	170
11:45	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4	127	11	0	5	1	0	4	152	152
H/TOT	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	19	546	61	2	11	8	0	22	669	669
12:00	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2	124	14	0	3	2	0	3	148	148
12:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	130	22	0	2	1	0	9	169	169
12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	142	12	1	4	0	1	6	173	173
12:45	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	2	130	18	0	1	1	0	4	156	156
H/TOT	0	2	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	16	526	66	1	10	4	1	22	646	646
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	159	14	0	3	0	0	2	180	180
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	137	16	0	0	0	1	5	162	162
13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	120	12	0	3	0	0	2	144	144
13:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	161	26	0	0	3	0	3	195	195
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	577	68	0	6	3	1	12	681	681
14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	139	24	0	2	3	0	5	178	178
14:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	131	17	1	0	1	0	6	160	160
14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	119	15	0	3	0	0	4	149	149
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	133	13	0	2	1	0	6	160	160
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	22	522	69	1	7	5	0	21	647	647
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	118	14	0	0	0	0	2	138	138
15:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	123	17	0	2	2	1	3	155	155
15:30	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4	139	15	0	2	1	2	4	167	167
15:45	0	0	0	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	5	118	15	1	3	0	0	4	146	146
H/TOT	0	1	0	0	0	0	1	0	2	2	0	0	0	0	0	0	0	0	0	0	20	498	61	1	7	3	3	13	606	606
16:00	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3	137	15	1	0	1	2	4	163	163
16:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	154	12	0	0	2	1	5	174	174
16:30	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	8	123	15	1	0	0	2	4	153	153
16:45	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4	135	17	0	2	0	0	2	160	160
H/TOT	0	2	1	0	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	15	549	59	2	2	3	5	15	650	650
17:00	0	1	0	0	0	0	1	0	2	2	0	0	0	0	0	0	0	0	0	0	5	115	12	0	1	0	0	1	134	134
17:15	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	7	146	10	1	2	0	0	1	167	167
17:30	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	12	148	10	0	1	0	0	3	174	174
17:45	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	3	174	19	0	0	0	1	5	202	202
H/TOT	0	4	0	0	0	0	1	0	5	5	0	0	0	0	0	0	0	0	0	0	27	583	51	1	4	0	1	10	677	677
18:00	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	4	157	12	0	3	0	0	3	179	179
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	162	8	0	0	0	1	5	180	180
18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	196	11	0	1	0	0	2	214	214
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	186	11	0	1	0	2	5	210	210
H/TOT	0	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	17	701	42	0	5	0	3	15	783	783
19:00	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
19:15	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	0
19:30	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	0	0
19:45	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	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	0	0
20:00	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
20:15	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	0
20:30	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	0	0
20:45	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	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	0	0
21:00	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
21:15	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	0
21:30	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	0	0
21:45	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	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	0	0
22:00	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
22:15	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	0
22:30	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	0	0
22:45	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	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	0	0
23:00	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
23:15	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	0
23:30	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	0	0
23:45	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	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	0	0
24 TOT	0	11	2	0	0	0	2	1	16	16	0	0	0	0	0	0	0	1	1	1	227	6691	710	13	92	47	38	221	8039	8039

	C => A										C => B										C => C									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	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
00:15	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	0
00:30	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	0	0
00:45	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	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	0	0
01:00	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
01:15	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	0
01:30	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	0	0
01:45	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	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	0	0
02:00	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
02:15	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	0
02:30	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	0	0
02:45	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	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	0	0
03:00	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
03:15	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	0
03:30	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	0	0
03:45	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	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	0	0
04:00	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
04:15	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	0
04:30	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	0	0
04:45	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	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	0	0
05:00	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
05:15	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	0
05:30	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	0	0
05:45	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	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	0	0
06:00	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
06:15	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	0
06:30	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	0	0
06:45	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	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	0	0
07:00	0	1	0	0	0	0	0	0	1	1	3	49	9	0	0	1	0	0	62	62	0	0	0	0	0	0	0	0	0	0
07:15	0	1	1	0	0	0	0	0	2	2	4	71	12	0	2	0	0	0	89	89	0	0	0	0	0	0	0	0	0	0
07:30	0	2	4	0	0	0	1	0	7	7	4	83	19	0	2	1	0	1	110	110	0	0	0	0	0	0	0	0	0	0
07:45	0	2	0	0	0	1	0	0	3	3	4	109	10	0	1	0	1	0	125	125	0	0	0	0	0	0	0	0	0	0
H/TOT	0	6	5	0	0	1	1	0	13	13	15	312	50	0	5	2	1	1	386	386	0	0	0	0	0	0	0	0	0	0
08:00	0	6	0	0	0	0	0	0	6	6	2	112	11	1	0	0	0	1	127	127	0	0	0	0	0	0	0	0	0	0
08:15	0	2	1	0	0	0	0	0	3	3	5	125	14	0	4	0	1	1	150	150	0	0	0	0	0	0	0	0	0	0
08:30	0	4	0	0	0	0	0	0	4	4	2	115	9	0	2	1	3	0	132	132	0	0	0	0	0	0	0	0	0	0
08:45	0	10	3	0	0	0	0	0	13	13	3	89	11	0	2	2	0	1	108	108	0	0	0	0	0	0	0	0	0	0
H/TOT	0	22	4	0	0	0	0	0	26	26	12	441	45	1	8	3	4	3	517	517	0	0	0	0	0	0	0	0	0	0
09:00	0	6	1	0	0	0	0	1	8	8	2	89	12	0	2	2	1	3	111	111	0	0	0	0	0	0	0	0	0	0
09:15	0	4	0	0	0	0	0	0	4	4	6	70	14	1	2	3	1	2	99	99	0	0	0	0	0	0	0	0	0	0
09:30	0	3	1	0	0	0	1	0	5	5	3	82	12	0	3	1	1	5	107	107	0	0	0	0	0	0	0	0	0	0
09:45	0	4	0	0	0	0	0	0	4	4	3	83	14	0	3	3	0	3	109	109	0	0	0	0	0	0	0	0	0	0
H/TOT	0	17	2	0	0	0	1	1	21	21	14	324	52	1	10	9	3	13	426	426	0	0	0	0	0	0	0	0	0	0
10:00	0	6	0	0	0	0	0	0	6	6	4	106	9	0	3	3	1	5	131	131	0	0	0	0	0	0	0	0	0	0
10:15	0	6	3	0	1	0	0	0	10	10	9	94	11	0	3	0	0	2	119	119	0	0	0	0	0	0	0	0	0	0
10:30	0	6	2	0	0	0	0	0	8	8	6	97	11	0	7	0	0	4	125	125	0	0	0	0	0	0	0	0	0	0
10:45	0	4	0	0	0	0	0	0	4	4	3	90	12	0	2	1	0	5	113	113	0	0	0	0	0	0	0	0	0	0
H/TOT	0	21	6	0	1	0	0	0	28	28	22	387	43	0	15	4	1	16	488	488	0	0	0	0	0	0	0	0	0	0
11:00	0	4	2	0	0	0	0	0	6	6	2	94	13	0	2	0	1	2	114	114	0	0	0	0	0	0	0	0	0	0
11:15	0	5	0	0	0	0	0	0	5	5	6	102	16	1	4	0	0	4	133	133	0	0	0	0	0	0	0	0	0	0
11:30	0	6	1	0	0	0	0	0	7	7	4	119	10	0	1	1	0	4	139	139	0	0	0	0	0	0	0	0	0	0
11:45	0	8	1	0	0	0	1	0	10	10	5	124	9	0	3	2	0	5	148	148	0	0	0	0	0	0	0	0	0	0
H/TOT	0	23	4	0	0	0	1	0	28	28	17	439	48	1	10	3	1	15	534	534	0	0	0	0	0	0	0	0	0	0
12:00	0	5	2	0	0	0	0	0	7	7	4	128	14	1	3	2	0	3	155	155	0	0	0	0	0	0	0	0	0	0
12:15	0	17	3	0	0	0	0	0	20	20	3	120	16	1	4	1	0	3	148	148	0	0	0	0	0	0	0	0	0	0
12:30	0	12	3	0	0	0	0	0	15	15	2	137	11	0	5	2	0	4	161	161	0	0	0	0	0	0	0	0	0	0
12:45	0	8	0	0	0	0	0	0	8	8	2	98	12	0	3	1	0	3	119	119	0	0	0	0	0	0	0	0	0	0
H/TOT	0	42	8	0	0	0	0	0	50	50	11	483	53	2	15	6	0	13	583	583	0	0	0	0	0	0	0	0	0	0
13:00	0	10	1	0	0	0	0	0	11	11	2	95	7	0	4	1	1	2	112	112	0	0	0	0	0	0	0	0	0	0
13:15	0	9	0	0	0	0	0	0	9	9	7	128	19	0	1	1	0	1	157	157	0	0	0	0	0	0	0	0	0	0
13:30	0	7	0	0	0	0	0	0	7	7	3	119	15	0	2	0	0	0	139	139	0	0	0	0	0	0	0	0	0	0
13:45	0	14	1	0	0	0	1	0	16	16	3	121	15	0	2	0	0	9	150	150	0	0	0	0	0	0	0	0	0	0
H/TOT	0	40	2	0	0	0	1	0	43	43	15	463	56	0	9	2	1	12	558	558	0	0	0	0	0	0	0	0	0	0
14:00	0	13	0	0	0	0	0	0	13	13	3	148	12	0	6	2	0	3	174	174	0	0	0	0	0	0	0	0	0	0
14:15	0	13	1	0	0	0	0	0	14	14	5	156	17	0	1	0	0	3	182	182	0	0	0	0	0	0	0	0	0	0
14:30	0	16	1	0	0	0	0	0	17	17	2	156	9	0	3	1	1	1	173	173	0	0	0	0	0	0	0	0	0	0
14:45	0	11	3	0	0	0	0	0	14	14	6	156	13	0	2	0	1	2	180	180	0	0	0	0	0	0	0	0	0	0
H/TOT	0	53	5	0	0	0	0	0	58	58	16	616	51	0	12	3	2	9	709	709	0	0	0	0	0	0	0	0	0	0
15:00	0	18	1	0	0	0	0	0	19	19	4	162	17	0	2	3	0	1	189	189	0	0	1	0	0	0	0	0	1	1
15:15	0	11	5	0	0	0	0	0	16	16	4	168	19	1	2	2	0	4	200	200	0	0	0	0	0	0	0	0	0	0
15:30	0	17	0	0	0	0	0	0	17	17	1	169	16	0	2	0	0	5	193	193	0	0	0	0	0	0	0	0	0	0
15:45	0	24	3	0	0	0	0	0	27	27	7	163	23	0	0	0	1	3	197	197	0	0	0	0	0	0	0	0	0	0
H/TOT	0	70	9	0	0	0	0	0	79	79	16	662	75	1	6	5	1	13	779	779	0	0	1	0	0	0	0	0	1	1
16:00	0	20	2	0	0	0	0	0	22	22	4	177	20	0	1	2	2	1	207	207	0	1	0	0	0	0	0	0	1	1
16:15	0	24	1	0	0	0	0	0	25	25	6	200	13	0	0	1	1	5	226	226	0	0	0	0	0	0	0	0	0	0
16:30	0	33	1	0	0	0	0	0	34	34	3	179	26	0	0	0	2	7	217	217	0	0	0	0	0	0	0	0	0	0
16:45	0	34	1	0	0	0	0	0	35	35	5	206	15	1	1	0	0	3	231	231	0	0	0	0	0	0	0	0	0	0
H/TOT	0	111	5	0	0	0	0	0	116	116	18	762	74	1	2	3	5	16	881	881	0	1	0	0	0	0	0	0	1	1
17:00	0	31	7	0	2	0	3	0	43	43	4	188	17	1	4	0	2	1	217	217	0	0	0	0	0	0	0	0	0	0
17:15	0	34	1	0	0	0	0	0	35	35	4	195	20	2	2	0	1	1	225	225	0	0	0	0	0	0	0	0	0	0
17:30	0	29	1	0	0	0	0	0	30	30	5	182	14	0	3	0	4	0	208	208	0	0	0	0	0	0	0	0	0	0
17:45	0	26	2	0	0	0	0	0	28	28	7	201	12	0	1	0	2	0	223	223	0	0	0	0	0	0	0	0	0	0
H/TOT	0	120	10	0	3	0	3	0	136	136	20	766	63	3	10	0	9	2	873	873	0	0	0	0	0	0	0	0	0	0
18:00	0	30	1	0	0	0	0	1	32	32	5	206	18	0	1	0	1	0	231	231	0	0	0	0	0	0	0	0	0	0
18:15	0	14	1	0	0	0	0	0	15	15	7	187	9	0	0	0	3	0	206	206	0	0	0	0	0	0	0	0	0	0
18:30	0	6	0	0	0	0	0	0	6	6	1	171	9	0	2	0	3	1	187	187	0	0	0	0	0	0	0	0	0	0
18:45	0	8	0	0	0	0	0	0	8	8	4	138	9	0	0	0	1	0	152	152	0	1	0	0	0	0	0	0	1	1
H/TOT	0	58	2	0	0	0	0	1	61	61	17	702	45	0	3	0	8	1	776	776	0	1	0	0	0	0	0	0	1	1
19:00	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
19:15	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	0
19:30	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	0	0
19:45	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	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	0	0
20:00	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
20:15	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	0
20:30	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	0	0
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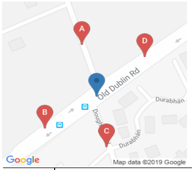
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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	0	0
22:00	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
22:15	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	0
22:30	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	0	0
22:45	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	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	0	0
23:00	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
23:15	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	0
23:30	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	0	0
23:45	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	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	0	0
24 TOT	0	583	62	0	4	1	7	2	659	659	193	6357	655	10	105	40	36	114	7510	7510	0	2	1	0	0	0	0	0	3	3



IDASO

Survey Name: Dublin Road, Galway Survey 2018 MCC Data
Site: Site 43
Location: Doughiska Road / Old Dublin Rd
Date: 15-Nov-2018

	A => A									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0
00:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0
05:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
06:00	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
07:00	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
24 TOT	0	0	0	0	0	0	0	0	0	0

	A => B									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0
00:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0
05:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
06:00	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
07:00	1	5	0	0	1	0	0	1	8	8
07:15	0	5	1	0	0	0	1	2	9	9
07:30	2	6	0	0	0	0	0	1	9	9
07:45	3	3	1	0	0	0	0	1	8	8
H/TOT	6	19	2	0	1	0	1	5	34	34
08:00	2	4	0	0	0	0	0	3	9	9
08:15	3	7	1	0	0	0	0	4	15	15
08:30	1	9	1	0	0	0	0	4	15	15
08:45	1	7	0	0	2	0	0	2	12	12
H/TOT	7	27	2	0	2	0	0	13	51	51
09:00	1	2	0	0	0	0	0	1	4	4
09:15	2	4	1	0	0	0	1	2	10	10
09:30	1	4	0	0	0	0	0	0	5	5
09:45	2	4	1	0	0	0	0	1	8	8
H/TOT	6	14	2	0	0	0	1	4	27	27
10:00	2	9	1	0	0	0	0	1	13	13
10:15	1	10	1	0	1	0	0	1	14	14
10:30	2	8	1	0	0	1	1	2	15	15
10:45	1	8	1	0	1	0	0	2	13	13
H/TOT	6	35	4	0	2	1	1	6	55	55
11:00	2	17	1	0	1	0	0	0	21	21
11:15	1	10	0	0	0	0	0	2	13	13
11:30	3	6	1	0	0	0	0	1	11	11
11:45	1	15	1	0	0	0	0	1	18	18
H/TOT	7	48	3	0	1	0	0	4	63	63
12:00	2	15	1	0	1	0	0	0	19	19
12:15	1	11	1	0	0	0	0	0	13	13
12:30	2	11	0	0	0	0	0	0	13	13
12:45	1	15	0	0	0	0	0	2	18	18
H/TOT	6	52	2	0	1	0	0	2	63	63
13:00	1	17	0	0	0	0	0	2	20	20
13:15	2	12	1	0	0	0	0	2	17	17
13:30	2	9	1	0	0	0	0	0	12	12
13:45	1	18	3	0	0	0	0	1	23	23
H/TOT	6	56	5	0	0	0	0	5	72	72
14:00	3	14	0	0	0	0	0	3	20	20
14:15	0	12	3	0	0	0	0	1	16	16
14:30	3	11	0	0	1	0	1	1	17	17
14:45	1	20	3	0	0	0	0	3	27	27
H/TOT	7	57	6	0	1	0	1	8	80	80
15:00	2	9	1	0	0	0	0	1	13	13
15:15	1	10	1	0	0	0	1	5	18	18
15:30	1	14	0	0	0	0	0	1	16	16
15:45	2	15	0	0	0	0	1	1	19	19
H/TOT	6	48	2	0	0	0	2	8	66	66
16:00	2	10	1	0	0	0	3	4	20	20
16:15	0	9	0	0	0	0	0	0	9	9
16:30	3	10	1	1	0	0	0	0	15	15
16:45	1	9	0	0	0	0	1	3	14	14
H/TOT	6	38	2	1	0	0	4	7	58	58
17:00	2	8	1	0	0	0	1	0	12	12
17:15	1	10	1	0	0	0	0	0	12	12
17:30	3	15	1	0	0	0	0	0	19	19
17:45	0	11	0	0	0	0	0	0	11	11
H/TOT	6	44	3	0	0	0	1	0	54	54
18:00	1	10	0	0	0	0	0	0	11	11
18:15	2	14	0	0	0	0	1	0	17	17
18:30	2	17	0	0	0	0	0	0	19	19
18:45	1	24	2	0	0	0	1	0	28	28
H/TOT	6	65	2	0	0	0	2	0	75	75
19:00	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
24 TOT	75	503	35	1	8	1	13	62	698	698

	A => C									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0
00:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0
05:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
06:00	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
07:00	0	1	1	0	1	0	0	0	3	3
07:15	0	6	1	0	0	0	0	0	7	7
07:30	0	4	1	0	1	0	0	0	6	6
07:45	0	5	0	0	0	0	0	0	5	5
H/TOT	0	16	3	0	2	0	0	0	21	21
08:00	0	12	2	0	0	0	0	0	14	14
08:15	0	9	2	0	0	0	1	0	12	12
08:30	1	19	3	0	0	0	0	0	23	23
08:45	0	14	1	0	0	0	1	1	17	17
H/TOT	1	54	8	0	0	0	2	1	66	66
09:00	0	15	1	0	0	0	0	0	16	16
09:15	0	11	1	0	0	0	0	1	13	13
09:30	0	10	0	0	0	0	0	0	10	10
09:45	0	7	4	0	1	0	0	0	12	12
H/TOT	0	43	6	0	1	0	0	1	51	51
10:00	0	12	4	0	0	0	0	1	17	17
10:15	0	6	2	0	0	0	0	0	8	8
10:30	0	20	2	0	0	0	0	1	23	23
10:45	0	10	4	0	0	0	0	0	14	14
H/TOT	0	48	12	0	0	0	0	2	62	62
11:00	0	9	1	0	2	0	0	0	12	12
11:15	0	11	2	0	2	0	0	2	17	17
11:30	0	15	2	0	0	0	0	0	17	17
11:45	0	11	0	0	0	0	0	1	12	12
H/TOT	0	46	5	0	4	0	0	3	58	58
12:00	0	17	1	0	1	0	0	2	21	21
12:15	0	14	0	0	0	0	0	0	14	14
12:30	0	30	4	0	2	0	0	1	37	37
12:45	1	9	0	0	0	0	0	0	10	10
H/TOT	1	70	5	0	3	0	0	3	82	82
13:00	0	24	4	0	0	0	0	0	28	28
13:15	0	21	4	0	0	0	0	1	26	26
13:30	0	25	2	0	0	0	0	0	27	27
13:45	0	19	3	0	2	0	1	0	25	25
H/TOT	0	89	13	0	2	0	1	1	106	106
14:00	0	15	2	0	0	0	0	1	18	18
14:15	0	19	2	0	0	0	1	0	22	22
14:30	0	21	3	0	1	0	0	0	25	25
14:45	0	14	2	0	0	0	0	1	17	17
H/TOT	0	69	9	0	1	0	1	2	82	82
15:00	0	20	1	0	1	0	0	0	22	22
15:15	1	31	3	0	0	0	0	0	35	35
15:30	0	28	5	0	0	0	0	0	33	33
15:45	0	21	0	0	0	0	0	0	21	21
H/TOT	1	100	9	0	1	0	0	0	111	111
16:00	0	48	2	0	0	0	0	0	50	50
16:15	0	28	6	0	0	0	1	0	35	35
16:30	0	33	3	0	0	0	0	1	37	37
16:45	0	31	0	0	0	0	1	0	32	32
H/TOT	0	140	11	0	0	0	2	1	154	154
17:00	0	42	2	0	0	0	0	0	44	44
17:15	0	39	0	0	0	0	0	0	39	39
17:30	0	28	5	0	0	0	0	0	33	33
17:45	0	34	1	0	0	0	1	0	36	36
H/TOT	0	143	8	0	0	0	1	0	152	152
18:00	0	30	0	0	0	0	0	0	30	30
18:15	0	13	0	0	0	0	0	0	13	13
18:30	0	26	1	0	0	0	0	0	27	27
18:45	0	22	1	0	0	0	0	0	23	23
H/TOT	0	91	2	0	0	0	0	0	93	93
19:00	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
24 TOT	3	909	91	0	14	0	7	14	1038	1038

	A => D									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0
00:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0
05:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
06:00	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
07:00	0	14	3	0	0	0	0	0	17	17
07:15	0	17	1	0	0	0	0	0	18	18
07:30	0	10	2	0	0	0	1	0	13	13
07:45	0	27	2	0	0	1	0	0	30	30
H/TOT	0	68	8	0	0	1	1	0	78	78
08:00	0	30	0	0	0	0	0	0	30	30
08:15	0	33	5	0	0	0	0	0	38	38
08:30	0	44	4	0	0	0	0	0	48	48
08:45	0	24	3	0	3	1	0	0	31	31
H/TOT	0	131	12	0	3	1	0	0	147	147
09:00	0	18	1	0	1	1	0	0	21	21
09:15	0	15	1	0	1	0	0	0	17	17
09:30	0	12	1	0	2	0	0	0	15	15
09:45	0	18	1	0	0	0	0	0	19	19
H/TOT	0	63	4	0	4	1	0	0	72	72
10:00	0	12	1	0	1	0	0	0	14	14
10:15	1	7	2	0	2	0	0	0	12	12
10:30	0	12	1	0	0	1	0	0	14	14
10:45	0	14	3	0	3	0	0	1	21	21
H/TOT	1	45	7	0	6	1	0	1	61	61
11:00	1	14	5	0	1	0	0	0	21	21
11:15	0	16	1	0	1	0	0	0	18	18
11:30	0	15	1	0	1	1	0	0	18	18
11:45	0	15	2	0	2	0	0	1	20	20
H/TOT	1	60	9	0	5	1	0	1	77	77
12:00	0	16	1	0	0	0	0	0	17	17
12:15	0	14	1	0	4	0	0	0	19	19
12:30	0	11	2	0	1	0	0	0	14	14
12:45	0	13	4	0	0	0	0	0	17	17
H/TOT	0	54	8	0	5	0	0	0	67	67
13:00	0	20	4	0	1	0	0	0	25	25
13:15	0	23	1	0	1	0	0	0	25	25
13:30	0	21	2	0	2	1	0	0	26	26
13:45	0	34	5	0	0	1	0	0	40	40
H/TOT	0	98	12	0	4	2	0	0	116	116
14:00	0	18	3	0	2	0	0	0	23	23
14:15	0	44	4	0	1	0	0	0	49	49
14:30	0	19	3	0	1	0	0	0	23	23
14:45	0	32	3	0	0	0	0	0	35	35
H/TOT	0	113	13	0	4	0	0	0	130	130
15:00	1	19	3	0	0	0	0	1	24	24
15:15	0	32	3	0	0	1	0	0	36	36
15:30	0	29	6	0	0	0	0	0	35	35
15:45	0	43	5	0	0	0	0	0	48	48
H/TOT	1	123	17	0	0	1	0	1	143	143
16:00	0	56	4	0	2	0	0	2	64	64
16:15	0	50	6	0	0	1	0	0	57	57
16:30	1	58	7	0	1	0	0	0	67	67
16:45	0	50	4	0	0	1	0	0	55	55
H/TOT	1	214	21	0	3	2	0	2	243	243
17:00	0	53	2	0	1	0	0	0	56	56
17:15	0	48	4	0	0	0	0	0	52	52
17:30	0	53	4	0	0	0	0	0	57	57
17:45	0	45	5	0	0	0	0	0	50	50
H/TOT	0	199	15	0	1	0	0	0	215	215
18:00	0	40	3	0	0	0	0	0	43	43
18:15	0	21	0	0	0	0	0	0	21	21
18:30	0	29	1	0	0	0	0	0	30	30
18:45	0	31	1	0	0	1	0	0	33	33
H/TOT	0	121	5	0	0	1	0	0	127	127
19:00	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
24 TOT	4	1289	131	0	35	11	1	5	1476	1476

	B => A									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0
00:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0
05:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
06:00	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
07:00	1	5	1	0	0	0	1	0	8	8
07:15	2	8	2	0	0	0	0	1	13	13
07:30	2	28	1	0	0	0	0	0	31	31
07:45	1	49	3	0	0	0	0	0	53	53
H/TOT	6	90	7	0	0	0	1	1	105	105
08:00	3	57	3	0	0	0	0	0	63	63
08:15	1	45	2	0	0	0	0	0	48	48
08:30	1	30	4	0	0	0	0	0	35	35
08:45	1	37	2	0	0	1	0	2	43	43
H/TOT	6	169	11	0	0	1	0	2	189	189
09:00	1	27	3	0	0	0	0	0	31	31
09:15	3	14	3	0	0	0	1	0	21	21
09:30	1	8	0	0	0	0	0	0	9	9
09:45	1	8	1	0	0	0	0	1	11	11
H/TOT	6	57	7	0	0	0	1	1	72	72
10:00	1	10	1	0	0	0	0	0	12	12
10:15	3	9	1	0	1	0	0	0	14	14
10:30	3	8	2	0	2	0	0	2	17	17
10:45	2	13	2	0	2	0	0	1	20	20
H/TOT	9	40	6	0	5	0	0	3	63	63
11:00	1	14	1	0	0	0	0	1	17	17
11:15	2	17	1	1	1	0	0	0	22	22
11:30	0	13	0	0	0	0	0	3	16	16
11:45	2	15	0	0	1	0	0	1	19	19
H/TOT	5	59	2	1	2	0	0	5	74	74
12:00	1	15	1	0	0	0	0	0	17	17
12:15	1	18	1	0	0	0	0	0	20	20
12:30	2	9	1	0	1	0	0	2	15	15
12:45	1	11	0	0	1	0	0	1	14	14
H/TOT	5	53	3	0	2	0	0	3	66	66
13:00	1	9	0	0	0	0	0	1	11	11
13:15	2	14	1	0	0	0	0	0	17	17
13:30	2	12	1	0	1	0	0	0	16	16
13:45	1	13	2	0	1	0	0	2	19	19
H/TOT	6	48	4	0	2	0	0	3	63	63
14:00	2	14	1	0	1	0	0	0	18	18
14:15	1	12	3	0	0	0	0	1	17	17
14:30	1	20	1	0	0	0	0	1	23	23
14:45	2	11	1	0	0	0	0	1	15	15
H/TOT	6	57	6	0	1	0	0	3	73	73
15:00	1	22	1	0	1	0	0	0	25	25
15:15	2	12	3	0	1	0	0	1	19	19
15:30	1	10	0	0	0	0	0	1	12	12
15:45	2	14	3	0	1	0	0	1	21	21
H/TOT	6	58	7	0	3	0	0	3	77	77
16:00	2	10	0	0	0	0	0	0	12	12
16:15	1	12	2	0	0	0	0	2	17	17
16:30	1	7	1	0	0	0	0	1	10	10
16:45	2	3	0	0	0	0	0	0	5	5
H/TOT	6	32	3	0	0	0	0	3	44	44
17:00	3	3	1	0	0	0	0	0	7	7
17:15	0	3	0	0	0	0	1	0	4	4
17:30	1	8	0	0	0	0	0	1	10	10
17:45	3	9	1	0	0	0	0	0	13	13
H/TOT	7	23	2	0	0	0	1	1	34	34
18:00	2	11	1	0	0	0	0	0	14	14
18:15	1	15	0	0	0	0	0	0	16	16
18:30	0	20	1	0	0	0	0	0	21	21
18:45	0	19	3	0	0	0	0	0	22	22
H/TOT	3	65	5	0	0	0	0	0	73	73
19:00	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
24 TOT	71	751	63	1	15	1	3	28	933	933

	B => B									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0
00:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0
05:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
06:00	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
07:00	0	0	0	0	0	0	0	0	0	0
07:15	0	0	0	0	0	0	0	0	0	0
07:30	0	0	0	0	0	0	0	0	0	0
07:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
08:00	0	0	0	0	0	0	0	0	0	0
08:15	0	0	0	0	0	0	0	0	0	0
08:30	0	0	0	0	0	0	0	0	0	0
08:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
09:00	0	0	0	0	0	0	0	0	0	0
09:15	0	0	0	0	0	0	0	0	0	0
09:30	0	0	0	0	0	0	0	0	0	0
09:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
10:00	0	0	0	0	0	0	0	0	0	0
10:15	0	0	0	0	0	0	0	0	0	0
10:30	0	0	0	0	0	0	0	0	0	0
10:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
11:00	0	0	0	0	0	0	0	0	0	0
11:15	0	0	0	0	0	0	0	0	0	0
11:30	0	0	0	0	0	0	0	0	0	0
11:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
12:00	0	0	0	0	0	0	0	0	0	0
12:15	0	0	0	0	0	0	0	0	0	0
12:30	0	0	0	0	0	0	0	0	0	0
12:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
13:00	0	0	0	0	0	0	0	0	0	0
13:15	0	0	0	0	0	0	0	0	0	0
13:30	0	0	0	0	0	0	0	0	0	0
13:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
14:00	0	0	0	0	0	0	0	0	0	0
14:15	0	0	0	0	0	0	0	0	0	0
14:30	0	0	0	0	0	0	0	0	0	0
14:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
15:00	0	0	0	0	0	0	0	0	0	0
15:15	0	0	0	0	0	0	0	0	0	0
15:30	0	0	0	0	0	0	0	0	0	0
15:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
16:00	0	0	0	0	0	0	0	0	0	0
16:15	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	0	0	0	0
16:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
17:00	0	0	0	0	0	0	0	0	0	0
17:15	0	0	0	0	0	0	0	0	0	0
17:30	0	0	0	0	0	0	0	0	0	0
17:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
18:00	0	0	0	0	0	0	0	0	0	0
18:15	0	0	0	0	0	0	0	0	0	0
18:30	0	0	0	0	0	0	0	0	0	0
18:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
24 TOT	0	0	0	0	0	0	0	0	0	0

	B => C									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0
00:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0
05:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
06:00	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
07:00	0	5	1	0	0	0	0	0	6	6
07:15	0	3	1	0	0	0	0	1	5	5
07:30	0	13	0	0	0	0	0	0	13	13
07:45	0	9	1	0	0	0	0	2	12	12
H/TOT	0	30	3	0	0	0	0	3	36	36
08:00	0	9	1	0	0	0	0	1	11	11
08:15	0	4	2	0	0	0	0	1	7	7
08:30	0	8	2	0	0	0	0	0	10	10
08:45	0	17	1	0	0	0	0	0	18	18
H/TOT	0	38	6	0	0	0	0	2	46	46
09:00	0	12	3	0	0	0	0	0	15	15
09:15	0	7	1	0	1	0	0	1	10	10
09:30	0	4	3	0	1	0	0	2	10	10
09:45	0	14	1	0	1	0	0	2	18	18
H/TOT	0	37	8	0	3	0	0	5	53	53
10:00	0	5	2	0	0	0	0	1	8	8
10:15	0	10	2	0	0	0	0	0	12	12
10:30	0	5	0	0	1	0	0	1	7	7
10:45	0	5	1	0	0	0	0	2	8	8
H/TOT	0	25	5	0	1	0	0	4	35	35
11:00	0	8	2	0	0	0	0	1	11	11
11:15	0	10	3	0	0	0	0	1	14	14
11:30	0	10	0	0	0	0	0	0	10	10
11:45	0	16	0	0	0	0	0	1	17	17
H/TOT	0	44	5	0	0	0	0	3	52	52
12:00	0	17	2	0	0	0	0	2	21	21
12:15	0	13	3	1	1	0	0	1	19	19
12:30	0	9	0	0	1	0	0	0	10	10
12:45	0	10	2	0	0	0	0	0	12	12
H/TOT	0	49	7	1	2	0	0	3	62	62
13:00	0	17	2	0	0	0	0	1	20	20
13:15	0	7	2	0	0	0	0	0	9	9
13:30	0	10	2	0	0	0	0	0	12	12
13:45	0	7	1	0	0	0	0	3	11	11
H/TOT	0	41	7	0	0	0	0	4	52	52
14:00	0	13	3	0	0	0	0	1	17	17
14:15	0	12	1	0	0	0	0	0	13	13
14:30	0	22	0	0	0	0	0	1	23	23
14:45	0	20	0	0	0	0	0	0	20	20
H/TOT	0	67	4	0	0	0	0	2	73	73
15:00	0	17	1	0	0	0	0	1	19	19
15:15	0	14	3	0	0	0	0	1	18	18
15:30	0	13	5	0	0	0	0	0	18	18
15:45	0	18	4	0	0	0	0	1	23	23
H/TOT	0	62	13	0	0	0	0	3	78	78
16:00	0	20	2	0	1	0	0	1	24	24
16:15	0	18	3	0	0	0	0	0	21	21
16:30	0	17	1	0	0	0	0	0	18	18
16:45	0	16	0	0	0	0	0	0	16	16
H/TOT	0	71	6	0	1	0	0	1	79	79
17:00	0	22	1	0	0	0	0	1	24	24
17:15	0	25	0	0	0	0	0	0	25	25
17:30	0	19	1	0	0	0	1	0	21	21
17:45	0	31	1	0	0	0	0	0	32	32
H/TOT	0	97	3	0	0	0	1	1	102	102
18:00	0	23	3	0	1	0	0	0	27	27
18:15	0	29	1	0	0	0	0	0	30	30
18:30	0	17	1	0	0	0	0	1	19	19
18:45	0	16	1	0	0	0	0	0	17	17
H/TOT	0	85	6	0	1	0	0	1	93	93
19:00	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
24 TOT	0	646	73	1	8	0	1	32	761	761

	B => D									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0
00:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0
05:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
06:00	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
07:00	1	36	5	0	0	1	1	0	44	44
07:15	0	42	7	0	2	0	0	0	51	51
07:30	1	44	11	0	0	0	0	0	56	56
07:45	3	74	10	0	1	0	0	1	89	89
H/TOT	5	196	33	0	3	1	1	1	240	240
08:00	1	80	5	1	0	0	0	0	87	87
08:15	2	63	6	0	2	0	1	1	75	75
08:30	2	65	3	0	1	1	0	0	72	72
08:45	1	31	4	0	0	1	1	3	41	41
H/TOT	6	239	18	1	3	2	2	4	275	275
09:00	2	50	9	0	1	2	1	0	65	65
09:15	2	45	10	1	1	3	0	4	66	66
09:30	2	55	4	0	2	0	2	2	67	67
09:45	0	45	13	0	1	2	0	1	62	62
H/TOT	6	195	36	1	5	7	3	7	260	260
10:00	1	55	7	0	2	2	0	2	69	69
10:15	4	60	9	0	2	2	0	2	79	79
10:30	3	53	10	0	5	0	0	2	73	73
10:45	2	59	7	0	0	2	0	4	74	74
H/TOT	10	227	33	0	9	6	0	10	295	295
11:00	1	45	11	0	3	0	0	0	60	60
11:15	2	58	11	1	3	0	0	0	75	75
11:30	2	63	9	0	1	1	0	2	78	78
11:45	4	64	3	0	2	2	0	1	76	76
H/TOT	9	230	34	1	9	3	0	3	289	289
12:00	0	60	9	0	2	2	0	4	77	77
12:15	3	63	9	0	2	0	0	0	77	77
12:30	0	63	9	0	3	2	0	2	79	79
12:45	1	60	6	0	1	2	0	2	72	72
H/TOT	4	246	33	0	8	6	0	8	305	305
13:00	1	54	3	0	1	1	0	0	60	60
13:15	1	69	10	0	1	1	0	1	83	83
13:30	2	74	6	0	1	0	0	0	83	83
13:45	2	58	8	0	0	0	0	4	72	72
H/TOT	6	255	27	0	3	2	0	5	298	298
14:00	1	74	6	0	4	2	0	1	88	88
14:15	2	64	11	0	1	0	0	0	78	78
14:30	0	94	11	0	3	2	0	0	110	110
14:45	3	92	10	0	3	0	0	1	109	109
H/TOT	6	324	38	0	11	4	0	2	385	385
15:00	3	91	7	0	0	3	0	0	104	104
15:15	2	96	14	1	1	1	0	2	117	117
15:30	0	86	9	0	1	1	0	2	99	99
15:45	3	91	14	0	0	0	0	2	110	110
H/TOT	8	364	44	1	2	5	0	6	430	430
16:00	1	92	11	0	0	1	1	1	107	107
16:15	2	101	8	0	0	2	0	3	116	116
16:30	0	98	16	0	0	0	0	4	118	118
16:45	2	127	12	0	0	0	0	1	142	142
H/TOT	5	418	47	0	0	3	1	9	483	483
17:00	2	110	9	0	2	0	0	1	124	124
17:15	4	97	18	2	1	0	0	1	123	123
17:30	2	103	9	0	2	0	0	0	116	116
17:45	3	104	6	0	1	0	0	0	114	114
H/TOT	11	414	42	2	6	0	0	2	477	477
18:00	3	109	10	0	0	0	0	0	122	122
18:15	2	78	7	0	0	0	0	0	87	87
18:30	1	97	3	0	1	0	0	0	102	102
18:45	1	70	2	0	0	0	0	0	73	73
H/TOT	7	354	22	0	1	0	0	0	384	384
19:00	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
24 TOT	83	3462	407	6	60	39	7	57	4121	4121

	C => A									
TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0
00:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
01:00	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0
01:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
02:00	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0
02:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
03:00	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0
03:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
04:00	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0
04:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
05:00	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0
05:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
06:00	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0
06:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
07:00	0	9	1	0	0	0	0	1	11	11
07:15	0	18	3	0	0	0	0	0	21	21
07:30	0	60	10	0	1	0	0	0	71	71
07:45	1	59	2	0	0	0	0	0	62	62
H/TOT	1	146	16	0	1	0	0	1	165	165
08:00	0	48	2	0	2	0	2	0	54	54
08:15	0	64	2	0	0	0	0	0	66	66
08:30	0	44	2	0	0	0	2	0	48	48
08:45	0	28	3	0	0	0	0	0	31	31
H/TOT	0	184	9	0	2	0	4	0	199	199
09:00	0	35	2	0	0	0	1	0	38	38
09:15	0	22	2	0	0	0	0	1	25	25
09:30	0	16	2	0	0	0	0	2	20	20
09:45	0	13	1	0	0	0	0	1	15	15
H/TOT	0	86	7	0	0	0	1	4	98	98
10:00	0	12	3	0	0	0	0	0	15	15
10:15	0	14	4	0	0	0	0	0	18	18
10:30	0	6	2	0	0	0	0	1	9	9
10:45	0	15	1	0	1	0	0	0	17	17
H/TOT	0	47	10	0	1	0	0	1	59	59
11:00	0	13	1	0	1	0	0	1	16	16
11:15	0	5	1	0	0	0	0	0	6	6
11:30	0	13	2	0	0	0	0	1	16	16
11:45	0	16	3	0	0	0	0	0	19	19
H/TOT	0	47	7	0	1	0	0	2	57	57
12:00	0	9	0	1	0	0	0	2	12	12
12:15	0	14	1	0	0	0	0	0	15	15
12:30	0	11	1	0	0	0	0	2	14	14
12:45	0	12	3	0	0	0	0	1	16	16
H/TOT	0	46	5	1	0	0	0	5	57	57
13:00	0	11	3	0	0	0	0	0	14	14
13:15	0	15	2	0	0	0	0	0	17	17
13:30	0	8	4	0	0	0	0	0	12	12
13:45	0	18	0	0	0	0	1	2	21	21
H/TOT	0	52	9	0	0	0	1	2	64	64
14:00	0	11	1	0	0	0	0	2	14	14
14:15	0	15	2	0	0	0	0	0	17	17
14:30	0	14	2	0	0	0	0	1	17	17
14:45	0	16	3	0	1	0	0	0	20	20
H/TOT	0	56	8	0	1	0	0	3	68	68
15:00	0	14	2	0	0	0	0	0	16	16
15:15	0	12	0	0	0	0	0	0	12	12
15:30	0	13	3	0	0	0	0	0	16	16
15:45	0	19	2	0	0	0	0	0	21	21
H/TOT	0	58	7	0	0	0	0	0	65	65
16:00	0	17	0	0	0	0	0	0	17	17
16:15	1	25	1	0	0	0	0	3	30	30
16:30	0	15	0	0	0	0	0	0	15	15
16:45	0	11	0	0	0	0	0	0	11	11
H/TOT	1	68	1	0	0	0	0	3	73	73
17:00	0	20	2	0	0	0	0	0	22	22
17:15	0	16	1	0	0	0	0	0	17	17
17:30	0	11	0	0	0	0	1	0	12	12
17:45	0	16	0	0	0	0	1	0	17	17
H/TOT	0	63	3	0	0	0	2	0	68	68
18:00	0	11	1	0	0	0	1	0	13	13
18:15	0	17	1	0	0	0	0	0	18	18
18:30	0	9	0	1	0	0	0	0	10	10
18:45	0	31	0	0	0	0	0	0	31	31
H/TOT	0	68	2	1	0	0	1	0	72	72
19:00	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0
19:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
20:00	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0
20:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
21:00	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0
21:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
22:00	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0
22:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
23:00	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0
23:45	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0
24 TOT	2	921	84	2	6	0	9	21	1045	1045

C => B

BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
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
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
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
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
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
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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
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
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0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
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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
0	19	3	0	1	0	0	1	24	24
0	22	3	0	1	0	0	1	27	27
0	15	0	0	0	0	1	1	17	17
0	7	1	0	1	0	1	0	10	10
0	63	7	0	3	0	2	3	78	78
0	4	0	0	0	0	1	3	8	8
0	4	1	0	0	0	2	1	8	8
1	6	2	0	0	0	0	0	9	9
0	6	1	0	0	1	1	1	10	10
1	20	4	0	0	1	4	5	35	35
0	8	2	0	0	0	0	1	11	11
0	9	0	0	0	0	0	0	9	9
0	9	0	0	0	0	0	2	11	11
0	16	0	0	0	0	0	1	17	17
0	42	2	0	0	0	0	4	48	48
0	11	2	0	0	0	0	2	15	15
0	11	0	0	0	0	0	2	13	13
0	15	2	0	1	0	0	1	19	19
0	9	1	1	0	0	0	1	12	12
0	46	5	1	1	0	0	6	59	59
0	16	5	0	0	0	0	4	25	25
0	12	0	0	0	0	0	3	15	15
0	16	1	0	1	0	0	0	18	18
0	12	3	0	1	0	0	0	16	16
0	56	9	0	2	0	0	7	74	74
0	6	1	0	0	0	0	1	8	8
0	8	4	0	1	0	0	3	16	16
0	12	3	0	0	0	1	0	16	16
0	10	1	0	1	0	0	0	12	12
0	36	9	0	2	0	1	4	52	52
0	13	1	0	0	0	0	0	14	14
0	9	1	0	0	0	0	1	11	11
0	10	1	0	0	0	0	0	11	11
0	16	2	0	0	0	0	1	19	19
0	48	5	0	0	0	0	2	55	55
0	27	4	0	0	1	0	0	32	32
0	14	2	0	0	0	0	1	17	17
0	8	2	0	0	0	0	0	10	10
0	17	1	0	0	0	0	1	19	19
0	66	9	0	0	1	0	2	78	78
0	25	1	0	0	0	0	0	26	26
0	12	3	0	0	0	1	0	16	16
0	12	2	0	0	0	0	1	15	15
0	9	1	1	0	0	0	1	12	12
0	58	7	1	0	0	1	2	69	69
0	12	2	0	0	0	0	0	14	14
0	17	3	0	0	0	0	2	22	22
0	17	5	0	0	0	0	1	23	23
0	13	2	0	0	0	0	1	16	16
0	59	12	0	0	0	0	4	75	75
0	17	3	0	1	0	0	0	21	21
0	12	2	0	1	0	0	2	17	17
0	10	1	0	0	0	0	0	11	11
0	21	1	0	0	0	0	0	22	22
0	60	7	0	2	0	0	2	71	71
0	19	3	0	0	0	0	0	22	22
0	18	1	0	0	0	0	1	20	20
0	24	3	0	0	0	0	0	27	27
0	28	0	0	0	0	0	1	29	29
0	89	7	0	0	0	0	2	98	98
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
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
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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
0	0	0	0	0	0	0	0	0	0
1	643	83	2	10	2	8	43	792	792

C => C

BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
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
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
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0
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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
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0

C => D

BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
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
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
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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
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0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0
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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
0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0
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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
0	20	0	0	1	0	1	0	22	22
0	46	1	0	0	0	0	0	47	47
0	19	0	0	0	0	1	0	20	20
0	13	0	0	1	0	0	0	14	14
0	98	1	0	2	0	2	0	103	103
0	15	1	0	0	0	0	0	16	16
0	14	1	0	0	1	0	0	16	16
0	22	1	0	0	0	0	0	23	23
0	18	2	1	1	0	0	0	22	22
0	69	5	1	1	1	0	0	77	77
0	13	0	0	0	2	1	0	16	16
0	14	0	0	0	0	0	0	14	14
0	17	1	0	0	1	0	0	19	19
0	12	1	0	3	0	0	0	16	16
0	56	2	0	3	3	1	0	65	65
0	17	6	0	0	0	0	0	23	23
0	13	3	1	0	0	0	0	17	17
0	10	2	0	0	0	0	1	13	13
0	8	3	0	1	1	0	0	13	13
0	48	14	1	1	1	0	1	66	66
0	9	0	0	0	0	0	0	9	9
0	6	1	0	1	0	0	1	9	9
0	7	2	0	0	0	0	1	10	10
0	10	4	0	0	0	0	0	14	14
0	32	7	0	1	0	0	2	42	42
0	16	2	0	0	0	0	1	19	19
0	6	0	0	0	0	0	0	6	6
0	14	1	0	1	0	0	0	16	16
0	16	0	0	1	1	0	0	18	18
0	52	3	0	2	1	0	1	59	59
0	24	1	0	0	0	0	1	26	26
0	17	2	0	1	0	0	0	20	20
0	19	3	0	0	0	0	0	22	22
0	10	3	0	0	1	0	3	17	17
0	70	9	0	1	1	0	4	85	85
0	19	2	0	2	0	0	0	23	23
0	8	4	0	0	0	0	0	12	12
0	10	3	0	1	1	0	0	15	15
0	16	3	0	0	0	0	0	19	19
0	53	12	0	3	1	0	0	69	69
0	16	4	0	0	0	1	0	21	21
0	24	1	0	2	0	0	1	28	28
0	20	5	0	0	0	1	0	26	26
0	18	2	0	2	0	0	0	22	22
0	78	12	0	4	0	2	1	97	97
0	16	4	0	0	0	0	0	20	20
0	17	3	0	0	0	0	0	20	20
0	19	5	0	2	0	0	0	26	26
0	16	3	0	1	0	0	0	20	20
0	68	15	0	3	0	0	0	86	86
0	20	2	0	1	0	0	0	23	23
0	23	3	0	0	0	0	0	26	26
0	22	2	0	1	0	0	0	25	25
0	18	1	0	0	1	0	0	20	20
0	83	8	0	2	1	0	0	94	94
0	18	0	0	0	0	0	0	18	18
0	20	2	0	1	0	0	0	23	23
0	15	3	0	0	0	0	0	18	18
0	16	3	0	0	0	0	0	19	19
0	69	8	0	1	0	0	0	78	78
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
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
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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
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
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
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
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
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
0	776	96	2	24	9	5	9	921	921

D => A

BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
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
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
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
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
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
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
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
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
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
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
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
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	9	1	0	0	0	0	0	10	10
0	22	5	0	0	0	0	0	27	27
1	57	10	0	0	0	0	0	68	68
0	73	3	0	2	0	0	0	78	78
1	161	19	0	2	0	0	0	183	183
0	68	2	0	0	0	0	2	72	72
1	69	7	0	1	0	0	0	78	78
0	67	6	0	2	0	0	0	75	75
0	65	4	0	2	0	0	0	71	71
1	269	19	0	5	0	0	2	296	296
1	66	8	0	2	2	0	0	79	79
1	45	3	0	3	0	0	0	52	52
0	34	4	0	1	0	0	2	41	41
0	26	2	0	0	0	0	0	28	28
2	171	17	0	6	2	0	2	200	200
1	13	3	0	0	0	0	0	17	17
0	10	2	0	0	0	0	0	12	12
0	8	2	0	0	0	0	1	11	11
1	12	1	0	1	0	0	0	15	15
2	43	8	0	1	0	0	1	55	55
0	13	4	0	1	0	0	0	18	18
0	13	2	0	0	0	0	0	15	15
0	8	4	0	1	1	0	0	14	14
0	11	3	0	2	0	0	0	16	16
0	45	13	0	4	1	0	0	63	63
0	10	1	0	1	0	0	1	13	13
0	9	1	0	1	0	0	0	11	11
0	12	0	0	0	0	0	0	12	12
0	20	2	0	1	0	0	0	23	23
0	51	4	0	3	0	0	1	59	59
1	10	1	0	0	1	0	1	14	14
0	10	3	0	1	0	0	0	14	14
0	16	1	0	2	0	0	0	19	19
0	16	5	0	0	0	0	1	22	22
1	52	10	0	3	1	0	2	69	69
0	17	2	0	0	1	0	0	20	20
0	21	0	0	0	0	0	0	21	21
0	6	2	0	1	0	0	0	9	9
1	15	2	0	0	0	0	0	18	18
1	59	6	0	1	1	0	0	68	68
1	22	2	0	0	0	0	1	26	26
0	14	2	0	0	0	0	0	16	16
0	25	5	0	0	1	0	0	31	31
0	16	6	0	2	1	0	0	25	25
1	77	15	0	2	2	0	1	98	98
0	17	5	0	2	0	0	1	25	25
0	17	1	0	0	0	0	0	18	18
0	18	5	0	0	0	0	2	25	25
0	25	3	0	2	0	0	1	31	31
0	77	14	0	4	0	0	4	99	99
0	22	1	0	0	1	0	0	24	24
0	30	1	0	0	0	0	0	31	31
0	18	3	0	2	1	0	0	24	24
0	25	0	0	2	0	0	0	27	27
0	95	5	0	4	2	0	0	106	106
0	19	1	0	0	0	0	0	20	20
0	14	3	0	0	0	0	0	17	17
0	15	2	0	0	0	0	0	17	17
0	21	2	0	0	0	0	0	23	23
0	69	8	0	0	0	0	0	77	77
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
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
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
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
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
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
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
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
0	0	0	0	0	0	0	0	0	0
9	1169	138	0	35	9	0	13	1373	1373

D => B

BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
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
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
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
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
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
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
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
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
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
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
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
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
1	94	6	0	1	1	0	0	103	103
3	103	13	1	3	0	0	0	123	123
1	69	11	0	3	1	0	3	88	88
0	26	2	0	0	0	1	0	29	29
5	292	32	1	7	2	1	3	343	343
1	42	5	0	3	3	0	2	56	56
2	38	8	0	1	1	0	1	51	51
5	34	4	2	0	2	0	4	51	51
4	63	8	0	0	2	1	4	82	82
12	177	25	2	4	8	1	11	240	240
2	92	11	0	2	2	0	3	112	112
1	78	15	0	2	3	0	2	101	101
2	104	10	0	5	1	0	2	124	124
2	104	13	0	0	0	1	5	125	125
7	378	49	0	9	6	1	12	462	462
2	89	13	0	0	1	0	4	109	109
4	102	11	0	1	1	0	2	121	121
4	81	13	0	1	0	0	4	103	103
1	72	9	0	2	0	0	2	86	86
11	344	46	0	4	2	0	12	419	419
2	84	12	0	0	4	0	2	104	104
4	77	10	0	1	1	0	0	93	93
3	71	9	0	3	1	0	3	90	90
2	85	7	0	1	1	0	2	98	98
11	317	38	0	5	7	0	7	385	385
0	78	8	0	3	1	0	1	91	91
4	90	13	0	0	1	0	4	112	112
2	74	2	0	3	0	0	5	86	86
1	71	16	0	0	2	0	0	90	90
7	313	39	0	6	4	0	10	379	379
0	100	6	0	3	0	0	0	109	109
2	82	8	0	1	0	0	2	95	95
3	78	7	0	1	2	0	2	93	93
1	104	14	0	0	2	0	1	122	122
6	364	35	0	5	4	0	5	419	419
3	73	16	1	1	2	0	3	99	99
2	81	10	0	0	1	0	5	99	99
4	70	9	0	2	1	0	0	86	86
3	64	7	0	2	1	0	4	81	81
12	288	42	1	5	5	0	12	365	365
3	60	9	0	0	1	0	2	75	75
2	84	7	0	1	2	0	3	99	99
2	80	8	0	1	1	0	2	94	94
3	66	10	0	2	0	0	1	82	82
10	290	34	0	4	4	0	8	350	350
2	76	9	0	0	1	0	0	88	88
1	79	6	0	0	1	0	2	89	89
4	84	6	0	0	0	1	0	95	95
2	79	10	0	2	0	0	1	94	94
9	318	31	0	2	2	1	3	366	366
3	64	6	0	0	0	0	0	73	73
8	89	5	1	0	0	0	0	103	103
5	108	5	0	1	0	0	0	119	119
4	101	11	0	0	0	0	0	116	116
20	362	27	1	1	0	0	0	411	411
1	108	7	0	2	0	0	0	118	118
3	94	0	0	0	0	0	0	97	97
2	122	4	1	0	0	0	0	129	129
5	90	4	0	0	0	0	0	99	99
11	414	15	1	2	0	0	0	443	443
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
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
0	0	0	0	0	0	0	0	0	0
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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
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
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
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
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
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
121	3857	413	6	54	44	4	83	4582	4582

D => C

BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
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
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
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
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
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
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
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
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
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
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
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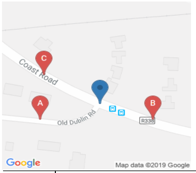
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	11	3	0	0	0	0	1	15	15
0	10	1	0	1	0	0	0	12	12
0	17	1	0	2	0	0	1	21	21
0	12	1	0	1	0	0	1	15	15
0	50	6	0	4	0	0	3	63	63
0	6	2	0	0	0	0	0	8	8
0	7	1	0	0	0	0	0	8	8
0	10	0	0	0	2	0	0	12	12
0	9	2	0	0	3	0	0	14	14
0	32	5	0	0	5	0	0	42	42
0	14	2	0	1	1	0	0	18	18
0	14	2	0	3	1	0	1	21	21
0	6	2	0	0	0	0	0	8	8
0	10	1	0	0	1	0	2	14	14
0	44	7	0	4	3	0	3	61	61
0	4	1	0	2	0	0	0	7	7
0	7	1	0	2	2	0	0	12	12
0	8	5	0	2	0	0	0	15	15
0	10	4	0	2	0	0	0	16	16
0	29	11	0	8	2	0	0	50	50
0	18	0	0	1	1	0	2	22	22
0	5	1	0	0	0	0	1	7	7
0	12	1	0	0	2	0	0	15	15
0	12	0	0	1	0	0	0	13	13
0	47	2	0	2	3	0	3	57	57
0	8	3	0	1	2	0	0	14	14
0	18	4	0	0	1	0	0	23	23
0	20	1	0	0	1	0	0	22	22
0	15	2	0	0	1	0	1	19	19
0	61	10	0	1	5	0	1	78	78
0	21	4	0	1	0	0	0	26	26
0	21	1	0	0	0	0	0	22	22
0	14	2	0	1	2	0	0	19	19
0	15	1	0	0	0	0	1	17	17
0	71	8	0	2	2	0	1	84	84
0	17	1	0	1	0	0	0	19	19
0	14	1	0	0	1	0	0	16	16
0	15	1	0	3	1	0	0	20	20
0	29	5	1	0	0	0	0	35	35
0	75	8	1	4	2	0	0	90	90
0	16	4	0	2	0	0	0	22	22
0	25	2	0	0	2	0	0	29	29
0	23	3	0	0	2	0	0	28	28
0	16	1	0	0	0	0	0	17	17
0	80	10	0	2	4	0	0	96	96
0	23	3	0	0	0	0	0	26	26
0	36	2	0	0	0	0	1	39	39
0	30	3	0	0	1	0	0	34	34
0	42	0	0	0	0	0	0	42	42
0	131	8	0	0	1	0	1	141	141
0	39	1	0	3	0	0	0	43	43
0	58	2	0	2	1	0	0	63	63
0	50	4	0	0	0	0	0	54	54
0	41	3	0	0	0	0	1	45	45
0	188	10	0	5	1	0	1	205	205
0	69	3	0	0	0	0	1	73	73
0	33	2	0	2	0	0	1	38	38
0	39	1	0	0	0	0	0	40	40
0	23	2	1	0	0	0	0	26	26
0	164	8	1	2	0	0	2	177	177
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
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
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
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
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
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
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
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
0	0	0	0	0	0	0	0	0	0
0	972	93	2	34	28	0	15	1144	1144

D => D

BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	TOT	PCU
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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
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



IDASO

Survey Name: Dublin Road, Galway Survey 2018 MCC Data
Site: 49
Location: Doughiska, Rosshill Cross
Date: 15-Nov-2018

A => A

TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	BEB	OB	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0	0	0
00:45	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
01:00	0	0	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0	0	0
01:45	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
02:00	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0	0	0
02:45	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
03:00	0	0	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0	0	0
03:45	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
04:00	0	0	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0	0	0
04:45	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
05:00	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0	0	0
05:45	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
06:00	0	0	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0	0	0
06:45	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
07:00	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
07:30	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
H/TOT	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
08:15	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
08:45	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
09:00	0	0	0	0	0	0	0	0	0	0	0	0
09:15	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
09:45	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
10:00	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
10:30	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
H/TOT	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
11:15	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
11:45	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
12:00	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
12:30	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
H/TOT	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
13:15	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
13:45	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
14:00	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
14:30	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
H/TOT	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
15:15	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
15:45	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
16:00	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
16:30	0	0	0	0	0	0	0	0	0	0	0	0
16:45	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
17:00	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
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	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
18:00	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
18:30	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
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0
19:45	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
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
20:45	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
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
21:45	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
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
22:45	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
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0
23:45	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
24 TOT	0	0	0	0	0	0	0	0	0	0	0	0

A => B

TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	BEB	OB	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0	0	0
00:45	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
01:00	0	0	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0	0	0
01:45	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
02:00	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0	0	0
02:45	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
03:00	0	0	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0	0	0
03:45	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
04:00	0	0	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0	0	0
04:45	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
05:00	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0	0	0
05:45	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
06:00	0	0	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0	0	0
06:45	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
07:00	0	2	0	0	0	0	0	0	0	0	2	2
07:15	0	3	1	0	1	0	0	0	0	0	5	5
07:30	0	1	2	0	0	0	0	1	0	0	4	4
07:45	0	4	2	0	0	0	0	0	0	0	6	6
H/TOT	0	10	5	0	1	0	0	1	0	0	17	17
08:00	0	9	1	0	0	0	0	0	0	0	10	10
08:15	0	7	0	0	0	0	0	0	0	0	7	7
08:30	0	12	2	0	1	0	0	0	0	0	15	15
08:45	0	9	3	0	0	0	0	0	0	0	12	12
H/TOT	0	37	6	0	1	0	0	0	0	0	44	44
09:00	0	5	3	0	1	0	1	0	0	0	10	10
09:15	0	2	0	0	0	0	0	0	0	0	2	2
09:30	0	3	1	0	0	0	1	0	0	0	5	5
09:45	0	2	3	0	0	0	0	0	0	0	5	5
H/TOT	0	12	7	0	1	0	2	0	0	0	22	22
10:00	0	3	2	0	0	0	0	0	0	0	5	5
10:15	0	4	2	0	0	0	0	0	0	0	6	6
10:30	0	4	1	0	0	0	0	1	0	0	6	6
10:45	0	6	1	0	0	0	0	0	0	0	7	7
H/TOT	0	17	6	0	0	0	0	1	0	0	24	24
11:00	0	2	1	0	0	0	0	0	0	0	3	3
11:15	0	7	0	0	0	1	0	0	0	0	8	8
11:30	0	7	1	0	0	0	0	0	0	0	8	8
11:45	0	4	1	0	0	0	0	0	0	0	5	5
H/TOT	0	20	3	0	0	1	0	0	0	0	24	24
12:00	0	5	1	0	0	0	1	1	0	0	8	8
12:15	1	11	4	0	0	0	0	0	0	0	16	16
12:30	0	11	2	0	0	0	0	0	0	0	13	13
12:45	0	6	0	0	1	0	1	0	0	0	8	8
H/TOT	1	33	7	0	1	0	2	1	0	0	45	45
13:00	0	12	1	0	1	0	0	1	0	0	15	15
13:15	0	6	0	0	0	0	0	0	0	0	6	6
13:30	0	6	0	0	0	0	0	0	0	0	6	6
13:45	0	15	1	0	0	0	0	0	0	0	16	16
H/TOT	0	39	2	0	1	0	0	1	0	0	43	43
14:00	0	19	0	0	0	0	0	0	0	0	19	19
14:15	0	9	1	0	0	0	0	0	0	0	10	10
14:30	0	13	0	0	0	0	0	0	0	0	13	13
14:45	0	16	1	0	0	0	0	0	0	0	17	17
H/TOT	0	57	2	0	0	0	0	0	0	0	59	59
15:00	0	14	1	0	0	0	0	0	0	0	15	15
15:15	0	8	4	0	0	0	0	0	0	0	12	12
15:30	0	18	4	0	0	0	0	0	0	0	22	22
15:45	0	22	5	0	0	0	0	0	0	0	27	27
H/TOT	0	62	14	0	0	0	0	0	0	0	76	76
16:00	0	17	2	0	0	0	0	1	0	0	20	20
16:15	0	26	2	0	0	0	0	0	0	0	28	28
16:30	0	30	3	0	1	0	0	0	0	0	34	34
16:45	0	33	3	0	0	0	0	1	0	0	37	37
H/TOT	0	106	10	0	1	0	0	2	0	0	119	119
17:00	0	36	7	0	1	0	1	0	0	0	45	45
17:15	0	34	2	0	0	0	2	0	0	0	38	38
17:30	0	31	1	0	0	0	0	0	0	0	32	32
17:45	0	30	1	0	0	0	0	0	0	0	31	31
H/TOT	0	131	11	0	1	0	3	0	0	0	146	146
18:00	0	27	2	0	0	0	1	0	0	0	30	30
18:15	0	18	2	0	1	0	0	0	0	0	21	21
18:30	0	8	0	0	0	0	0	0	0	0	8	8
18:45	0	6	0	0	0	0	0	0	0	0	6	6
H/TOT	0	59	4	0	1	0	1	0	0	0	65	65
19:00	0	0	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0
19:45	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
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
20:45	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
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
21:45	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
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
22:45	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
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0
23:45	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
24 TOT	1	583	77	0	8	1	8	6	0	0	684	684

A => C

TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	BEB	OB	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0	0	0
00:45	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
01:00	0	0	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0	0	0
01:45	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
02:00	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0	0	0
02:45	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
03:00	0	0	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0	0	0
03:45	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
04:00	0	0	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0	0	0
04:45	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
05:00	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0	0	0
05:45	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
06:00	0	0	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0	0	0
06:45	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
07:00	0	0	0	0	0	0	0	0	0	0	0	0
07:15	0	1	0	0	0	0	0	0	0	0	1	1
07:30	0	0	0	0	0	0	0	0	0	0	0	0
07:45	0	0	1	0	0	0	1	0	0	0	2	2
H/TOT	0	1	1	0	0	0	1	0	0	0	3	3
08:00	0	1	0	0	0	0	0	0	0	0	1	1
08:15	0	0	0	0	0	0	1	0	0	0	1	1
08:30	0	1	0	0	0	0	0	0	0	0	1	1
08:45	0	1	0	0	0	0	0	0	0	0	1	1
H/TOT	0	3	0	0	0	0	1	0	0	0	4	4
09:00	0	0	1	0	0	1	0	0	0	0	2	2
09:15	0	2	0	0	0	0	0	0	0	0	2	2
09:30	0	0	1	0	0	0	0	0	0	0	1	1
09:45	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	2	2	0	0	1	0	0	0	0	5	5
10:00	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
10:30	0	1	0	0	0	0	0	0	0	0	1	1
10:45	0	1	0	0	0	0	0	0	0	0	1	1
H/TOT	0	2	0	0	0	0	0	0	0	0	2	2
11:00	0	1	1	0	0	0	0	0	0	0	2	2
11:15	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
11:45	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	1	1	0	0	0	0	0	0	0	2	2
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	1	0	0	0	0	0	0	0	0	1	1
12:30	0	0	0	0	0	0	0	0	0	0	0	0
12:45	0	1	0	0	0	0	0	0	0	0	1	1
H/TOT	0	2	0	0	0	0	0	0	0	0	2	2
13:00	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
13:30	0	1	0	0	1	0	0	0	0	0	2	2
13:45	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	1	0	0	1	0	0	0	0	0	2	2
14:00	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
14:30	0	1	0	0	0	0	0	0	0	0	1	1
14:45	0	0	1	0	0	0	0	0	0	0	1	1
H/TOT	0	1	1	0	0	0	0	0	0	0	2	2
15:00	0	2	0	0	0	0	0	0	0	0	2	2
15:15	0	0	1	0	0	0	0	0	0	0	1	1
15:30	0	1	0	0	0	0	0	0	0	0	1	1
15:45	0	0	0	0	0	0	1	0	0	0	1	1
H/TOT	0	3	1	0	0	0	1	0	0	0	5	5
16:00	0	2	0	0	0	0	0	0	0	0	2	2
16:15	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
16:45	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	2	0	0	0	0	0	0	0	0	2	2
17:00	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
17:30	0	1	0	0	0	0	0	0	0	0	1	1
17:45	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	1	0	0	0	0	0	0	0	0	1	1
18:00	0	0	0	0	0	0	0	0	0	0	0	0
18:15	0	1	0	0	0	0	0	0	0	0	1	1
18:30	0	1	0	0	0	0	0	0	0	0	1	1
18:45	0	1	0	0	0	0	0	0	0	0	1	1
H/TOT	0	3	0	0	0	0	0	0	0	0	3	3
19:00	0	0	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0
19:45	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
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
20:45	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
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
21:45	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
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
22:45	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
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0
23:45	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
24 TOT	0	22	6	0	1	1	3	0	0	0	33	33

B => A

TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	BEB	OB	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0	0	0
00:45	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
01:00	0	0	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0	0	0
01:45	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
02:00	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0	0	0
02:45	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
03:00	0	0	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0	0	0
03:45	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
04:00	0	0	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0	0	0
04:45	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
05:00	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0	0	0
05:45	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
06:00	0	0	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0	0	0
06:45	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
07:00	0	21	1	0	0	0	1	0	0	0	23	23
07:15	0	62	4	0	1	0	0	0	0	0	67	67
07:30	0	122	19	0	0	0	0	0	0	0	141	141
07:45	0	91	8	0	0	0	0	0	0	0	99	99
H/TOT	0	296	32	0	1	0	1	0	0	0	330	330
08:00	0	103	2	0	1	0	1	0	0	0	107	107
08:15	0	81	1	0	1	0	1	0	0	0	84	84
08:30	0	51	7	0	0	0	2	0	0	0	60	60
08:45	0	44	4	0	1	0	0	0	0	0	49	49
H/TOT	0	279	14	0	3	0	4	0	0	0	300	300
09:00	0	48	5	0	1	0	1	0	0	0	55	55
09:15	0	45	3	0	1	0	0	0	0	0	49	49
09:30	0	37	1	0	1	0	1	0	0	0	40	40
09:45	0	16	2	0	0	0	0	0	0	0	18	18
H/TOT	0	146	11	0	3	0	2	0	0	0	162	162
10:00	0	9	2	0	0	0	0	0	0	0	11	11
10:15	1	9	0	0	0	0	0	0	0	0	10	10
10:30	0	10	1	0	0	0	0	0	0	0	11	11
10:45	0	11	1	0	0	0	0	0	0	0	12	12
H/TOT	1	39	4	0	0	0	0	0	0	0	44	44
11:00	0	3	2	0	0	0	0	0	0	0	5	5
11:15	0	7	0	0	1	0	0	0	0	0	8	8
11:30	0	2	0	0	0	0	0	0	0	0	2	2
11:45	0	10	2	0	0	0	1	1	0	0	14	14
H/TOT	0	22	4	0	1	0	1	1	0	0	29	29
12:00	0	8	0	0	1	0	0	0	0	0	9	9
12:15	0	4	0	0	0	0	0	0	0	0	4	4
12:30	0	8	0	0	0	0	0	0	0	0	8	8
12:45	0	3	3	0	0	0	0	1	0	0	7	7
H/TOT	0	23	3	0	1	0	0	1	0	0	28	28
13:00	0	11	0	0	0	0	1	1	0	0	13	13
13:15	0	7	0	0	0	0	0	0	0	0	7	7
13:30	0	10	1	0	0	0	0	0	0	0	11	11
13:45	0	13	1	0	1	0	0	1	0	0	16	16
H/TOT	0	41	2	0	1	0	1	2	0	0	47	47
14:00	0	12	3	0	0	0	0	0	0	0	15	15
14:15	0	14	0	0	0	0	0	0	0	0	14	14
14:30	0	8	0	0	0	0	0	0	0	0	8	8
14:45	0	9	0	0	0	0	0	1	0	0	10	10
H/TOT	0	43	3	0	0	0	0	1	0	0	47	47
15:00	0	6	2	0	1	0	0	0	0	0	9	9
15:15	0	9	1	0	0	0	1	0	0	0	11	11
15:30	0	3	3	0	0	0	0	0	0	0	6	6
15:45	0	10	3	0	0	0	0	0	0	0	13	13
H/TOT	0	28	9	0	1	0	1	0	0	0	39	39
16:00	0	9	0	0	1	0	0	0	0	0	10	10
16:15	0	16	3	0	0	0	1	0	0	0	20	20
16:30	0	11	1	0	0	0	0	0	0	0	12	12
16:45	0	7	1	0	0	0	0	1	0	0	9	9
H/TOT	0	43	5	0	1	0	1	1	0	0	51	51
17:00	0	8	1	0	1	0	0	0	0	0	10	10
17:15	0	12	2	0	0	1	0	0	0	0	15	15
17:30	0	8	0	0	0	0	0	0	0	0	8	8
17:45	0	10	2	0	0	0	0	0	0	0	12	12
H/TOT	0	38	5	0	1	1	0	0	0	0	45	45
18:00	0	8	1	0	0	0	0	0	0	0	9	9
18:15	0	2	0	0	0	0	0	0	0	0	2	2
18:30	0	4	0	0	0	0	0	0	0	0	4	4
18:45	0	4	0	0	0	0	0	0	0	0	4	4
H/TOT	0	18	1	0	0	0	0	0	0	0	19	19
19:00	0	0	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0
19:45	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
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
20:45	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
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
21:45	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
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
22:45	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
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0
23:45	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
24 TOT	1	1016	93	0	13	1	11	6	0	0	1141	1141

B => B

TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	BEB	OB	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0	0	0
00:45	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
01:00	0	0	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0	0	0
01:45	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
02:00	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0	0	0
02:45	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
03:00	0	0	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0	0	0
03:45	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
04:00	0	0	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0	0	0
04:45	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
05:00	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0	0	0
05:45	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
06:00	0	0	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0	0	0
06:45	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
07:00	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
07:30	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
H/TOT	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
08:15	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
08:45	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
09:00	0	0	0	0	0	0	0	0	0	0	0	0
09:15	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
09:45	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
10:00	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
10:30	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
H/TOT	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
11:15	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
11:45	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
12:00	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
12:30	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
H/TOT	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
13:15	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
13:45	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
14:00	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
14:30	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
H/TOT	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
15:15	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
15:45	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
16:00	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
16:30	0	0	0	0	0	0	0	0	0	0	0	0
16:45	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
17:00	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
17:30	0	0	0	0	0	0	0	0	0	0	0	0
17:45	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
18:00	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
18:30	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
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0
19:00	0	0	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0
19:45	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
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
20:45	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
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
21:45	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
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
22:45	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
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0
23:45	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
24 TOT	0	0	0	0	0	0	0	0	0	0	0	0

B => C

TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	BEB	OB	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0	0	0
00:45	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
01:00	0	0	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0	0	0
01:45	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
02:00	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0	0	0
02:45	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
03:00	0	0	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0	0	0
03:45	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
04:00	0	0	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0	0	0
04:45	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
05:00	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0	0	0
05:45	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
06:00	0	0	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0	0	0
06:45	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
07:00	0	56	1	0	1	0	0	0	0	0	58	58
07:15	0	76	2	0	3	0	0	0	0	0	81	81
07:30	1	90	9	0	1	0	2	0	0	0	103	103
07:45	1	108	8	0	0	0	0	0	0	0	117	117
H/TOT	2	330	20	0	5	0	2	0	0	0	359	359
08:00	4	142	7	0	0	1	0	0	0	0	154	154
08:15	3	108	7	0	0	0	2	1	0	0	121	121
08:30	2	69	9	0	2	0	1	2	0	0	85	85
08:45	0	74	8	0	0	1	0	2	0	0	85	85
H/TOT	9	393	31	0	2	2	3	5	0	0	445	445
09:00	0	57	3	0	0	0	1	1	0	0	62	62
09:15	1	60	3	0	3	0	1	0	0	0	68	68
09:30	3	40	4	0	1	0	2	1	0	0	51	51
09:45	0	29	4	0	0	0	0	1	0	0	34	34
H/TOT	4	186	14	0	4	0	4	3	0	0	215	215
10:00	1	28	4	0	1	1	0	0	0	0	35	35
10:15	1	29	2	0	0	0	0	1	0	0	33	33
10:30	2	29	3	0	1	0	0	1	0	0	36	36
10:45	0	37	3	0	0	0	0	2	0	0	42	42
H/TOT	4	123	12	0	2	1	0	4	0	0	146	146
11:00	0	24	5	1	0	0	0	1	0	0	31	31
11:15	0	35	3	0	0	0	0	0	0	0	38	38
11:30	1	38	2	0	0	1	0	0	0	0	42	42
11:45	0	24	4	0	3	0	0	0	0	0	31	31
H/TOT	1	121	14	1	3	1	0	1	0	0	142	142
12:00	0	33	3	0	1	1	0	1	0	0	39	39
12:15	0	27	3	0	1	0	0	1	0	0	32	32
12:30	3	32	8	1	0	1	0	0	0	0	45	45
12:45	0	35	5	0	0	0	0	0	0	0	40	40
H/TOT	3	127	19	1	2	2	0	2	0	0	156	156
13:00	0	40	4	0	1	0	0	0	0	0	45	45
13:15	1	29	5	0	0	0	1	1	0	0	37	37
13:30	1	26	3	0	2	1	0	0	0	0	33	33
13:45	0	33	5	0	0	0	0	0	0	0	38	38
H/TOT	2	128	17	0	3	1	1	1	0	0	153	153
14:00	0	22	4	0	1	2	0	1	0	0	30	30
14:15	0	29	3	0	0	1	0	1	0	0	34	34
14:30	2	34	5	0	1	0	0	0	0	0	42	42
14:45	1	34	5	0	0	0	0	1	0	0	41	41
H/TOT	3	119	17	0	2	3	0	3	0	0	147	147
15:00	0	29	3	0	1	0	0	0	0	0	33	33
15:15	4	29	3	0	1	0	0	1	0	0	38	38
15:30	0	33	5	0	1	1	1	0	0	0	41	41
15:45	0	32	2	1	1	0	0	1	0	0	37	37
H/TOT	4	123	13	1	4	1	1	2	0	0	149	149
16:00	0	40	4	1	0	0	0	0	0	0	45	45
16:15	0	56	2	0	0	2	0	0	0	0	60	60
16:30	1	21	2	0	0	0	0	0	0	0	24	24
16:45	0	25	1	0	0	0	0	0	0	0	26	26
H/TOT	1	142	9	1	0	2	0	0	0	0	155	155
17:00	0	37	5	0	0	1	0	0	0	0	43	43
17:15	0	34	3	0	0	0	0	0	0	0	37	37
17:30	2	39	1	0	0	1	0	0	0	0	43	43
17:45	0	48	0	0	0	0	0	0	0	0	48	48
H/TOT	2	158	9	0	0	2	0	0	0	0	171	171
18:00	0	43	0	0	0	0	0	0	0	0	43	43
18:15	0	38	0	0	0	0	0	0	0	0	38	38
18:30	0	56	0	0	0	0	1	0	0	0	57	57
18:45	0	45	0	0	1	0	0	0	0	0	46	46
H/TOT	0	182	0	0	1	0	1	0	0	0	184	184
19:00	0	0	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0
19:45	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
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
20:45	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
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
21:45	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
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
22:45	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
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0
23:45	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
24 TOT	35	2132	175	4	28	15	12	21	0	0	2422	2422

C => A

TIME	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	BEB	OB	TOT	PCU
00:00	0	0	0	0	0	0	0	0	0	0	0	0
00:15	0	0	0	0	0	0	0	0	0	0	0	0
00:30	0	0	0	0	0	0	0	0	0	0	0	0
00:45	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
01:00	0	0	0	0	0	0	0	0	0	0	0	0
01:15	0	0	0	0	0	0	0	0	0	0	0	0
01:30	0	0	0	0	0	0	0	0	0	0	0	0
01:45	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
02:00	0	0	0	0	0	0	0	0	0	0	0	0
02:15	0	0	0	0	0	0	0	0	0	0	0	0
02:30	0	0	0	0	0	0	0	0	0	0	0	0
02:45	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
03:00	0	0	0	0	0	0	0	0	0	0	0	0
03:15	0	0	0	0	0	0	0	0	0	0	0	0
03:30	0	0	0	0	0	0	0	0	0	0	0	0
03:45	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
04:00	0	0	0	0	0	0	0	0	0	0	0	0
04:15	0	0	0	0	0	0	0	0	0	0	0	0
04:30	0	0	0	0	0	0	0	0	0	0	0	0
04:45	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
05:00	0	0	0	0	0	0	0	0	0	0	0	0
05:15	0	0	0	0	0	0	0	0	0	0	0	0
05:30	0	0	0	0	0	0	0	0	0	0	0	0
05:45	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
06:00	0	0	0	0	0	0	0	0	0	0	0	0
06:15	0	0	0	0	0	0	0	0	0	0	0	0
06:30	0	0	0	0	0	0	0	0	0	0	0	0
06:45	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
07:00	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
07:30	0	2	0	0	0	0	0	0	0	0	2	2
07:45	0	1	0	0	0	0	0	0	0	0	1	1
H/TOT	0	3	0	0	0	0	0	0	0	0	3	3
08:00	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
08:30	0	0	0	0	0	0	0	0	0	0	0	0
08:45	0	0	1	0	0	0	0	0	0	0	1	1
H/TOT	0	0	1	0	0	0	0	0	0	0	1	1
09:00	0	1	0	0	0	0	0	0	0	0	1	1
09:15	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
09:45	0	0	1	0	0	0	0	0	0	0	1	1
H/TOT	0	1	1	0	0	0	0	0	0	0	2	2
10:00	0	1	0	0	0	0	0	0	0	0	1	1
10:15	0	0	0	0	0	0	0	0	0	0	0	0
10:30	0	2	0	0	0	0	0	0	0	0	2	2
10:45	0	0	0	0	0	1	0	0	0	0	1	1
H/TOT	0	3	0	0	0	1	0	0	0	0	4	4
11:00	0	0	1	0	0	0	0	0	0	0	1	1
11:15	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
11:45	0	0	1	0	0	0	0	0	0	0	1	1
H/TOT	0	0	2	0	0	0	0	0	0	0	2	2
12:00	0	0	0	0	0	0	0	0	0	0	0	0
12:15	0	1	0	0	0	0	0	0	0	0	1	1
12:30	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
H/TOT	0	1	0	0	0	0	0	0	0	0	1	1
13:00	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
13:30	0	1	0	0	0	0	1	0	0	0	2	2
13:45	0	1	0	0	0	0	0	0	0	0	1	1
H/TOT	0	2	0	0	0	0	1	0	0	0	3	3
14:00	0	1	0	0	0	0	0	0	0	0	1	1
14:15	0	0	0	0	0	0	0	0	0	0	0	0
14:30	0	1	0	0	0	0	0	0	0	0	1	1
14:45	0	0	0	0	0	0	0	0	0	0	0	0
H/TOT	0	2	0	0	0	0	0	0	0	0	2	2
15:00	0	0	0	0	0	0	0	0	0	0	0	0
15:15	0	2	0	0	0	0	0	0	0	0	2	2
15:30	0	0	0	0	0	0	0	0	0	0	0	0
15:45	0	1	0	0	0	0	0	0	0	0	1	1
H/TOT	0	3	0	0	0	0	0	0	0	0	3	3
16:00	0	2	0	0	0	0	0	0	0	0	2	2
16:15	0	0	0	0	0	0	0	0	0	0	0	0
16:30	0	0	0	0	0	0	1	0	0	0	1	1
16:45	0	2	0	0	0	0	0	0	0	0	2	2
H/TOT	0	4	0	0	0	0	1	0	0	0	5	5
17:00	0	1	0	0	0	0	0	0	0	0	1	1
17:15	0	1	0	0	0	0	0	0	0	0	1	1
17:30	0	1	1	0	0	0	0	0	0	0	2	2
17:45	0	2	0	0	0	0	0	0	0	0	2	2
H/TOT	0	5	1	0	0	0	0	0	0	0	6	6
18:00	0	3	0	1	0	0	0	0	0	0	4	4
18:15	0	1	0	0	0	0	0	0	0	0	1	1
18:30	0	0	0	0	0	0	0	0	0	0	0	0
18:45	0	1	0	0	0	0	0	0	0	0	1	1
H/TOT	0	5	0	1	0	0	0	0	0	0	6	6
19:00	0	0	0	0	0	0	0	0	0	0	0	0
19:15	0	0	0	0	0	0	0	0	0	0	0	0
19:30	0	0	0	0	0	0	0	0	0	0	0	0
19:45	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
20:00	0	0	0	0	0	0	0	0	0	0	0	0
20:15	0	0	0	0	0	0	0	0	0	0	0	0
20:30	0	0	0	0	0	0	0	0	0	0	0	0
20:45	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
21:00	0	0	0	0	0	0	0	0	0	0	0	0
21:15	0	0	0	0	0	0	0	0	0	0	0	0
21:30	0	0	0	0	0	0	0	0	0	0	0	0
21:45	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
22:00	0	0	0	0	0	0	0	0	0	0	0	0
22:15	0	0	0	0	0	0	0	0	0	0	0	0
22:30	0	0	0	0	0	0	0	0	0	0	0	0
22:45	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
23:00	0	0	0	0	0	0	0	0	0	0	0	0
23:15	0	0	0	0	0	0	0	0	0	0	0	0
23:30	0	0	0	0	0	0	0	0	0	0	0	0
23:45	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
24 TOT	0	29	5	1	0	1	2	0	0	0	38	38

					C => B												C => C						
BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	BEB	OB	TOT	PCU	BUS	CAR	LGV	MCL	OGV1	OGV2	PCL	TAXI	BEB	OB	TOT	PCU
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	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	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	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
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	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	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	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
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	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	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	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
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	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	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	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
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	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	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	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
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	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	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	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
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	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	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	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
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	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	6	0	0	0	0	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0
1	11	1	0	0	0	0	0	0	0	13	13	0	0	0	0	0	0	0	0	0	0	0	0
2	18	4	0	2	0	0	0	0	0	26	26	0	0	0	0	0	0	0	0	0	0	0	0
0	27	2	0	1	0	0	0	0	0	30	30	0	0	0	0	0	0	0	0	0	0	0	0
3	62	7	0	3	0	0	0	0	0	75	75	0	0	0	0	0	0	0	0	0	0	0	0
0	38	2	0	0	2	0	0	0	0	42	42	0	0	0	0	0	0	0	0	0	0	0	0
2	46	3	0	0	0	0	1	0	0	52	52	0	0	0	0	0	0	0	0	0	0	0	0
0	44	3	0	1	0	1	1	0	0	50	50	0	0	0	0	0	0	0	0	0	0	0	0
0	33	3	0	1	3	0	0	0	0	40	40	0	0	0	0	0	0	0	0	0	0	0	0
2	161	11	0	2	5	1	2	0	0	184	184	0	0	0	0	0	0	0	0	0	0	0	0
0	17	0	0	0	0	0	1	0	0	18	18	0	0	0	0	0	0	0	0	0	0	0	0
1	18	2	0	0	1	0	0	0	0	22	22	0	0	0	0	0	0	0	0	0	0	0	0
0	17	3	0	1	0	0	2	0	0	23	23	0	0	0	0	0	0	0	0	0	0	0	0
1	15	2	0	2	1	0	1	0	0	22	22	0	0	0	0	0	0	0	0	0	0	0	0
2	67	7	0	3	2	0	4	0	0	85	85	0	0	0	0	0	0	0	0	0	0	0	0
0	20	2	0	1	0	0	0	0	0	23	23	0	0	0	0	0	0	0	0	0	0	0	0
3	22	1	0	2	0	1	1	0	0	30	30	0	0	0	0	0	0	0	0	0	0	0	0
0	18	3	0	0	0	0	1	0	0	22	22	0	0	0	0	0	0	0	0	0	0	0	0
0	23	4	0	0	0	0	0	0	0	27	27	0	0	0	0	0	0	0	0	0	0	0	0
3	83	10	0	3	0	1	2	0	0	102	102	0	0	0	0	0	0	0	0	0	0	0	0
0	15	2	0	1	0	0	0	0	0	18	18	0	0	0	0	0	0	0	0	0	0	0	0
1	26	2	0	0	1	0	1	0	0	31	31	0	0	0	0	0	0	0	0	0	0	0	0
0	25	2	0	0	0	0	0	0	0	27	27	0	0	0	0	0	0	0	0	0	0	0	0
0	30	4	0	0	0	0	0	0	0	34	34	0	0	0	0	0	0	0	0	0	0	0	0
1	96	10	0	1	1	0	1	0	0	110	110	0	0	0	0	0	0	0	0	0	0	0	0
1	39	4	1	0	0	0	1	0	0	46	46	0	0	0	0	0	0	0	0	0	0	0	0
1	28	3	0	1	0	0	0	0	0	33	33	0	0	0	0	0	0	0	0	0	0	0	0
0	35	2	0	2	0	0	2	0	0	41	41	0	0	0	0	0	0	0	0	0	0	0	0
0	31	6	0	0	1	0	1	0	0	39	39	0	0	0	0	0	0	0	0	0	0	0	0
2	133	15	1	3	1	0	4	0	0	159	159	0	0	0	0	0	0	0	0	0	0	0	0
0	25	4	0	3	1	1	1	0	0	35	35	0	0	0	0	0	0	0	0	0	0	0	0
2	31	5	0	0	1	0	3	0	0	42	42	0	0	0	0	0	0	0	0	0	0	0	0
1	30	5	0	2	1	0	0	0	0	39	39	0	0	0	0	0	0	0	0	0	0	0	0
0	31	0	0	1	0	0	1	0	0	33	33	0	0	0	0	0	0	0	0	0	0	0	0
3	117	14	0	6	3	1	5	0	0	149	149	0	0	0	0	0	0	0	0	0	0	0	0
0	57	3	0	1	1	0	1	0	0	63	63	0	0	0	0	0	0	0	0	0	0	0	0
2	39	3	0	0	2	0	1	0	0	47	47	0	0	0	0	0	0	0	0	0	0	0	0
0	37	3	0	0	0	0	0	0	0	40	40	0	0	0	0	0	0	0	0	0	0	0	0
0	36	3	0	1	2	1	0	0	0	43	43	0	0	0	0	0	0	0	0	0	0	0	0
2	169	12	0	2	5	1	2	0	0	193	193	0	0	0	0	0	0	0	0	0	0	0	0
0	35	7	0	0	1	0	0	0	0	43	43	0	0	0	0	0	0	0	0	0	0	0	0
2	45	4	0	1	0	0	0	0	0	52	52	0	0	0	0	0	0	0	0	0	0	0	0
0	47	2	0	1	1	0	0	0	0	51	51	0	0	0	0	0	0	0	0	0	0	0	0
2	47	2	1	0	1	0	0	0	0	53	53	0	0	0	0	0	0	0	0	0	0	0	0
4	174	15	1	2	3	0	0	0	0	199	199	0	0	0	0	0	0	0	0	0	0	0	0
0	57	10	0	0	0	1	1	0	0	69	69	0	0	0	0	0	0	0	0	0	0	0	0
3	57	6	0	0	0	0	1	0	0	67	67	0	0	0	0	0	0	0	0	0	0	0	0
2	53	6	0	0	1	1	1	0	0	64	64	0	0	0	0	0	0	0	0	0	0	0	0
0	62	7	1	1	0	0	0	0	0	71	71	0	0	0	0	0	0	0	0	0	0	0	0
5	229	29	1	1	1	2	3	0	0	271	271	0	0	0	0	0	0	0	0	0	0	0	0
0	64	3	0	1	0	0	0	0	0	68	68	0	0	0	0	0	0	0	0	0	0	0	0
1	82	2	0	0	0	0	0	0	0	85	85	0	0	0	0	0	0	0	0	0	0	0	0
2	64	0	0	0	0	0	0	0	0	66	66	0	0	0	0	0	0	0	0	0	0	0	0
1	70	0	1	0	0	0	0	0	0	72	72	0	0	0	0	0	0	0	0	0	0	0	0
4	280	5	1	1	0	0	0	0	0	291	291	0	0	0	0	0	0	0	0	0	0	0	0
0	68	0	0	0	0	0	0	0	0	68	68	0	0	0	0	0	0	0	0	0	0	0	0
3	65	0	1	0	0	0	0	0	0	69	69	0	0	0	0	0	0	0	0	0	0	0	0
1	60	0	0	0	0	0	0	0	0	61	61	0	0	0	0	0	0	0	0	0	0	0	0
0	43	0	0	0	0	0	0	0	0	43	43	0	0	0	0	0	0	0	0	0	0	0	0
4	236	0	1	0	0	0	0	0	0	241	241	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	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
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	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	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	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
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
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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	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	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	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
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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	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	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	0	0	0	0	0	0
35	1807	135	5	27	21	6	23	0	0	2059	2059	0	0	0	0	0	0	0	0	0	0	0	0

APPENDIX B

TRICS Analysis

Calculation Reference: AUDIT-363901-190628-0637

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : A - HOUSES PRIVATELY OWNED
VEHICLES

Selected regions and areas:

12	CONNAUGHT		
	CS	SLIGO	1 days
	RO	ROSCOMMON	3 days
14	LEINSTER		
	CC	CARLOW	1 days
	WC	WICKLOW	1 days
	WX	WEXFORD	1 days
16	ULSTER (REPUBLIC OF IRELAND)		
	CV	CAVAN	1 days
	DN	DONEGAL	2 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Secondary 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: Number of dwellings
Actual Range: 6 to 50 (units:)
Range Selected by User: 4 to 50 (units:)

Parking Spaces Range: All Surveys Included

Percentage of dwellings privately owned: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/11 to 10/10/18

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:

Monday	3 days
Wednesday	2 days
Thursday	4 days
Friday	1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count	10 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:

Suburban Area (PPS6 Out of Centre)	3
Edge of Town	6
Neighbourhood Centre (PPS6 Local Centre)	1

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:

Residential Zone	5
Village	1
No Sub Category	4

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.

Secondary Filtering selection:

Use Class:

C3	10 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order 2005 has been used for this purpose, which can be found within the Library module of TRICS®.

Population within 1 mile:

1,000 or Less	1 days
1,001 to 5,000	5 days
5,001 to 10,000	2 days
10,001 to 15,000	1 days
15,001 to 20,000	1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

5,000 or Less	4 days
5,001 to 25,000	4 days
25,001 to 50,000	2 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	5 days
1.6 to 2.0	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:

No	10 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	10 days

This data displays the number of selected surveys with PTAL Ratings.

LIST OF SITES relevant to selection parameters

1 CC-03-A-01 DETACHED HOUSES CARLOW
R417 ANTHY ROAD
CARLOW

Edge of Town
Residential Zone
Total Number of dwellings: 23
Survey date: WEDNESDAY 25/05/16 Survey Type: MANUAL

2 CS-03-A-03 MIXED HOUSES SLIGO
TOP ROAD
STRANDHILL
STRANDHILL
Neighbourhood Centre (PPS6 Local Centre)
Village
Total Number of dwellings: 30
Survey date: THURSDAY 27/10/16 Survey Type: MANUAL

3 CV-03-A-03 DETACHED HOUSES CAVAN
R212 DUBLIN ROAD
CAVAN
PULLAMORE NEAR
Edge of Town
No Sub Category
Total Number of dwellings: 37
Survey date: MONDAY 22/05/17 Survey Type: MANUAL

4 DN-03-A-03 DETACHED/SEMI-DETACHED DONEGAL
THE GRANGE
LETTERKENNY
GLENCAR IRISH
Edge of Town
Residential Zone
Total Number of dwellings: 50
Survey date: MONDAY 01/09/14 Survey Type: MANUAL

5 DN-03-A-06 DETACHED HOUSING DONEGAL
GLENFIN ROAD
BALLYBOFEY

Edge of Town
Residential Zone
Total Number of dwellings: 6
Survey date: WEDNESDAY 10/10/18 Survey Type: MANUAL

6 RO-03-A-02 SEMI DET. & BUNGALOWS ROSCOMMON
SLIGO ROAD
BALLAGHADERREEN

Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 31
Survey date: THURSDAY 14/07/11 Survey Type: MANUAL

7 RO-03-A-03 DETACHED HOUSES ROSCOMMON
N61
BOYLE
GREATMEADOW
Edge of Town
No Sub Category
Total Number of dwellings: 23
Survey date: THURSDAY 25/09/14 Survey Type: MANUAL

8 RO-03-A-04 SEMI DET. & BUNGALOWS ROSCOMMON
EAGLE COURT
ROSCOMMON
ARDNANAGH
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 39
Survey date: FRIDAY 26/09/14 Survey Type: MANUAL

LIST OF SITES relevant to selection parameters (Cont.)

9 WC-03-A-01 DETACHED HOUSES WICKLOW
STATION ROAD
WICKLOW
CORPORATION MURRAGH
Edge of Town
No Sub Category
Total Number of dwellings: 50
Survey date: MONDAY 28/05/18 Survey Type: MANUAL

10 WX-03-A-01 SEMI-DETACHED WEXFORD
CLONARD ROAD
WEXFORD

Suburban Area (PPS6 Out of Centre)
No Sub Category
Total Number of dwellings: 34
Survey date: THURSDAY 25/09/14 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 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED
VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	10	32	0.043	10	32	0.183	10	32	0.226
08:00 - 09:00	10	32	0.198	**10**	**32**	**0.560**	10	32	0.758
09:00 - 10:00	10	32	0.266	10	32	0.334	10	32	0.600
10:00 - 11:00	10	32	0.223	10	32	0.257	10	32	0.480
11:00 - 12:00	10	32	0.189	10	32	0.223	10	32	0.412
12:00 - 13:00	10	32	0.269	10	32	0.207	10	32	0.476
13:00 - 14:00	10	32	0.347	10	32	0.328	10	32	0.675
14:00 - 15:00	10	32	0.303	10	32	0.378	10	32	0.681
15:00 - 16:00	10	32	0.418	10	32	0.328	10	32	0.746
16:00 - 17:00	10	32	0.406	10	32	0.291	10	32	0.697
17:00 - 18:00	**10**	**32**	**0.483**	10	32	0.316	**10**	**32**	**0.799**
18:00 - 19:00	10	32	0.390	10	32	0.316	10	32	0.706
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			3.535			3.721			7.256

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.*

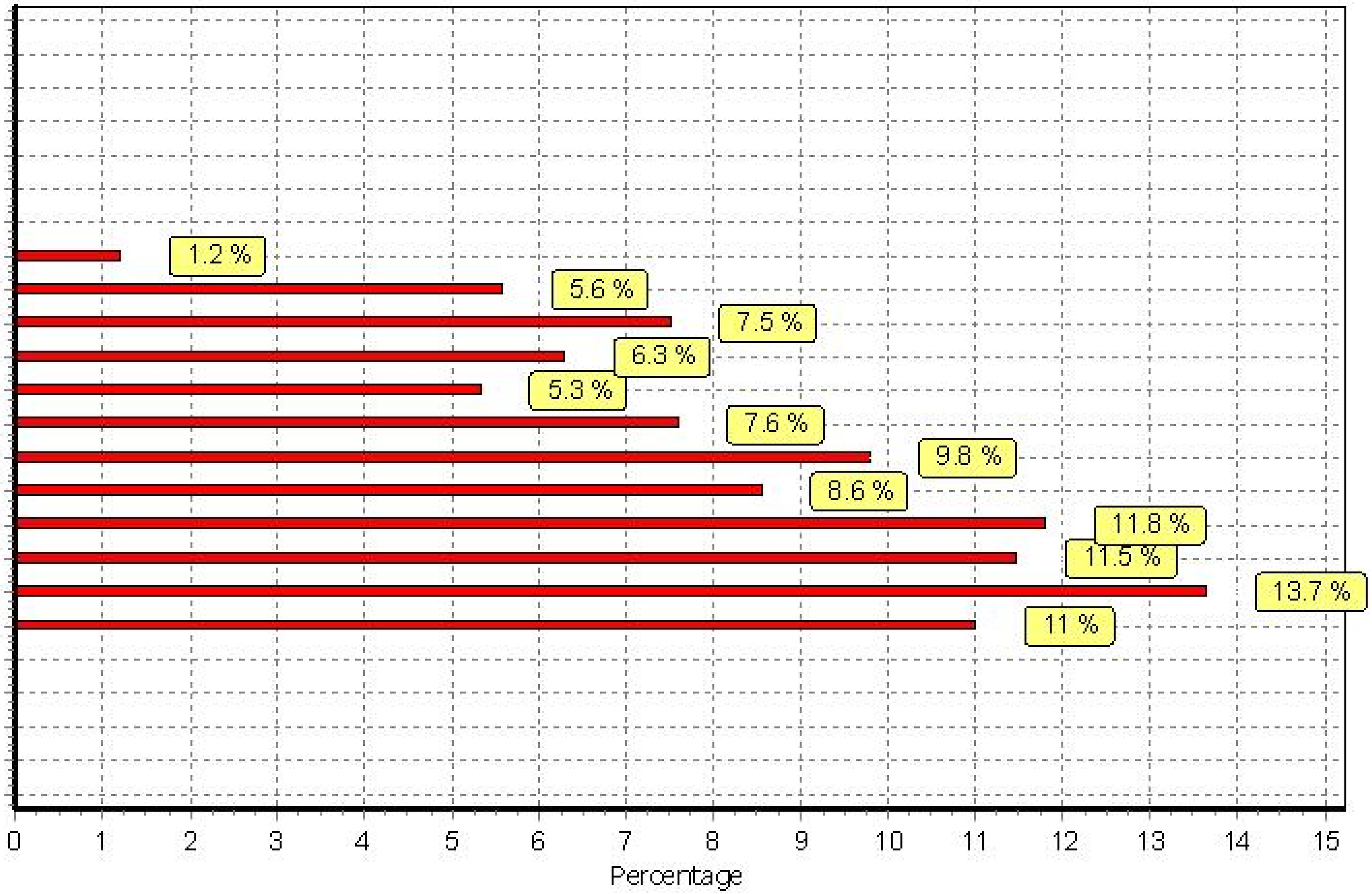
Parameter summary

Trip rate parameter range selected:	6 - 50 (units:)
Survey date date range:	01/01/11 - 10/10/18
Number of weekdays (Monday-Friday):	10
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	2
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.

TRIP RATE GRAPH - ARRIVALS 03 - RESIDENTIAL A - HOUSES PRIVATELY OWNED VEHICLES

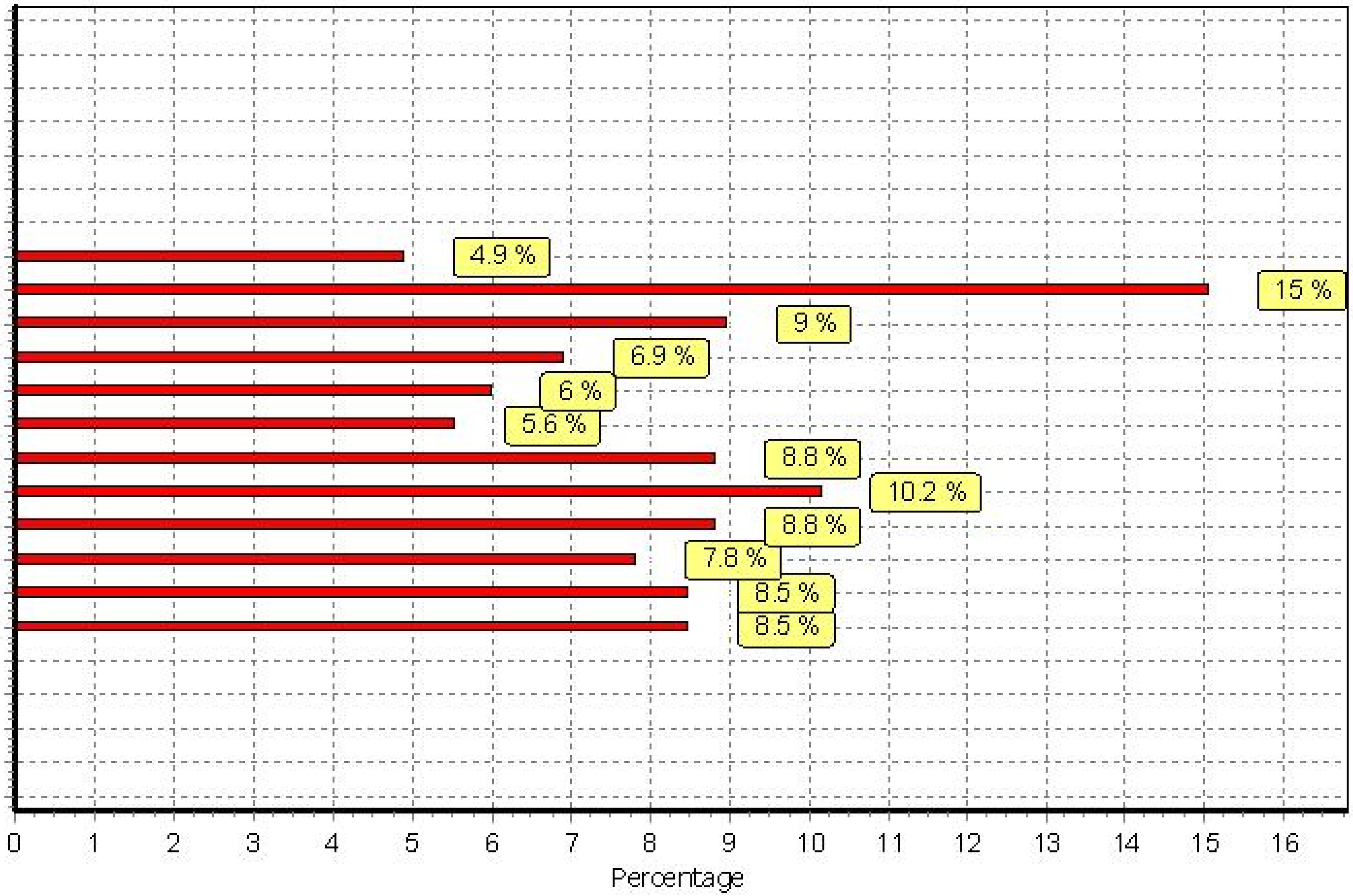
TIME	RATE	%
00:00-01:00		
01:00-02:00		
02:00-03:00		
03:00-04:00		
04:00-05:00		
05:00-06:00		
06:00-07:00		
07:00-08:00	0.043	1.2
08:00-09:00	0.198	5.6
09:00-10:00	0.266	7.5
10:00-11:00	0.223	6.3
11:00-12:00	0.189	5.3
12:00-13:00	0.269	7.6
13:00-14:00	0.347	9.8
14:00-15:00	0.303	8.6
15:00-16:00	0.418	11.8
16:00-17:00	0.406	11.5
17:00-18:00	0.483	13.7
18:00-19:00	0.390	11.0
19:00-20:00		
20:00-21:00		
21:00-22:00		
22:00-23:00		
23:00-24:00		



This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TRIP RATE GRAPH - DEPARTURES 03 - RESIDENTIAL A - HOUSES PRIVATELY OWNED VEHICLES

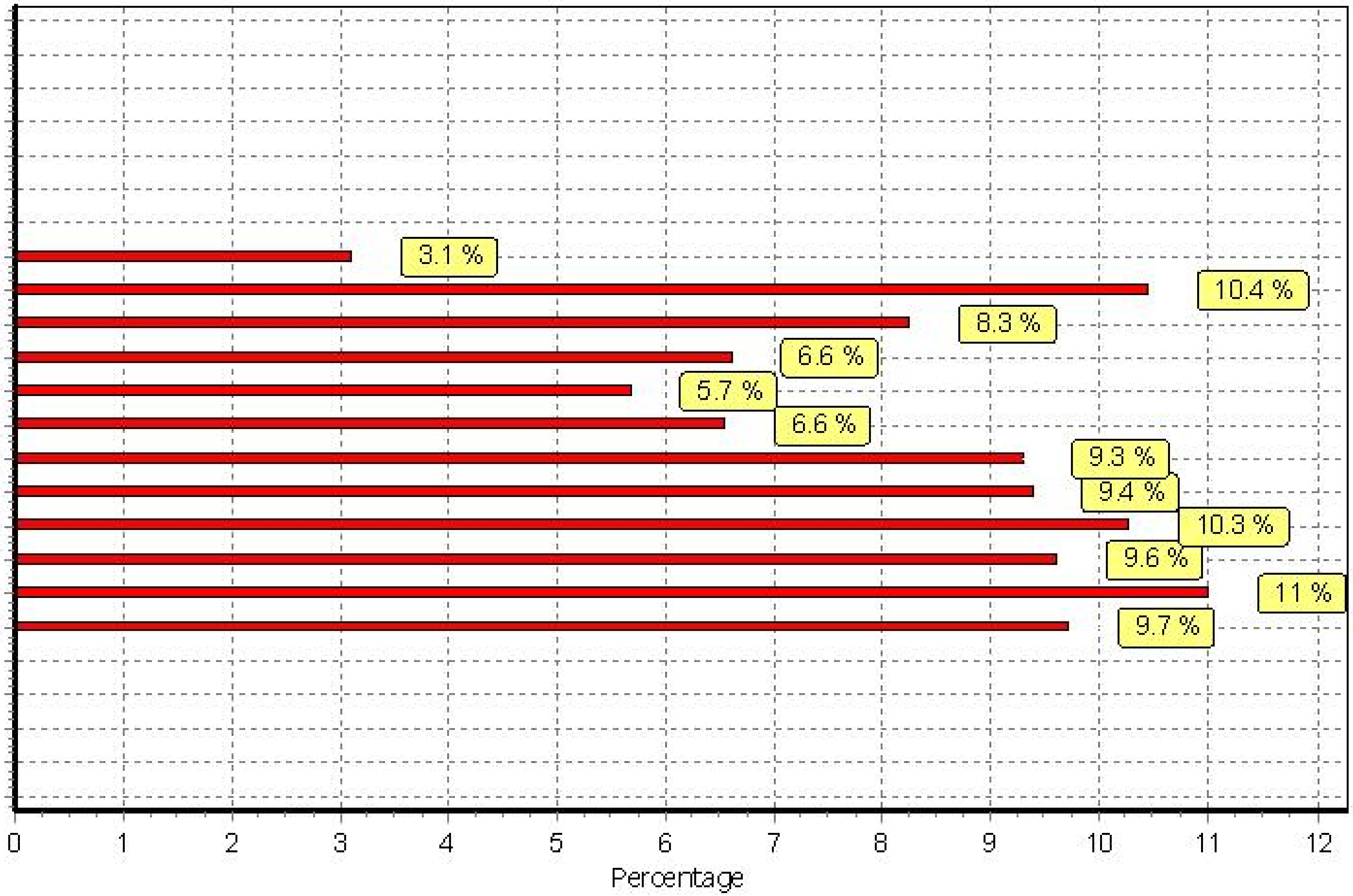
TIME	RATE	%
00:00-01:00		
01:00-02:00		
02:00-03:00		
03:00-04:00		
04:00-05:00		
05:00-06:00		
06:00-07:00		
07:00-08:00	0.183	4.9
08:00-09:00	0.560	15.0
09:00-10:00	0.334	9.0
10:00-11:00	0.257	6.9
11:00-12:00	0.223	6.0
12:00-13:00	0.207	5.6
13:00-14:00	0.328	8.8
14:00-15:00	0.378	10.2
15:00-16:00	0.328	8.8
16:00-17:00	0.291	7.8
17:00-18:00	0.316	8.5
18:00-19:00	0.316	8.5
19:00-20:00		
20:00-21:00		
21:00-22:00		
22:00-23:00		
23:00-24:00		



This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

TRIP RATE GRAPH - TOTALS 03 - RESIDENTIAL A - HOUSES PRIVATELY OWNED VEHICLES

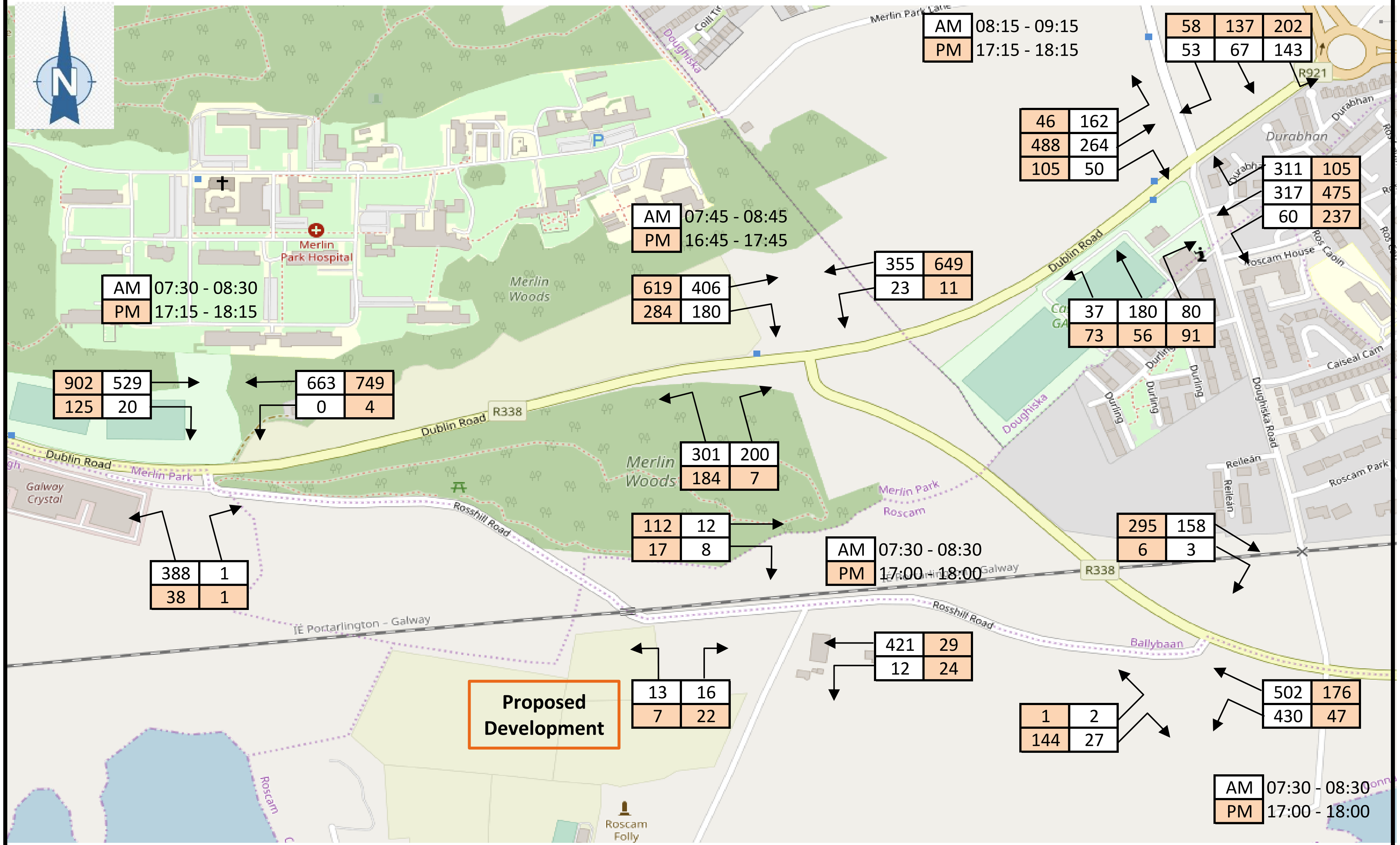
TIME	RATE	%
00:00-01:00		
01:00-02:00		
02:00-03:00		
03:00-04:00		
04:00-05:00		
05:00-06:00		
06:00-07:00		
07:00-08:00	0.226	3.1
08:00-09:00	0.758	10.4
09:00-10:00	0.600	8.3
10:00-11:00	0.480	6.6
11:00-12:00	0.412	5.7
12:00-13:00	0.476	6.6
13:00-14:00	0.675	9.3
14:00-15:00	0.681	9.4
15:00-16:00	0.746	10.3
16:00-17:00	0.697	9.6
17:00-18:00	0.799	11.0
18:00-19:00	0.706	9.7
19:00-20:00		
20:00-21:00		
21:00-22:00		
22:00-23:00		
23:00-24:00		



This graph is a visual representation of the trip rate calculation results screen. The same time periods and trip rates are displayed, but in addition there is an additional column showing the percentage of the total trip rate by individual time period, allowing peak periods to be easily identified through observation. Note that the type of count and the selected direction is shown at the top of the graph.

APPENDIX C

Traffic Flow Calculations



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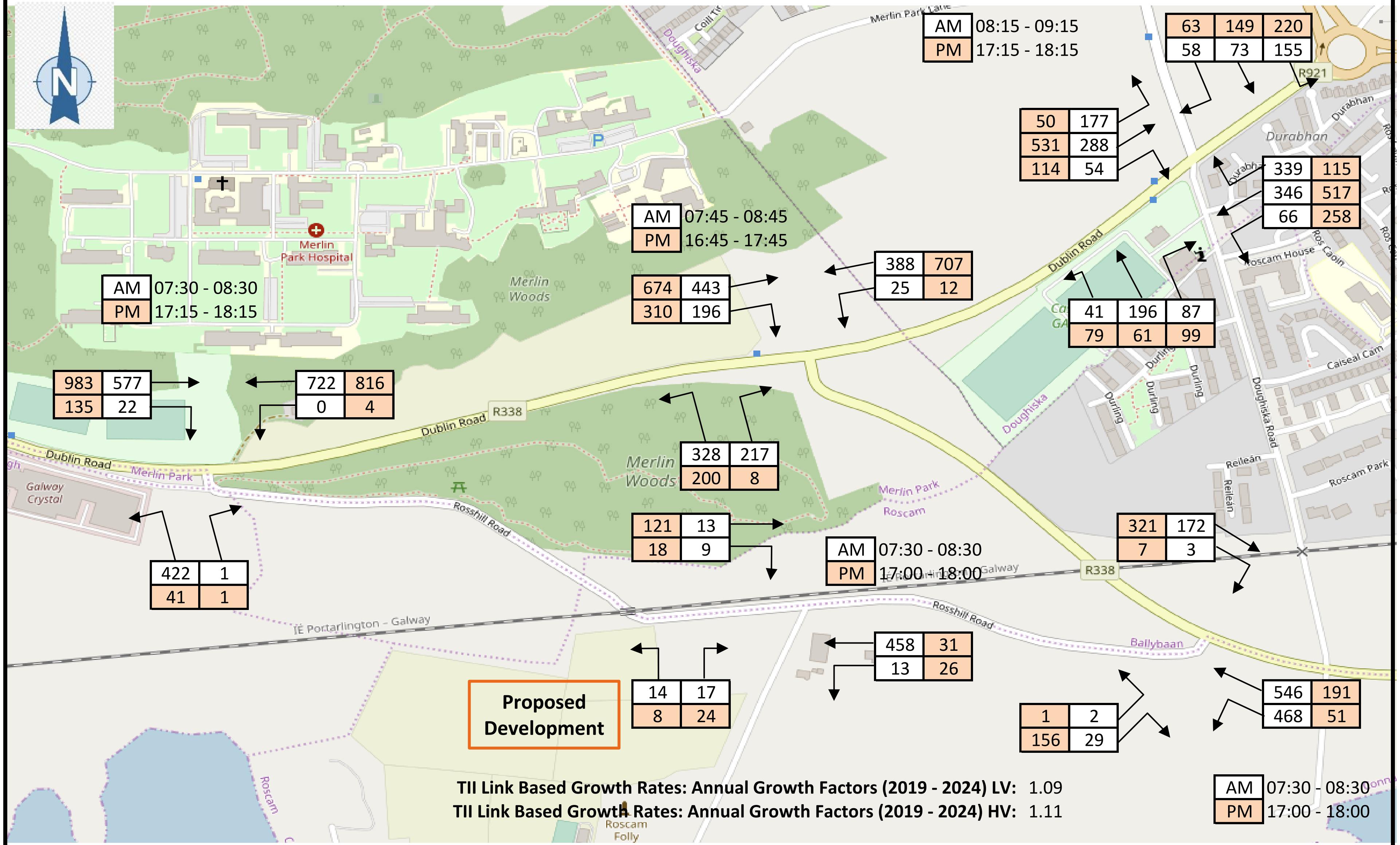
Job No: 119209

Job Title: TTA - Proposed Residential Development, Rosshill, Galway

2019 SURVEYED PEAK HOUR TRAFFIC FLOWS

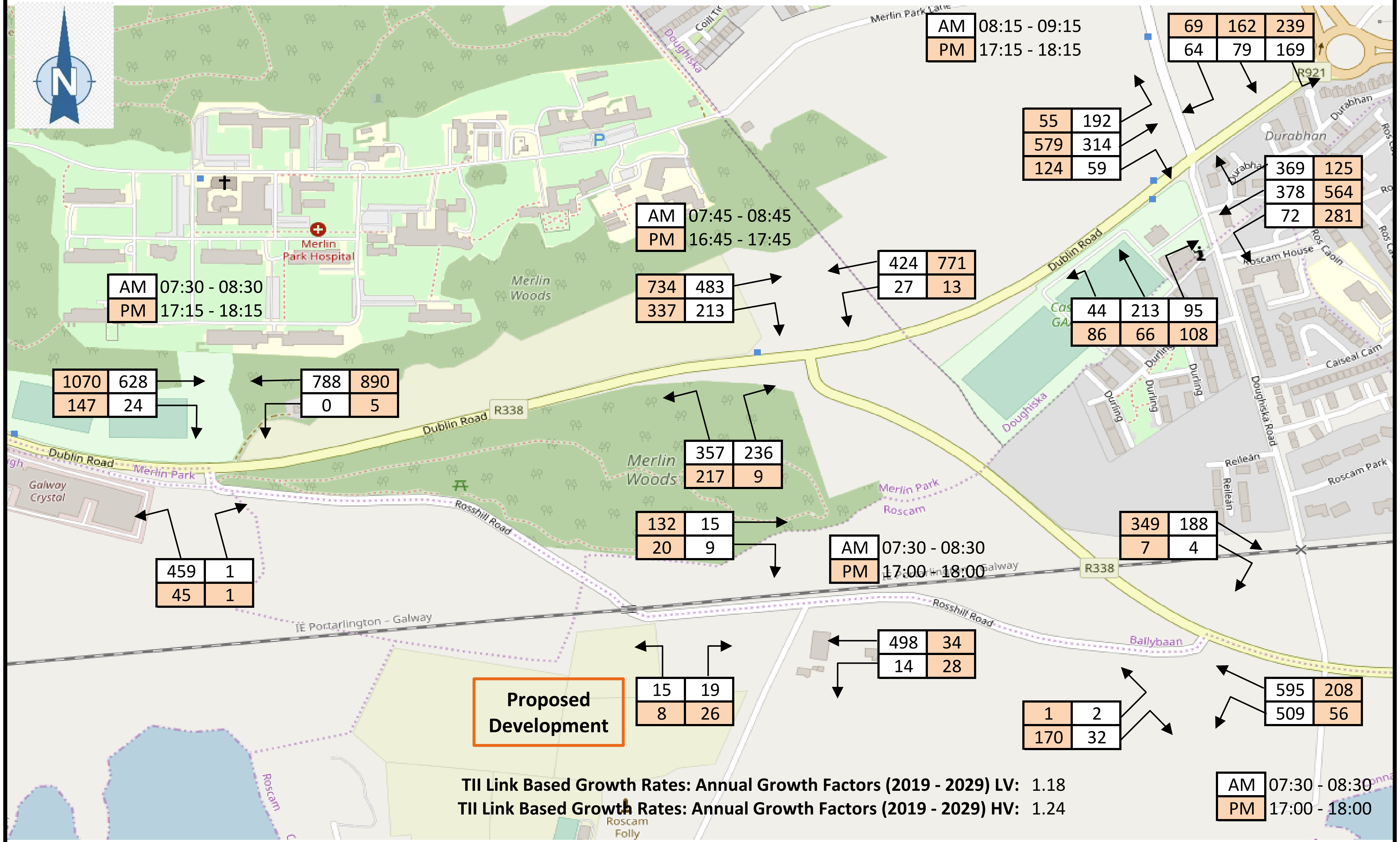


CST Group Chartered Consulting Engineers

Job No: 119209

Job Title: TTA - Proposed Residential Development, Rosshill, Galway

2024 FULL DEVELOPMENT OPENING YEAR PEAK HOUR TRAFFIC FLOWS WITHOUT DEVELOPMENT

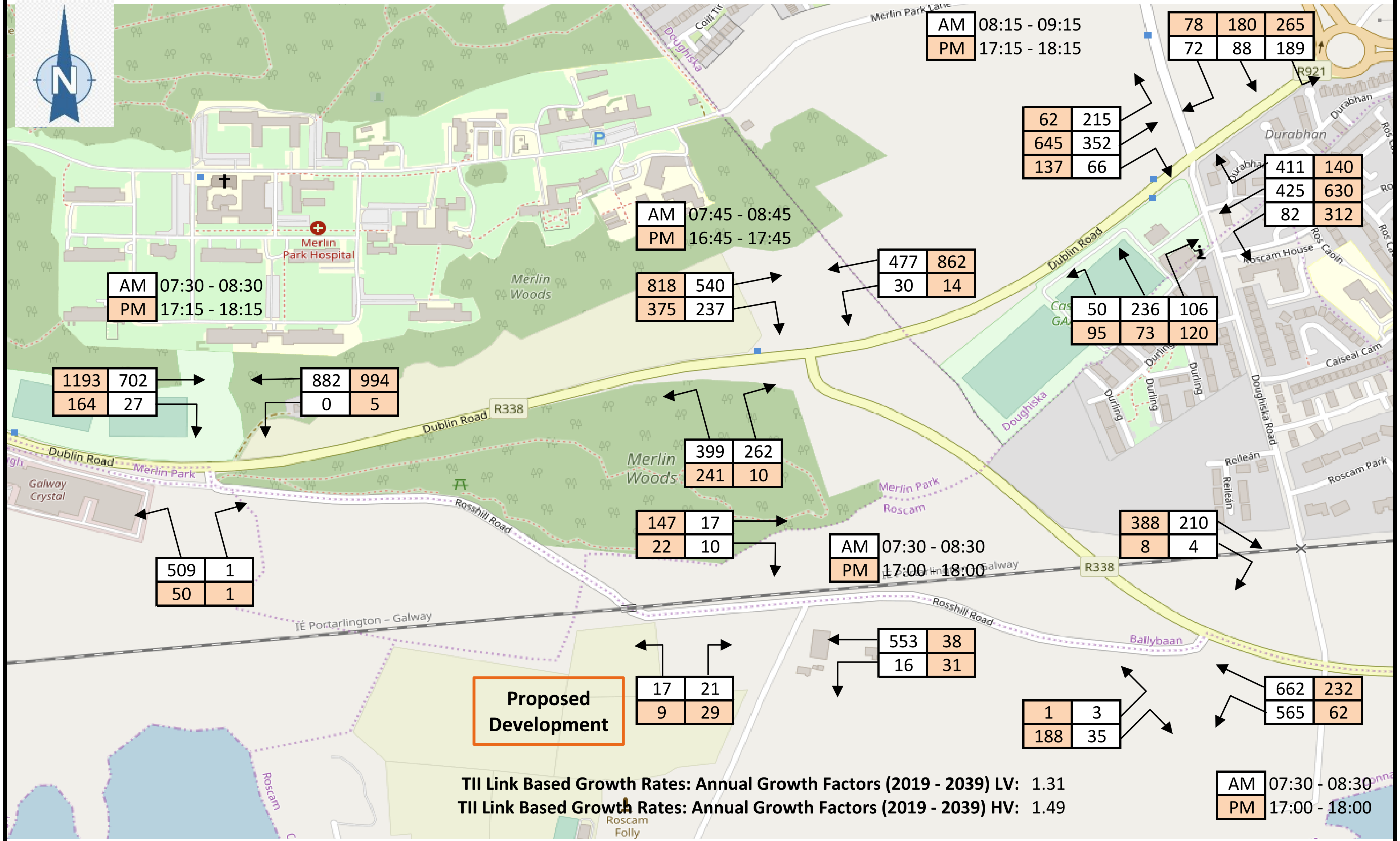


CST Group
Chartered Consulting Engineers

Job No: 119209

Job Title: TTA - Proposed Residential Development, Rosshill, Galway

2029 FULL DEVELOPMENT OPENING YEAR +5 YEARS PEAK HOUR TRAFFIC FLOWS WITHOUT DEVELOPMENT



TII Link Based Growth Rates: Annual Growth Factors (2019 - 2039) LV: 1.31

TII Link Based Growth Rates: Annual Growth Factors (2019 - 2039) HV: 1.49

CST Group Chartered Consulting Engineers

Job No: 119209

Job Title: TTA - Proposed Residential Development, Rosshill, Galway

2039 FULL DEVELOPMENT OPENING YEAR +15 YEARS PEAK HOUR TRAFFIC FLOWS WITHOUT DEVELOPMENT

	Calculation Factor	Trip Rate per dwelling unit				Number of Trips			
Landuse	**Residential Units**	**AM Arrivals**	**AM Departures**	**PM Arrivals**	**PM Departures**	**AM Arrivals**	**AM Departures**	**PM Arrivals**	**PM Departures**
Réileán Estate (48 Apartments & 82 houses)	*106*	*0.1509*	*0.5283*	*0.3962*	*0.1509*	*16*	*56*	*42*	*16*
Mixed Residential (Apartments & House) Ph 1	51	0.151	0.528	0.396	0.151	8	27	20	8
Mixed Residential (Apartments & House) Ph 2	53	0.151	0.528	0.396	0.151	8	28	21	8
Mixed Residential (Apartments & House) Ph 3	143	0.151	0.528	0.396	0.151	22	76	57	22
Mixed Residential (Apartments & House) Ph 4	95	0.151	0.528	0.396	0.151	14	50	38	14
Houses Privately Owned (TRICS) Adjacent Development	16	0.266	0.560	0.483	0.316	4	9	8	5
TOTAL						**56**	**190**	**143**	**57**

Note:
Trip rates for proposed development based on trip rates calculated from traffic count survey at nearby Réileán Estate as per scoping meeting with GCC

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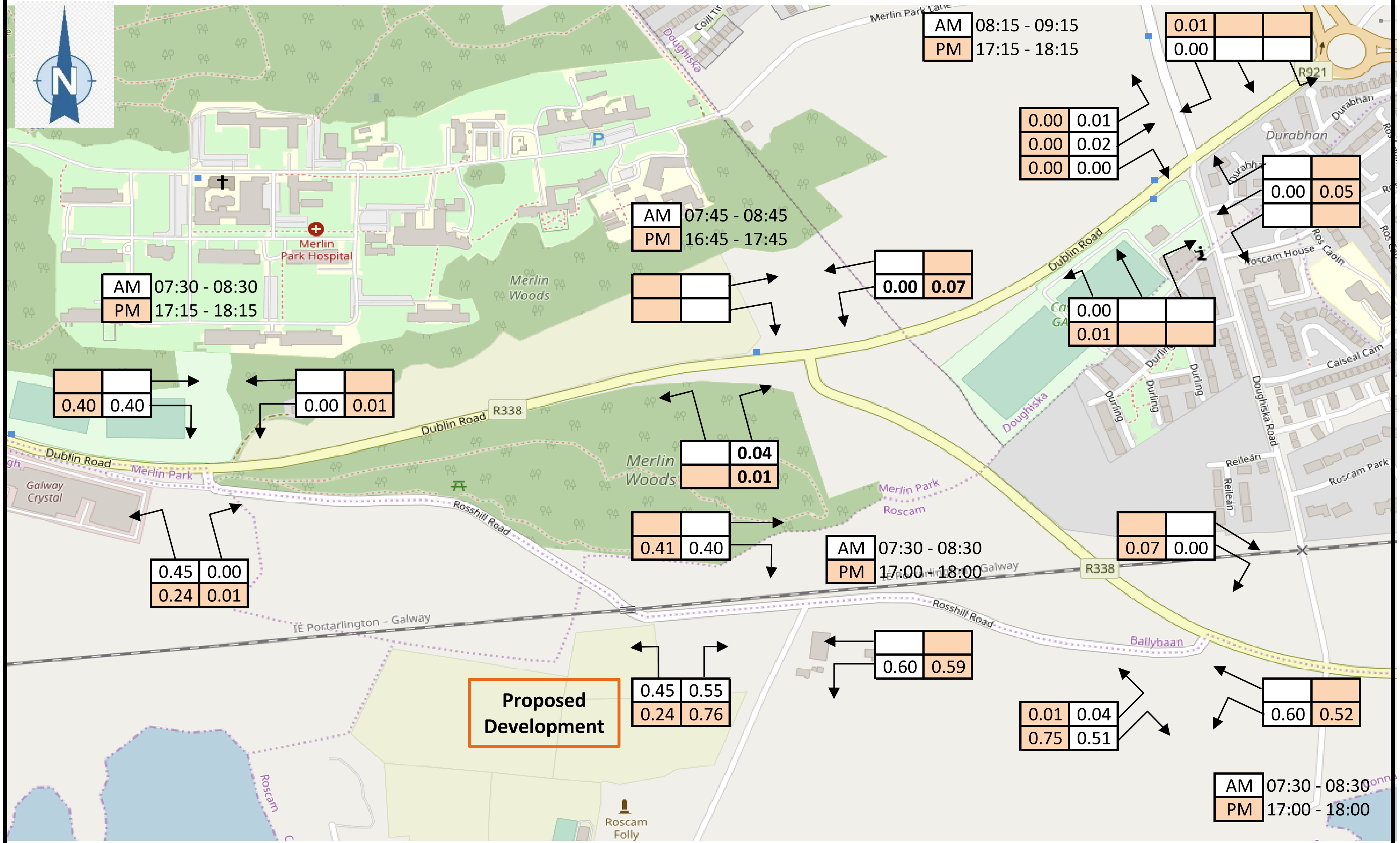
PROPOSED DEVELOPMENT TRAFFIC GENERATION



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PROPOSED DEVELOPMENT GENERATED TRAFFIC DISTRIBUTION

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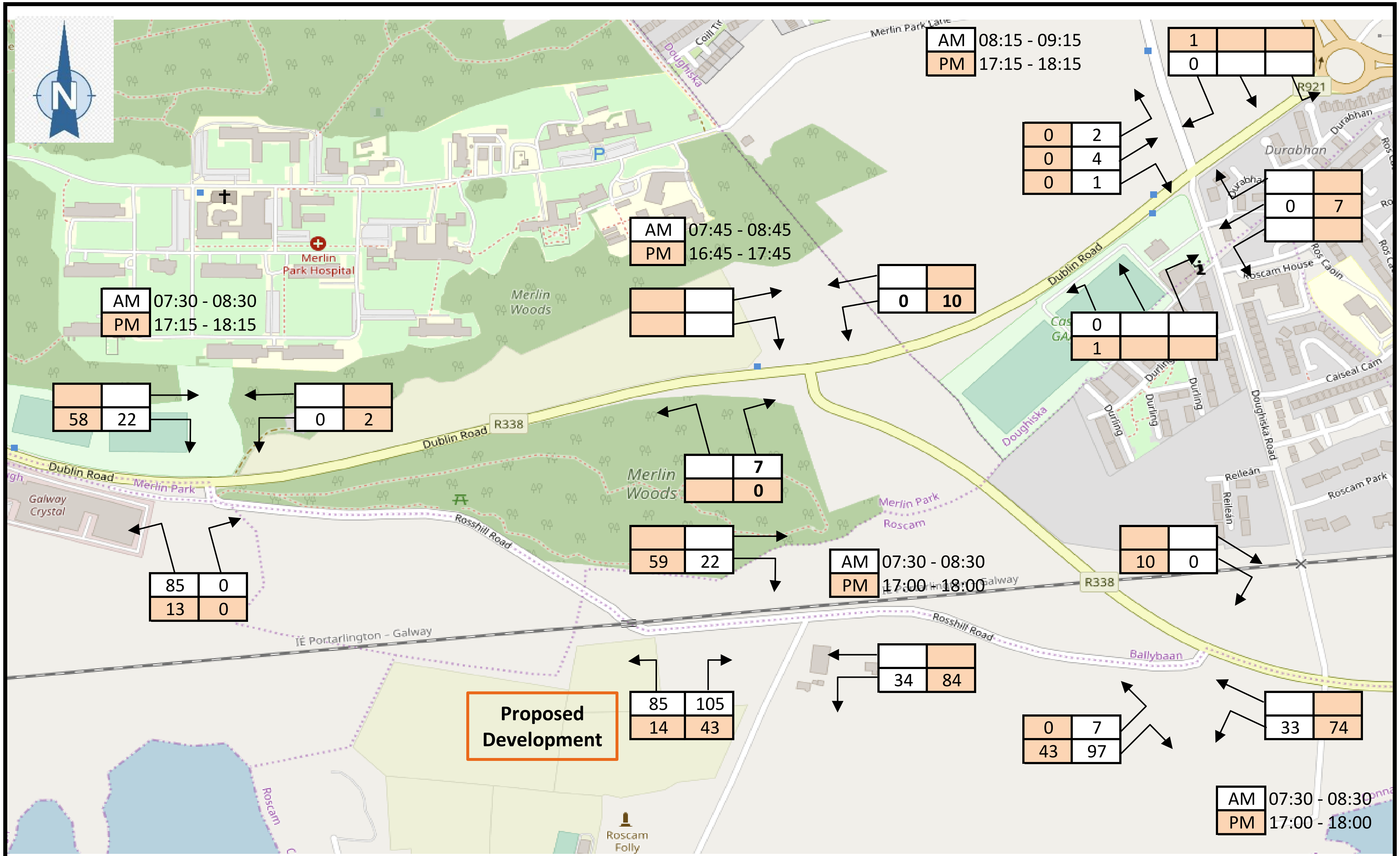

Job No: 119209

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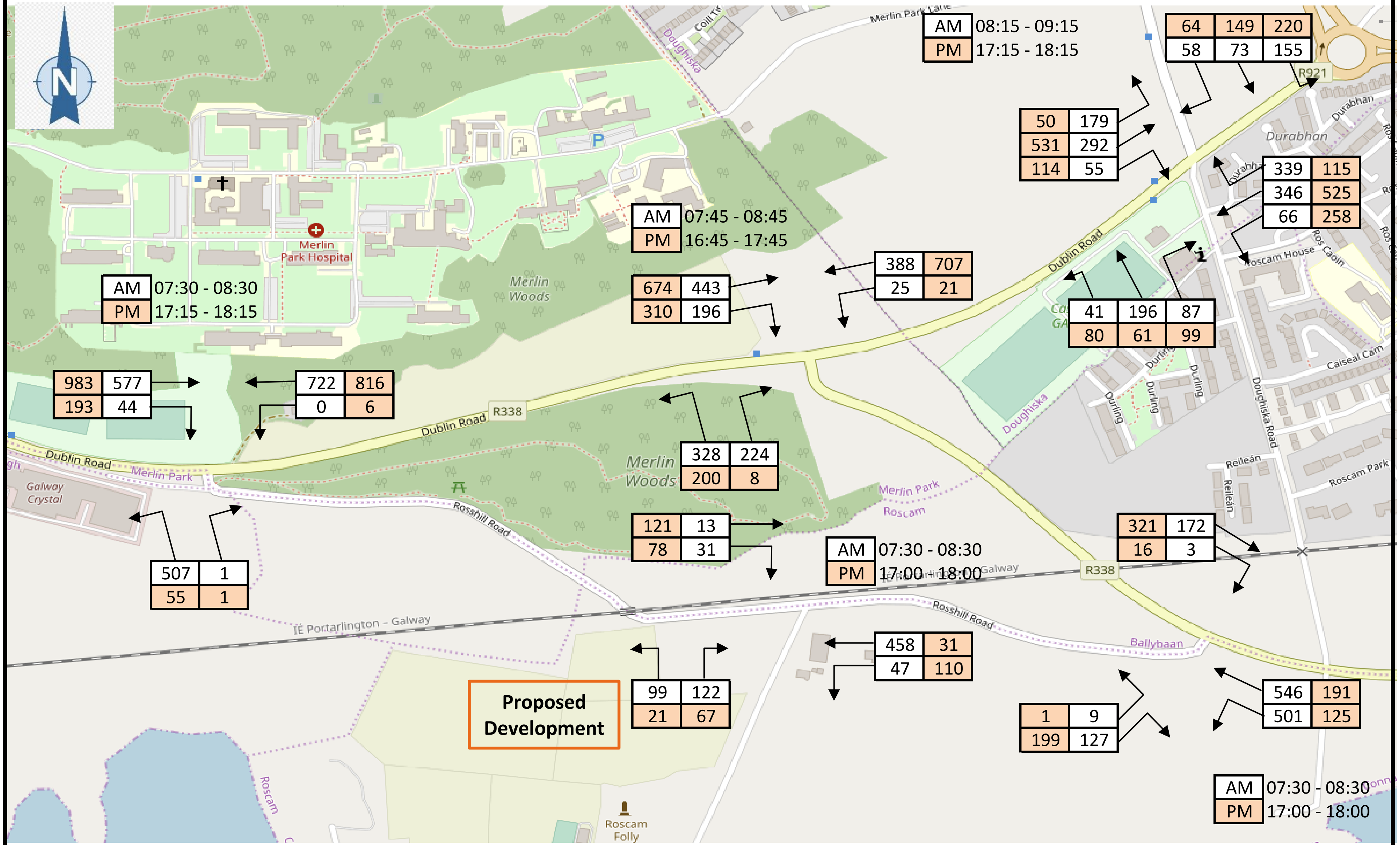
PROPOSED DEVELOPMENT GENERATED TRAFFIC FLOWS



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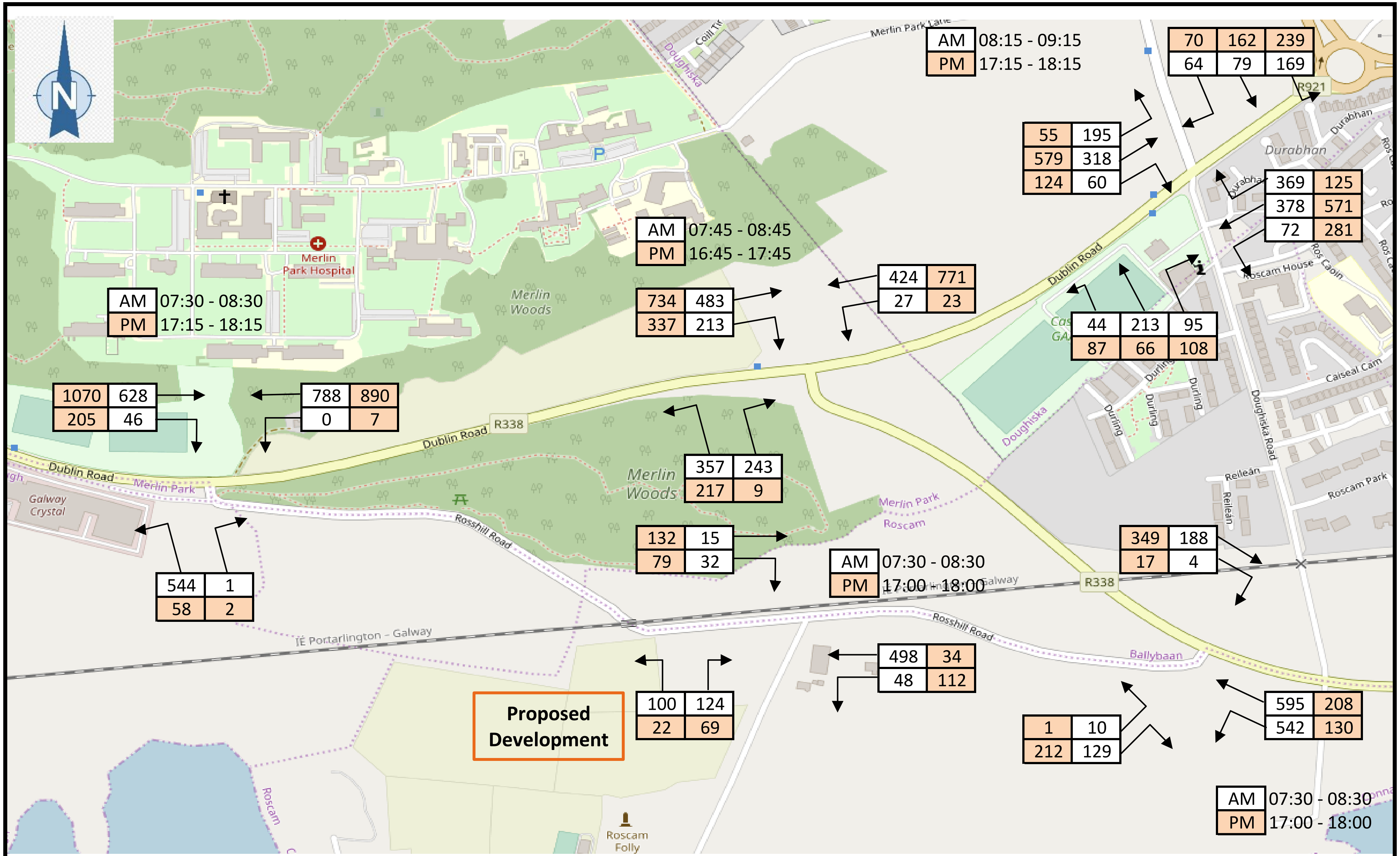
Job Title: TTA - Proposed Residential Development, Rosshill, Galway

2024 FULL DEVELOPMENT OPENING YEAR PEAK HOUR TRAFFIC FLOWS WITH DEVELOPMENT FULLY OPERATIONAL

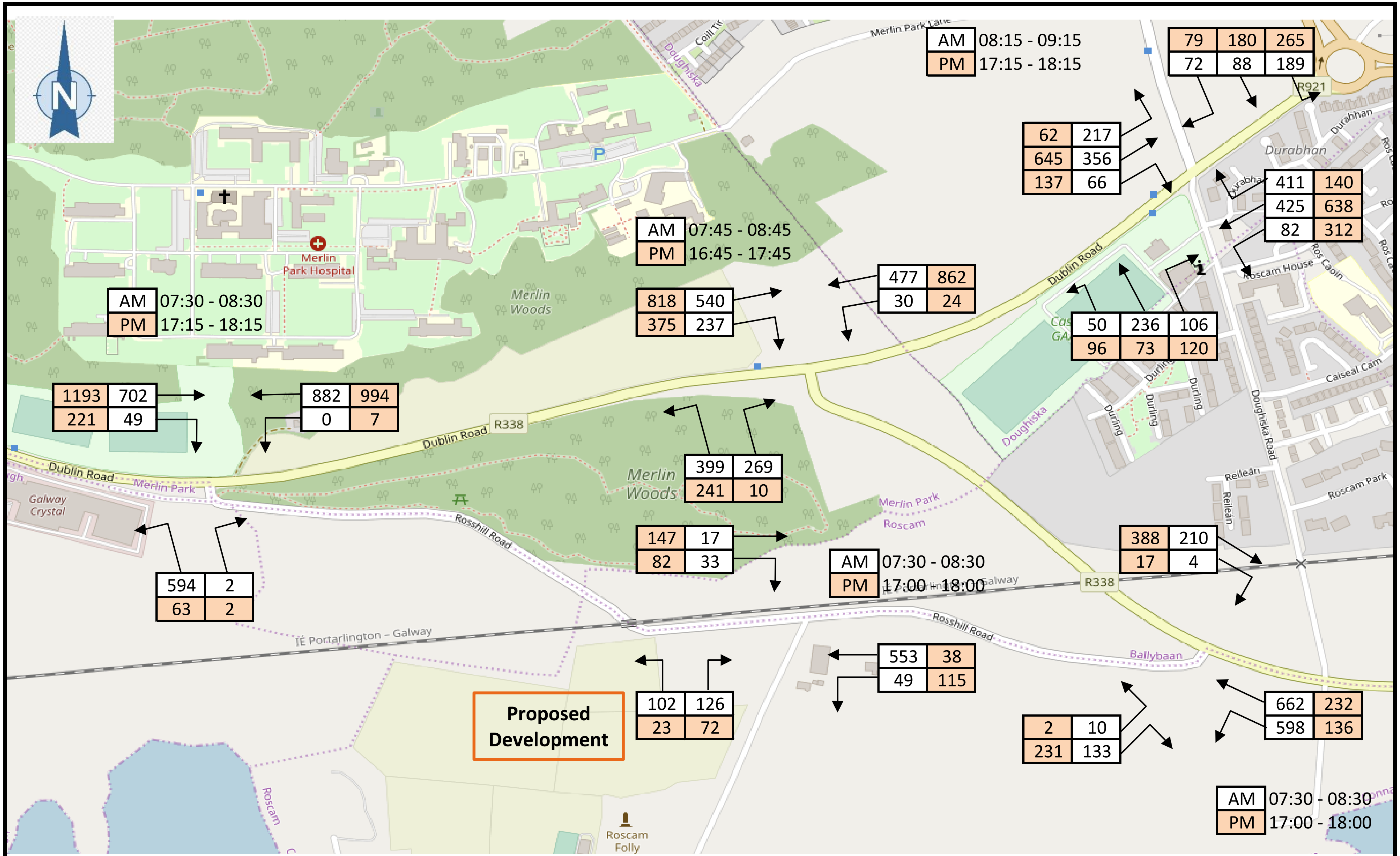


CST Group
Chartered Consulting Engineers

Job No: 119209

Job Title: TTA - Proposed Residential Development, Rosshill, Galway

2029 FULL DEVELOPMENT OPENING YEAR +5 YEARS PEAK HOUR TRAFFIC FLOWS WITH DEVELOPMENT FULLY OPERATIONAL



Job No: 119209

Job Title: TTA - Proposed Residential Development, Rosshill, Galway

2039 FULL DEVELOPMENT OPENING YEAR +15 YEARS PEAK HOUR TRAFFIC FLOWS WITH DEVELOPMENT FULLY OPERATIONAL

APPENDIX D

City Bus Direct Ltd Letter

The difference is our service

City Direct

City Direct Bus Limited,

Lough Atalia Road,

Galway City,

H91 CDD8.

Ref: GB/CDBL/12-11

Date 12th November 2019

RE: Roshill SHD Planning Application

To Whom it concerns,

We have carried out preliminary consultation with the Applicant, Kegata Ltd regarding the commercial feasibility of providing a bus service in the vicinity of the proposed development on Rosshill Road. There is an existing bus stop on the Rosshill road which is currently not in use due to low demand for same.

We confirm that we are reviewing the proposal in light of the proposed development with a view to serving the proposed development and surrounding residential developments in the area when the demand for a bus stop arises. The bus corridor proposals for the Dublin Road and Lough Atalia will also be considered as part of the commercial review process.

Yours sincerely,

Gerard Bartley

Gerard Bartley

General Manager

APPENDIX E1

PICADY Analysis - Junction between Old Dublin Road R338-Rosshill Rd

PICADY

GUI Version: 5.1 AD
Analysis Program Release: 4.0 (SEPT 2008)

For sales and distribution information, program advice and maintenance, contact:

TRL Limited
Crowthorne House
Nine Mile Ride
Wokingham, Berks.
RG40 3GA, UK

Tel: +44 (0)1344 770758
Fax:+44 (0)1344 770864
E-mail: software@trl.co.uk
Web: www.trlsoftware.co.uk

Run Analysis

Parameter	Values
File Run	I:\..\Old Dublin Rd_Rosshill Rd\119209 Old Dublin Rd_Rosshill Rd PICADY Analysis.vpi
Date Run	13 December 2019
Time Run	13:37:27
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	Old Dublin Rd East	100
Arm B	Rosshill Rd	100
Arm C	Old Dublin Rd West	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	Old Dublin Road/Rosshill Road T-junction
Location	Rosshill, Galway City
Date	18 July 2019
Enumerator	J Noone
Job Number	119209
Status	Preliminary
Client	Alber Homes
Description	-

Geometric Data

Geometric Parameters

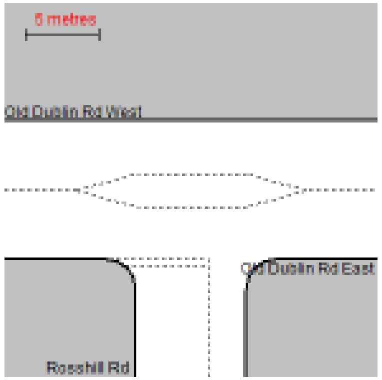
Parameter	Minor Arm B
Major Road Carriageway Width (m)	6.90
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	2.30
Minor Road First Lane Width (m)	4.80
Minor Road Visibility To Right (m)	15
Minor Road Visibility To Left (m)	15
Major Road Right Turn Visibility (m)	160
Major Road Right Turn Blocks Traffic	Yes

Slope and Intercept Values

Stream	Intercept for Stream B-A	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	578.163	0.101	0.256	0.161	0.365
B-C	747.522	0.110	0.278	-	-
C-B	673.876	0.251	0.251	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	07:15-08:45	90	15
Second Modelling Period	17:00-18:30	90	15

ODTAB Turning Counts

Demand Set: 2019 AM Survey Year
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	0.0	663.0
Arm B	1.0	0.0	388.0
Arm C	529.0	20.0	0.0

Demand Set: 2019 PM Survey Year
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	4.0	749.0
Arm B	1.0	0.0	38.0
Arm C	902.0	125.0	0.0

Demand Set: 2024 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	0.0	722.0
Arm B	1.0	0.0	422.0
Arm C	577.0	22.0	0.0

Demand Set: 2024 PM without Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	4.0	816.0
Arm B	1.0	0.0	41.0
Arm C	983.0	135.0	0.0

Demand Set: 2029 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	0.0	788.0
Arm B	1.0	0.0	459.0
Arm C	628.0	24.0	0.0

Demand Set: 2029 PM without Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	5.0	890.0
Arm B	1.0	0.0	45.0
Arm C	1070.0	147.0	0.0

Demand Set: 2039 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	0.0	882.0
Arm B	1.0	0.0	509.0
Arm C	702.0	27.0	0.0

Demand Set: 2039 PM without Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	5.0	994.0
Arm B	1.0	0.0	50.0
Arm C	1193.0	164.0	0.0

Demand Set: 2024 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	0.0	722.0
Arm B	1.0	0.0	507.0
Arm C	577.0	44.0	0.0

Demand Set: 2024 PM with Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	6.0	816.0
Arm B	1.0	0.0	55.0
Arm C	983.0	193.0	0.0

Demand Set: 2029 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	0.0	788.0
Arm B	1.0	0.0	544.0
Arm C	628.0	46.0	0.0

Demand Set: 2029 PM with Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	7.0	890.0
Arm B	2.0	0.0	58.0
Arm C	1070.0	205.0	0.0

Demand Set: 2039 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	0.0	882.0
Arm B	2.0	0.0	594.0
Arm C	702.0	49.0	0.0

Demand Set: 2039 PM with Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	0.0	7.0	994.0
Arm B	2.0	0.0	63.0
Arm C	1193.0	221.0	0.0

ODTAB Synthesised Flows

Demand Set: 2019 AM Survey Year
Modelling Period: 07:15-08:45

Arm	Rising Time	Rising Flow (veh/min)	Peak Time	Peak Flow (veh/min)	Falling Time	Falling Flow (veh/min)
Arm A	07:30	8.288	08:00	12.431	08:30	8.288
Arm B	07:30	4.863	08:00	7.294	08:30	4.863
Arm C	07:30	6.863	08:00	10.294	08:30	6.863

Heavy Vehicles Percentages

Demand Set: 2019 AM Survey Year
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2019 PM Survey Year
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 PM without Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 PM without Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 PM without Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 PM with Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 PM with Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 PM with Dev
Modelling Period: 17:00-18:30

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Default proportions of heavy vehicles are used

Queues & Delays

Demand Set: 2019 AM Survey Year
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-AC	4.88	9.00	0.543	-	0.00	1.15	-	15.8	0.23
	C-AB	0.25	8.12	0.031	-	0.00	0.03	-	0.5	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	8.32	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-AC	5.83	8.54	0.682	-	1.15	2.01	-	27.5	0.35
	C-AB	0.30	7.72	0.039	-	0.03	0.04	-	0.6	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	9.93	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	7.14	7.92	**0.901**	-	2.01	5.90	-	69.3	0.81
	C-AB	0.37	7.16	0.051	-	0.04	0.05	-	0.8	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	12.17	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	7.14	7.92	**0.901**	-	5.90	6.89	-	96.9	1.04
	C-AB	0.37	7.16	0.051	-	0.05	0.05	-	0.8	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	12.17	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	5.83	8.54	0.682	-	6.89	2.31	-	43.2	0.46
	C-AB	0.30	7.72	0.039	-	0.05	0.04	-	0.6	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	9.93	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	4.88	9.00	0.543	-	2.31	1.23	-	19.7	0.25
	C-AB	0.25	8.12	0.031	-	0.04	0.03	-	0.5	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	8.32	-	-	-	-	-	-	-	-

Demand Set: 2019 PM Survey Year
Modelling Period: 17:00-18:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	0.49	8.45	0.058	-	0.00	0.06	-	0.9	0.13
	C-AB	1.57	7.84	0.200	-	0.00	0.25	-	3.7	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.05	-	-	-	-	-	-	-	-
	A-C	9.40	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	0.58	7.85	0.074	-	0.06	0.08	-	1.2	0.14
	C-AB	1.87	7.38	0.254	-	0.25	0.33	-	5.0	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.06	-	-	-	-	-	-	-	-
	A-C	11.22	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	0.72	6.90	0.104	-	0.08	0.11	-	1.7	0.16
	C-AB	2.29	6.74	0.340	-	0.33	0.50	-	7.5	0.22
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.07	-	-	-	-	-	-	-	-
	A-C	13.74	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	0.72	6.90	0.104	-	0.11	0.12	-	1.7	0.16
	C-AB	2.29	6.74	0.340	-	0.50	0.51	-	7.7	0.22
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.07	-	-	-	-	-	-	-	-
	A-C	13.74	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	0.58	7.85	0.074	-	0.12	0.08	-	1.3	0.14
	C-AB	1.87	7.38	0.254	-	0.51	0.35	-	5.2	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.06	-	-	-	-	-	-	-	-
	A-C	11.22	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:15-18:30	B-AC	0.49	8.44	0.058	-	0.08	0.06	-	1.0	0.13
	C-AB	1.57	7.84	0.200	-	0.35	0.25	-	3.8	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.05	-	-	-	-	-	-	-	-
	A-C	9.40	-	-	-	-	-	-	-	-

Demand Set: 2024 AM without Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-AC	5.31	8.79	0.604	-	0.00	1.46	-	19.8	0.27
	C-AB	0.28	7.94	0.035	-	0.00	0.04	-	0.5	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	9.06	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-AC	6.34	8.30	0.764	-	1.46	2.88	-	38.0	0.47
	C-AB	0.33	7.50	0.044	-	0.04	0.05	-	0.7	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	10.82	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	7.76	7.62	1.019	-	2.88	11.97	-	122.2	1.37
	C-AB	0.40	6.89	0.059	-	0.05	0.06	-	0.9	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	13.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	7.76	7.62	1.019	-	11.97	17.46	-	222.5	2.26
	C-AB	0.40	6.89	0.059	-	0.06	0.06	-	0.9	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	13.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	6.34	8.30	0.764	-	17.46	3.85	-	121.0	1.20
	C-AB	0.33	7.50	0.044	-	0.06	0.05	-	0.7	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	10.82	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	5.31	8.79	0.604	-	3.85	1.59	-	26.8	0.31
	C-AB	0.28	7.94	0.035	-	0.05	0.04	-	0.5	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	9.06	-	-	-	-	-	-	-	-

Demand Set: 2024 PM without Dev
Modelling Period: 17:00-18:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	0.53	8.20	0.064	-	0.00	0.07	-	1.0	0.13
	C-AB	1.69	7.63	0.222	-	0.00	0.28	-	4.2	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.05	-	-	-	-	-	-	-	-
	A-C	10.24	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	0.63	7.53	0.084	-	0.07	0.09	-	1.3	0.14
	C-AB	2.02	7.13	0.284	-	0.28	0.39	-	5.8	0.20
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.06	-	-	-	-	-	-	-	-

	A-C	12.23	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	0.77	6.33	0.122	-	0.09	0.14	-	2.0	0.18
	C-AB	2.48	6.44	0.385	-	0.39	0.61	-	9.1	0.25
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.07	-	-	-	-	-	-	-	-
	A-C	14.97	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	0.77	6.32	0.122	-	0.14	0.14	-	2.1	0.18
	C-AB	2.48	6.44	0.385	-	0.61	0.62	-	9.4	0.25
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.07	-	-	-	-	-	-	-	-
	A-C	14.97	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	0.63	7.53	0.084	-	0.14	0.09	-	1.4	0.15
	C-AB	2.02	7.13	0.284	-	0.62	0.40	-	6.1	0.20
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.06	-	-	-	-	-	-	-	-
	A-C	12.23	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
18:15-18:30	B-AC	0.53	8.20	0.064	-	0.09	0.07	-	1.1	0.13
	C-AB	1.69	7.63	0.222	-	0.40	0.29	-	4.4	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.05	-	-	-	-	-	-	-	-
	A-C	10.24	-	-	-	-	-	-	-	-

Demand Set: 2029 AM without Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-AC	5.77	8.56	0.674	-	0.00	1.93	-	25.6	0.33
	C-AB	0.30	7.73	0.039	-	0.00	0.04	-	0.6	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	9.89	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-AC	6.89	8.02	**0.859**	-	1.93	4.66	-	57.5	0.68
	C-AB	0.36	7.25	0.050	-	0.04	0.05	-	0.8	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	11.81	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	8.44	7.28	**1.160**	-	4.66	24.46	-	224.8	2.41
	C-AB	0.44	6.58	0.067	-	0.05	0.07	-	1.1	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	14.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	8.44	7.28	**1.160**	-	24.46	42.40	-	502.0	4.81
	C-AB	0.44	6.58	0.067	-	0.07	0.07	-	1.1	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	14.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	6.89	8.02	**0.859**	-	42.40	28.20	-	529.5	4.53
	C-AB	0.36	7.25	0.050	-	0.07	0.05	-	0.8	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	11.81	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	5.77	8.56	0.674	-	28.20	2.39	-	170.5	1.54
	C-AB	0.30	7.73	0.039	-	0.05	0.04	-	0.6	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-

	A-C	9.89	-	-	-	-	-	-	-	-

Demand Set: 2029 PM without Dev
Modelling Period: 17:00-18:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	0.58	7.92	0.073	-	0.00	0.08	-	1.1	0.14
	C-AB	1.84	7.39	0.249	-	0.00	0.33	-	4.8	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.06	-	-	-	-	-	-	-	-
	A-C	11.17	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	0.69	7.16	0.096	-	0.08	0.11	-	1.5	0.15
	C-AB	2.20	6.85	0.322	-	0.33	0.47	-	7.0	0.21
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.07	-	-	-	-	-	-	-	-
	A-C	13.33	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	0.84	5.09	0.166	-	0.11	0.20	-	2.8	0.23
	C-AB	2.70	6.09	0.443	-	0.47	0.77	-	11.5	0.29
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	16.33	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	0.84	5.06	0.167	-	0.20	0.20	-	3.0	0.24
	C-AB	2.70	6.09	0.443	-	0.77	0.79	-	11.9	0.29
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	16.33	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	0.69	7.15	0.096	-	0.20	0.11	-	1.7	0.16
	C-AB	2.20	6.85	0.322	-	0.79	0.48	-	7.4	0.22
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.07	-	-	-	-	-	-	-	-
	A-C	13.33	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:15-18:30	B-AC	0.58	7.92	0.073	-	0.11	0.08	-	1.2	0.14
	C-AB	1.84	7.39	0.249	-	0.48	0.34	-	5.1	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.06	-	-	-	-	-	-	-	-
	A-C	11.17	-	-	-	-	-	-	-	-

Demand Set: 2039 AM without Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-AC	6.40	8.23	0.777	-	0.00	3.04	-	38.1	0.45
	C-AB	0.34	7.43	0.046	-	0.00	0.05	-	0.7	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	11.07	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-AC	7.64	7.63	**1.001**	-	3.04	10.86	-	114.4	1.31
	C-AB	0.40	6.89	0.059	-	0.05	0.06	-	0.9	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	13.21	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	9.36	6.80	**1.377**	-	10.86	49.77	-	456.2	4.80
	C-AB	0.50	6.15	0.081	-	0.06	0.09	-	1.3	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	16.18	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	9.36	6.80	**1.377**	-	49.77	88.27	-	1035.4	9.94
	C-AB	0.50	6.15	0.081	-	0.09	0.09	-	1.3	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	16.18	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	7.64	7.63	**1.001**	-	88.27	89.03	-	1329.8	11.45
	C-AB	0.40	6.89	0.059	-	0.09	0.06	-	0.9	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	13.21	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	6.40	8.23	0.777	-	89.03	62.91	-	1139.6	9.36
	C-AB	0.34	7.43	0.046	-	0.06	0.05	-	0.7	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	11.07	-	-	-	-	-	-	-	-

Demand Set: 2039 PM without Dev
Modelling Period: 17:00-18:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	0.64	7.51	0.085	-	0.00	0.09	-	1.3	0.15
	C-AB	2.06	7.07	0.291	-	0.00	0.40	-	5.9	0.20
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.06	-	-	-	-	-	-	-	-
	A-C	12.47	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	0.76	6.51	0.117	-	0.09	0.13	-	1.9	0.17
	C-AB	2.46	6.46	0.381	-	0.40	0.60	-	9.0	0.25
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.07	-	-	-	-	-	-	-	-
	A-C	14.89	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	0.94	0.00	***	-	0.13	14.17	-	107.3	23.76
	C-AB	3.01	5.61	0.536	-	0.60	1.12	-	16.4	0.37
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	18.24	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	0.94	0.00	***	-	14.17	28.21	-	317.8	10.92
	C-AB	3.01	5.61	0.536	-	1.12	1.15	-	17.7	0.38
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	18.24	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	0.76	6.50	0.118	-	28.21	0.14	-	73.6	0.45
	C-AB	2.46	6.46	0.381	-	1.15	0.63	-	9.7	0.25
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.07	-	-	-	-	-	-	-	-
	A-C	14.89	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:15-18:30	B-AC	0.64	7.51	0.085	-	0.14	0.09	-	1.5	0.15
	C-AB	2.06	7.07	0.291	-	0.63	0.42	-	6.3	0.20
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.06	-	-	-	-	-	-	-	-
	A-C	12.47	-	-	-	-	-	-	-	-

Demand Set: 2024 AM with Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-AC	6.37	8.79	0.725	-	0.00	2.41	-	31.2	0.37
	C-AB	0.55	7.94	0.070	-	0.00	0.07	-	1.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	9.06	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-AC	7.61	8.30	0.917	-	2.41	6.60	-	77.2	0.85
	C-AB	0.66	7.50	0.088	-	0.07	0.10	-	1.4	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-

	A-C	10.82	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	9.32	7.62	1.223	-	6.60	33.53	-	305.1	3.00
	C-AB	0.81	6.89	0.117	-	0.10	0.13	-	2.0	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	13.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	9.32	7.62	1.223	-	33.53	59.31	-	696.6	6.22
	C-AB	0.81	6.89	0.117	-	0.13	0.13	-	2.0	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	13.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	7.61	8.30	0.917	-	59.31	51.03	-	827.6	6.70
	C-AB	0.66	7.50	0.088	-	0.13	0.10	-	1.5	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	10.82	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	6.37	8.79	0.725	-	51.03	17.30	-	512.5	4.07
	C-AB	0.55	7.94	0.070	-	0.10	0.08	-	1.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	9.06	-	-	-	-	-	-	-	-

Demand Set: 2024 PM with Dev
Modelling Period: 17:00-18:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	0.70	8.23	0.085	-	0.00	0.09	-	1.3	0.13
	C-AB	2.42	7.62	0.318	-	0.00	0.46	-	6.7	0.19
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.08	-	-	-	-	-	-	-	-
	A-C	10.24	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	0.84	7.56	0.111	-	0.09	0.12	-	1.8	0.15
	C-AB	2.89	7.12	0.406	-	0.46	0.67	-	10.0	0.23
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	12.23	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	1.03	6.15	0.167	-	0.12	0.20	-	2.9	0.19
	C-AB	3.54	6.43	0.551	-	0.67	1.19	-	17.5	0.34
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.11	-	-	-	-	-	-	-	-
	A-C	14.97	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	1.03	6.13	0.168	-	0.20	0.20	-	3.0	0.20
	C-AB	3.54	6.43	0.551	-	1.19	1.22	-	18.7	0.35
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.11	-	-	-	-	-	-	-	-
	A-C	14.97	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	0.84	7.56	0.111	-	0.20	0.13	-	2.0	0.15
	C-AB	2.89	7.12	0.406	-	1.22	0.70	-	10.7	0.24
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	12.23	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:15-18:30	B-AC	0.70	8.23	0.085	-	0.13	0.09	-	1.4	0.13
	C-AB	2.42	7.62	0.318	-	0.70	0.47	-	7.2	0.19
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.08	-	-	-	-	-	-	-	-

	A-C	10.24	-	-	-	-	-	-	-	-

Demand Set: 2029 AM with Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-AC	6.84	8.56	0.799	-	0.00	3.39	-	41.9	0.47
	C-AB	0.58	7.73	0.075	-	0.00	0.08	-	1.2	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	9.89	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-AC	8.17	8.03	**1.017**	-	3.39	12.38	-	128.3	1.37
	C-AB	0.69	7.25	0.095	-	0.08	0.10	-	1.6	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	11.81	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	10.00	7.28	**1.373**	-	12.38	53.61	-	496.3	4.85
	C-AB	0.84	6.58	0.128	-	0.10	0.15	-	2.2	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	14.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	10.00	7.28	**1.373**	-	53.61	94.47	-	1110.7	10.00
	C-AB	0.84	6.58	0.128	-	0.15	0.15	-	2.2	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	14.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	8.17	8.03	**1.017**	-	94.47	96.92	-	1435.4	11.79
	C-AB	0.69	7.25	0.095	-	0.15	0.11	-	1.6	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	11.81	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	6.84	8.56	0.799	-	96.92	72.38	-	1269.7	10.02
	C-AB	0.58	7.73	0.075	-	0.11	0.08	-	1.2	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	9.89	-	-	-	-	-	-	-	-

Demand Set: 2029 PM with Dev
Modelling Period: 17:00-18:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	0.75	7.71	0.098	-	0.00	0.11	-	1.5	0.14
	C-AB	2.57	7.39	0.348	-	0.00	0.52	-	7.7	0.20
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	11.17	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	0.90	6.77	0.133	-	0.11	0.15	-	2.2	0.17
	C-AB	3.07	6.84	0.449	-	0.52	0.79	-	11.8	0.26
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.10	-	-	-	-	-	-	-	-
	A-C	13.33	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	1.10	0.48	**2.274**	-	0.15	10.01	-	78.8	15.61
	C-AB	3.76	6.08	0.619	-	0.79	1.59	-	23.0	0.41
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.13	-	-	-	-	-	-	-	-
	A-C	16.33	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	1.10	0.00	***	-	10.01	26.52	-	274.0	10.35
	C-AB	3.76	6.08	0.619	-	1.59	1.66	-	25.5	0.43
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.13	-	-	-	-	-	-	-	-

	A-C	16.33	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	0.90	6.76	0.133	-	26.52	0.16	-	64.4	0.39
	C-AB	3.07	6.84	0.449	-	1.66	0.84	-	13.0	0.27
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.10	-	-	-	-	-	-	-	-
	A-C	13.33	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:15-18:30	B-AC	0.75	7.71	0.098	-	0.16	0.11	-	1.7	0.14
	C-AB	2.57	7.39	0.348	-	0.84	0.55	-	8.3	0.21
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	11.17	-	-	-	-	-	-	-	-

Demand Set: 2039 AM with Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-AC	7.48	8.22	**0.910**	-	0.00	6.14	-	67.8	0.72
	C-AB	0.61	7.43	0.083	-	0.00	0.09	-	1.3	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	11.07	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-AC	8.93	7.62	**1.172**	-	6.14	27.74	-	259.1	2.66
	C-AB	0.73	6.89	0.106	-	0.09	0.12	-	1.8	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	13.21	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	10.94	6.77	**1.614**	-	27.74	90.27	-	885.3	8.97
	C-AB	0.90	6.15	0.146	-	0.12	0.17	-	2.5	0.19
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	16.18	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	10.94	6.77	**1.614**	-	90.27	152.72	-	1822.4	16.91
	C-AB	0.90	6.15	0.146	-	0.17	0.17	-	2.6	0.19
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	16.18	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	8.93	7.62	**1.172**	-	152.72	172.44	-	2438.7	21.03
	C-AB	0.73	6.89	0.106	-	0.17	0.12	-	1.8	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	13.21	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	7.48	8.22	**0.910**	-	172.44	162.01	-	2508.4	20.47
	C-AB	0.61	7.43	0.083	-	0.12	0.09	-	1.4	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.00	-	-	-	-	-	-	-	-
	A-C	11.07	-	-	-	-	-	-	-	-

Demand Set: 2039 PM with Dev
Modelling Period: 17:00-18:30

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	0.82	7.25	0.112	-	0.00	0.13	-	1.8	0.15
	C-AB	2.77	7.06	0.393	-	0.00	0.63	-	9.2	0.23
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	12.47	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	0.97	5.82	0.167	-	0.13	0.20	-	2.9	0.21
	C-AB	3.31	6.45	0.514	-	0.63	1.03	-	15.2	0.31
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.10	-	-	-	-	-	-	-	-
	A-C	14.89	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	1.19	0.00	***	-	0.20	18.09	-	137.2	24.27
	C-AB	4.06	5.60	0.724	-	1.03	2.71	-	36.5	0.58
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.13	-	-	-	-	-	-	-	-
	A-C	18.24	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	1.19	0.00	***	-	18.09	35.98	-	405.5	12.39
	C-AB	4.06	5.60	0.724	-	2.71	2.98	-	46.1	0.65
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.13	-	-	-	-	-	-	-	-
	A-C	18.24	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	0.97	5.73	0.170	-	35.98	0.21	-	142.3	1.26
	C-AB	3.31	6.45	0.514	-	2.98	1.12	-	17.8	0.34
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.10	-	-	-	-	-	-	-	-
	A-C	14.89	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:15-18:30	B-AC	0.82	7.24	0.113	-	0.21	0.13	-	2.0	0.16
	C-AB	2.77	7.06	0.393	-	1.12	0.66	-	10.1	0.24
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.09	-	-	-	-	-	-	-	-
	A-C	12.47	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: 2019 AM Survey Year
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	535.4	357.0	272.5	0.5	272.6	0.5
C-AB	27.5	18.4	3.8	0.1	3.8	0.1
C-A	-	-	-	-	-	-
A-B	0.0	0.0	-	-	-	-
A-C	912.6	608.4	-	-	-	-
All	**2203.7**	**1469.1**	**276.3**	**0.1**	**276.4**	**0.1**

Demand Set: 2019 PM Survey Year
Modelling Period: 17:00-18:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	53.7	35.8	7.6	0.1	7.6	0.1
C-AB	172.1	114.7	33.0	0.2	33.0	0.2
C-A	-	-	-	-	-	-
A-B	5.5	3.7	-	-	-	-
A-C	1030.9	687.3	-	-	-	-
All	**2503.7**	**1669.1**	**40.6**	**0.0**	**40.6**	**0.0**

Demand Set: 2024 AM without Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	582.2	388.2	550.2	0.9	550.4	0.9
C-AB	30.3	20.2	4.3	0.1	4.3	0.1
C-A	-	-	-	-	-	-
A-B	0.0	0.0	-	-	-	-
A-C	993.8	662.5	-	-	-	-
All	**2400.5**	**1600.3**	**554.5**	**0.2**	**554.7**	**0.2**

Demand Set: 2024 PM without Dev
Modelling Period: 17:00-18:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	57.8	38.5	8.8	0.2	8.8	0.2
C-AB	185.8	123.9	39.0	0.2	39.0	0.2
C-A	-	-	-	-	-	-
A-B	5.5	3.7	-	-	-	-
A-C	1123.2	748.8	-	-	-	-
All	**2725.3**	**1816.9**	**47.8**	**0.0**	**47.8**	**0.0**

Demand Set: 2029 AM without Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	633.2	422.1	1509.9	2.4	1510.2	2.4
C-AB	33.0	22.0	4.9	0.1	4.9	0.1
C-A	-	-	-	-	-	-
A-B	0.0	0.0	-	-	-	-
A-C	1084.6	723.1	-	-	-	-
All	**2615.2**	**1743.5**	**1514.8**	**0.6**	**1515.2**	**0.6**

Demand Set: 2029 PM without Dev
Modelling Period: 17:00-18:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	63.3	42.2	11.3	0.2	11.3	0.2
C-AB	202.3	134.9	47.7	0.2	47.7	0.2
C-A	-	-	-	-	-	-
A-B	6.9	4.6	-	-	-	-
A-C	1225.0	816.7	-	-	-	-
All	**2970.3**	**1980.2**	**59.0**	**0.0**	**59.0**	**0.0**

Demand Set: 2039 AM without Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	702.0	468.0	4113.4	5.9	4353.8	6.2
C-AB	37.2	24.8	5.9	0.2	5.9	0.2
C-A	-	-	-	-	-	-
A-B	0.0	0.0	-	-	-	-
A-C	1214.0	809.3	-	-	-	-
All	**2919.4**	**1946.3**	**4119.3**	**1.4**	**4359.7**	**1.5**

Demand Set: 2039 PM without Dev
Modelling Period: 17:00-18:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	70.2	46.8	503.3	7.2	503.3	7.2
C-AB	225.7	150.5	65.0	0.3	65.0	0.3
C-A	-	-	-	-	-	-
A-B	6.9	4.6	-	-	-	-
A-C	1368.2	912.1	-	-	-	-
All	**3313.1**	**2208.7**	**568.4**	**0.2**	**568.4**	**0.2**

Demand Set: 2024 AM with Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	699.2	466.1	2450.2	3.5	2467.2	3.5
C-AB	60.6	40.4	9.1	0.2	9.1	0.2
C-A	-	-	-	-	-	-
A-B	0.0	0.0	-	-	-	-
A-C	993.8	662.5	-	-	-	-
All	**2547.8**	**1698.5**	**2459.3**	**1.0**	**2476.3**	**1.0**

Demand Set: 2024 PM with Dev
Modelling Period: 17:00-18:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	77.1	51.4	12.4	0.2	12.4	0.2
C-AB	265.7	177.1	70.9	0.3	70.9	0.3
C-A	-	-	-	-	-	-
A-B	8.3	5.5	-	-	-	-
A-C	1123.2	748.8	-	-	-	-
All	**2827.2**	**1884.8**	**83.3**	**0.0**	**83.3**	**0.0**

Demand Set: 2029 AM with Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	750.2	500.1	4482.3	6.0	4788.2	6.4
C-AB	63.3	42.2	10.0	0.2	10.0	0.2
C-A	-	-	-	-	-	-
A-B	0.0	0.0	-	-	-	-
A-C	1084.6	723.1	-	-	-	-
All	**2762.5**	**1841.7**	**4492.3**	**1.6**	**4798.2**	**1.7**

Demand Set: 2029 PM with Dev
Modelling Period: 17:00-18:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	82.6	55.1	422.6	5.1	422.6	5.1
C-AB	282.2	188.1	89.3	0.3	89.3	0.3
C-A	-	-	-	-	-	-
A-B	9.6	6.4	-	-	-	-
A-C	1225.0	816.7	-	-	-	-
All	**3072.2**	**2048.1**	**511.9**	**0.2**	**511.9**	**0.2**

Demand Set: 2039 AM with Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	820.4	546.9	7981.6	9.7	9578.0	11.7
C-AB	67.4	45.0	11.4	0.2	11.4	0.2
C-A	-	-	-	-	-	-
A-B	0.0	0.0	-	-	-	-
A-C	1214.0	809.3	-	-	-	-
All	**3068.1**	**2045.4**	**7992.9**	**2.6**	**9589.4**	**3.1**

Demand Set: 2039 PM with Dev
Modelling Period: 17:00-18:30

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	89.5	59.6	691.7	7.7	691.7	7.7
C-AB	304.2	202.8	135.0	0.4	135.0	0.4
C-A	-	-	-	-	-	-
A-B	9.6	6.4	-	-	-	-
A-C	1368.2	912.1	-	-	-	-
All	**3413.5**	**2275.7**	**826.6**	**0.2**	**826.7**	**0.2**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful

APPENDIX E2

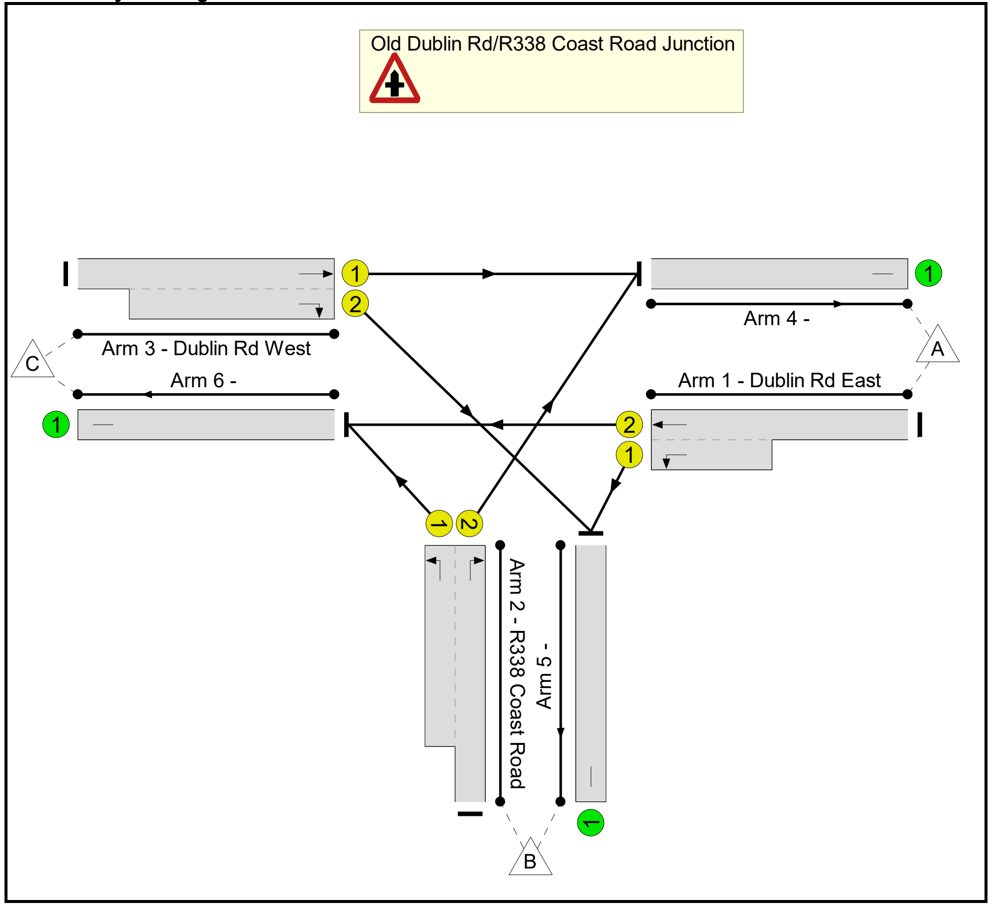
LinSig Analysis – Signal-controlled Junction between R338 Dublin Rd-R338 Coast Road

Full Input Data And Results

User and Project Details

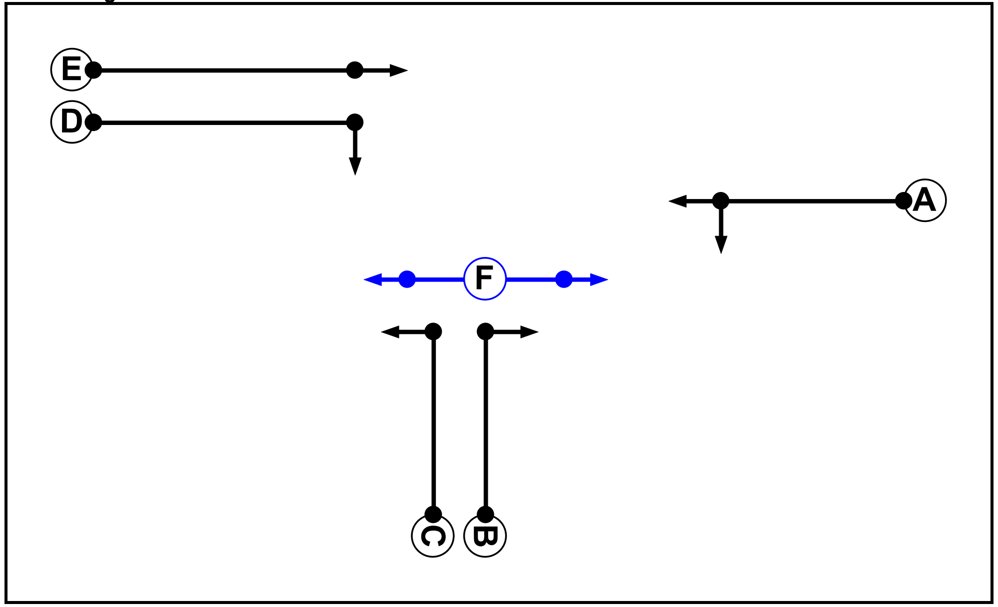
Project:	**Proposed Residential Development at Rosshill, Galway City**
Title:	**Dublin Rd_R338 Junction**
Location:	Rosshill, Galway City
File name:	119209 Dublin Rd_R338 Signalised Junction.lsg3x
Author:	J Noone
Company:	CST Group
Address:	1 O'Connell Street, Sligo
Notes:	

Network Layout Diagram



Full Input Data And Results

Phase Diagram



Phase Input Data

Phase Name	Phase type	Assoc Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Traffic		7	7
F	Pedestrian		8	8

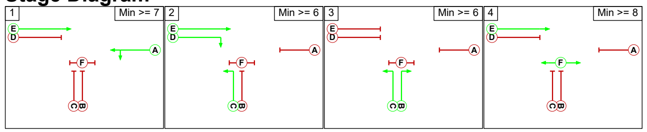
Phase Intergreens Matrix

		Starting Phase					
		A	B	C	D	E	F
Terminating Phase	A		5	6	5	-	7
	B	5		-	5	5	5
	C	5	-		-	-	5
	D	6	5	-		-	8
	E	-	5	-	-		-
	F	18	18	18	18	-	

Phases in Stage

Stage No.	Phases in Stage
1	A E
2	C D E
3	B C
4	E F

Stage Diagram



Lane Input Data

Junction: Old Dublin Rd/R338 Coast Road Junction													
Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Dublin Rd East)	U	A	2	3	6.0	Geom	-	3.40	0.00	Y	Arm 5 Left	20.00
1/2 (Dublin Rd East)	U	A	2	3	60.0	Geom	-	3.40	0.00	Y	Arm 6 Ahead	Inf
2/1 (R338 Coast Road)	U	C	2	3	10.0	Geom	-	3.60	0.00	Y	Arm 6 Left	12.00
2/2 (R338 Coast Road)	U	B	2	3	60.0	Geom	-	3.40	0.00	Y	Arm 4 Right	15.00
3/1 (Dublin Rd West)	U	E	2	3	60.0	Geom	-	3.40	0.00	Y	Arm 4 Ahead	Inf
3/2 (Dublin Rd West)	U	D	2	3	19.0	Geom	-	3.00	0.00	Y	Arm 5 Right	15.00
4/1	U		2	3	60.0	Inf	-	-	-	-	-	-
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2019 AM Survey Year'	07:45	08:45	01:00	
2: '2019 PM Survey Year'	16:45	17:45	01:00	
3: '2024 AM without Dev'	07:45	08:45	01:00	
4: '2024 PM without Dev'	16:45	17:45	01:00	
5: '2029 AM without Dev'	07:45	08:45	01:00	
6: '2029 PM without Dev'	16:45	17:45	01:00	
7: '2039 AM without Dev'	07:45	08:45	01:00	
8: '2039 PM without Dev'	16:45	17:45	01:00	
9: '2024 AM with Dev'	07:45	08:45	01:00	F3+F15
10: '2024 PM with Dev'	16:45	17:45	01:00	F4+F16
11: '2029 AM with Dev'	07:45	08:45	01:00	F5+F15
12: '2029 PM with Dev'	16:45	17:45	01:00	F6+F16
13: '2039 AM with Dev'	07:45	08:45	01:00	F7+F15
14: '2039 PM with Dev'	16:45	17:45	01:00	F8+F16

Traffic Flows, Desired

Scenario 1: '2019 AM Survey Year' (FG1: '2019 AM Survey Year', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	23	355	378
	B	200	0	301	501
	C	406	180	0	586
	Tot.	606	203	656	1465

Scenario 2: '2019 PM Survey Year' (FG2: '2019 PM Survey Year', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	11	649	660
	B	7	0	184	191
	C	619	284	0	903
	Tot.	626	295	833	1754

Scenario 3: '2024 AM without Dev' (FG3: '2024 AM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	25	388	413
	B	217	0	328	545
	C	443	196	0	639
	Tot.	660	221	716	1597

Scenario 4: '2024 PM without Dev' (FG4: '2024 PM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	12	707	719
	B	8	0	200	208
	C	674	310	0	984
	Tot.	682	322	907	1911

Full Input Data And Results

Scenario 5: '2029 AM without Dev' (FG5: '2029 AM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	27	424	451
	B	236	0	357	593
	C	483	213	0	696
	Tot.	719	240	781	1740

Scenario 6: '2029 PM without Dev' (FG6: '2029 PM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	13	771	784
	B	9	0	217	226
	C	734	337	0	1071
	Tot.	743	350	988	2081

Scenario 7: '2039 AM without Dev' (FG7: '2039 AM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	30	477	507
	B	262	0	399	661
	C	540	237	0	777
	Tot.	802	267	876	1945

Scenario 8: '2039 PM without Dev' (FG8: '2039 PM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	14	862	876
	B	10	0	241	251
	C	818	375	0	1193
	Tot.	828	389	1103	2320

Scenario 9: '2024 AM with Dev' (FG9: '2024 AM with Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	25	388	413
	B	224	0	328	552
	C	443	196	0	639
	Tot.	667	221	716	1604

Scenario 10: '2024 PM with Dev' (FG10: '2024 PM with Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	22	707	729
	B	8	0	200	208
	C	674	310	0	984
	Tot.	682	332	907	1921

Scenario 11: '2029 AM with Dev' (FG11: '2029 AM with Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	27	424	451
	B	243	0	357	600
	C	483	213	0	696
	Tot.	726	240	781	1747

Scenario 12: '2029 PM with Dev' (FG12: '2029 PM with Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	23	771	794
	B	9	0	217	226
	C	734	337	0	1071
	Tot.	743	360	988	2091

Scenario 13: '2039 AM with Dev' (FG13: '2039 AM with Dev', Plan 1: 'with Peds')
Desired Flow :

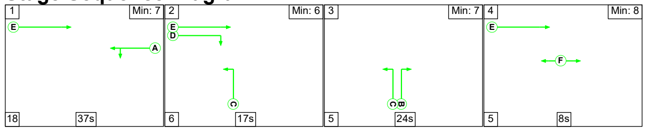
		Destination			
		A	B	C	Tot.
Origin	A	0	30	477	507
	B	269	0	399	668
	C	540	237	0	777
	Tot.	809	267	876	1952

Scenario 14: '2039 PM with Dev' (FG14: '2039 PM with Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination			
		A	B	C	Tot.
Origin	A	0	24	862	886
	B	10	0	241	251
	C	818	375	0	1193
	Tot.	828	399	1103	2330

Full Input Data And Results

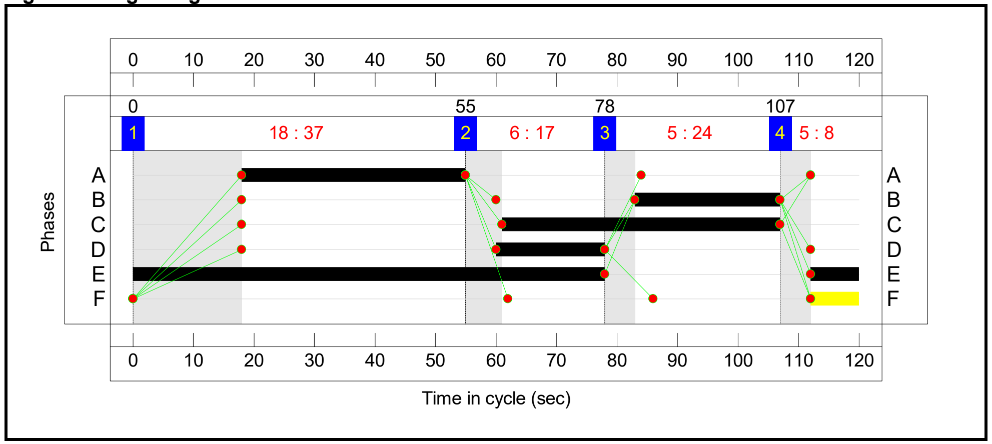
Scenario 1: '2019 AM Survey Year' (FG1: '2019 AM Survey Year', Plan 1: 'with Peds')
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	37	17	24	8
Change Point	0	55	78	107

Signal Timings Diagram



Full Input Data And Results
Network Results

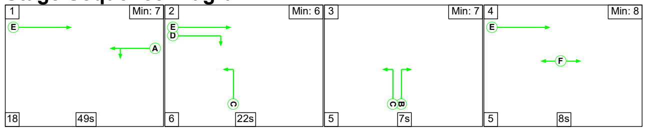
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**60.9%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**60.9%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	37		378	1955:1819	630	60.0%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	24:46		501	1777:1756	825	60.7%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	86:18		586	1955:1741	962	60.9%
4/1		U	N/A	N/A	-		-	-	-	606	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	203	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	656	1	Inf	0.0%

Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**11.2**	**2.3**	**0.0**	**13.5**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**11.2**	**2.3**	**0.0**	**13.5**	-	-	-	-
1/2+1/1	378	378	-	-	-	3.6	0.7	-	4.3	41.3	10.1	0.7	10.9
2/2+2/1	501	501	-	-	-	4.6	0.8	-	5.4	38.5	7.4	0.8	8.1
3/1+3/2	586	586	-	-	-	3.0	0.8	-	3.8	23.3	5.6	0.8	6.4
4/1	606	606	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	203	203	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	656	656	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 47.8 Total Delay for Signalled Lanes (pcuHr): 13.49
PRC Over All Lanes (%): 47.8 Total Delay Over All Lanes(pcuHr): 13.49 Cycle Time (s): 120

Full Input Data And Results
Scenario 2: '2019 PM Survey Year' (FG2: '2019 PM Survey Year', Plan 1: 'with Peds')

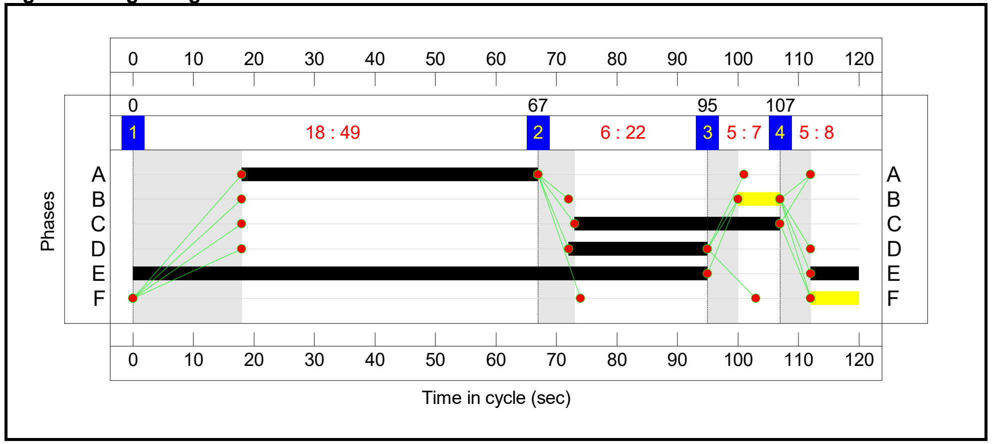
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	49	22	7	8
Change Point	0	67	95	107

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**81.6%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**81.6%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	49		660	1955:1819	818	80.7%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	7:34		191	1777:1756	516	37.0%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	103:23		903	1955:1741	1107	81.6%
4/1		U	N/A	N/A	-		-	-	-	626	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	295	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	833	1	Inf	0.0%

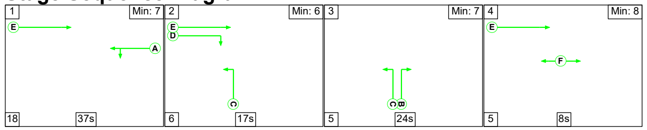
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	0	0	0	11.3	4.5	0.0	15.8	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	0	0	0	11.3	4.5	0.0	15.8	-	-	-	-
1/2+1/1	660	660	-	-	-	5.6	2.0	-	7.7	41.8	19.1	2.0	21.2
2/2+2/1	191	191	-	-	-	1.8	0.3	-	2.1	39.9	4.8	0.3	5.1
3/1+3/2	903	903	-	-	-	3.9	2.2	-	6.1	24.1	9.0	2.2	11.2
4/1	626	626	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	295	295	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	833	833	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 10.3 Total Delay for Signalled Lanes (pcuHr): 15.83
PRC Over All Lanes (%): 10.3 Total Delay Over All Lanes(pcuHr): 15.83 Cycle Time (s): 120

Full Input Data And Results

Scenario 3: '2024 AM without Dev' (FG3: '2024 AM without Dev', Plan 1: 'with Peds')

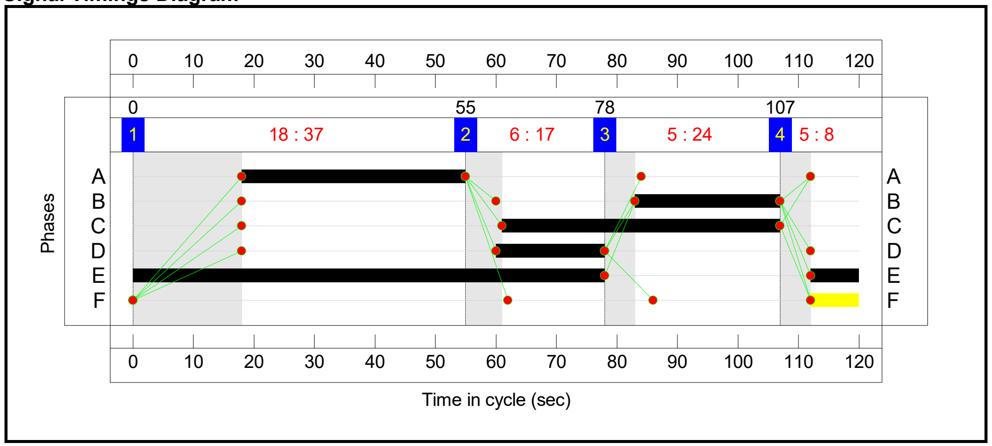
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	37	17	24	8
Change Point	0	55	78	107

Signal Timings Diagram



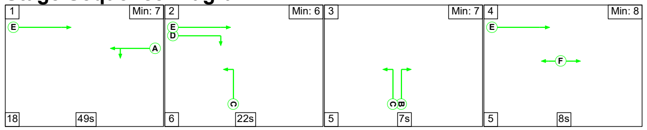
Full Input Data And Results
Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**66.1%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**66.1%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	37		413	1955:1819	629	65.6%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	24:46		545	1777:1756	827	65.9%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	86:18		639	1955:1741	967	66.1%
4/1		U	N/A	N/A	-		-	-	-	660	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	221	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	716	1	Inf	0.0%

Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**12.4**	**2.9**	**0.0**	**15.3**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**12.4**	**2.9**	**0.0**	**15.3**	-	-	-	-
1/2+1/1	413	413	-	-	-	4.0	0.9	-	5.0	43.2	11.4	0.9	12.4
2/2+2/1	545	545	-	-	-	5.1	1.0	-	6.0	39.8	8.1	1.0	9.1
3/1+3/2	639	639	-	-	-	3.3	1.0	-	4.3	24.2	6.2	1.0	7.1
4/1	660	660	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	221	221	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	716	716	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 36.1 Total Delay for Signalled Lanes (pcuHr): 15.28
PRC Over All Lanes (%): 36.1 Total Delay Over All Lanes(pcuHr): 15.28 Cycle Time (s): 120

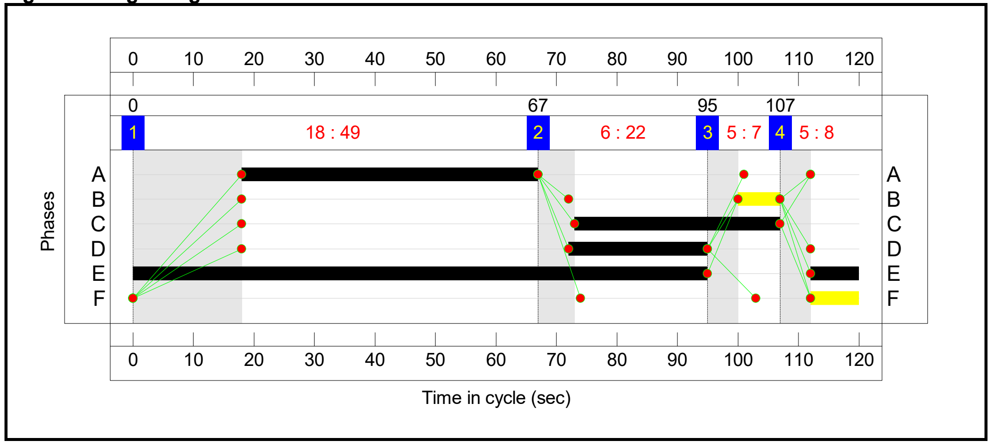
Full Input Data And Results
Scenario 4: '2024 PM without Dev' (FG4: '2024 PM without Dev', Plan 1: 'with Peds')
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	49	22	7	8
Change Point	0	67	95	107

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**89.0%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**89.0%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	49		719	1955:1819	818	87.9%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	7:34		208	1777:1756	517	40.2%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	103:23		984	1955:1741	1105	89.0%
4/1		U	N/A	N/A	-		-	-	-	682	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	322	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	907	1	Inf	0.0%

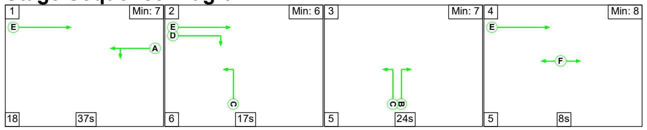
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**12.7**	**7.6**	**0.0**	**20.3**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**12.7**	**7.6**	**0.0**	**20.3**	-	-	-	-
1/2+1/1	719	719	-	-	-	6.4	3.4	-	9.8	49.2	21.9	3.4	25.3
2/2+2/1	208	208	-	-	-	2.0	0.3	-	2.3	40.5	5.3	0.3	5.6
3/1+3/2	984	984	-	-	-	4.3	3.8	-	8.1	29.8	10.0	3.8	13.8
4/1	682	682	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	322	322	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	907	907	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 1.1 Total Delay for Signalled Lanes (pcuHr): 20.31
PRC Over All Lanes (%): 1.1 Total Delay Over All Lanes(pcuHr): 20.31 Cycle Time (s): 120

Full Input Data And Results

Scenario 5: '2029 AM without Dev' (FG5: '2029 AM without Dev', Plan 1: 'with Peds')

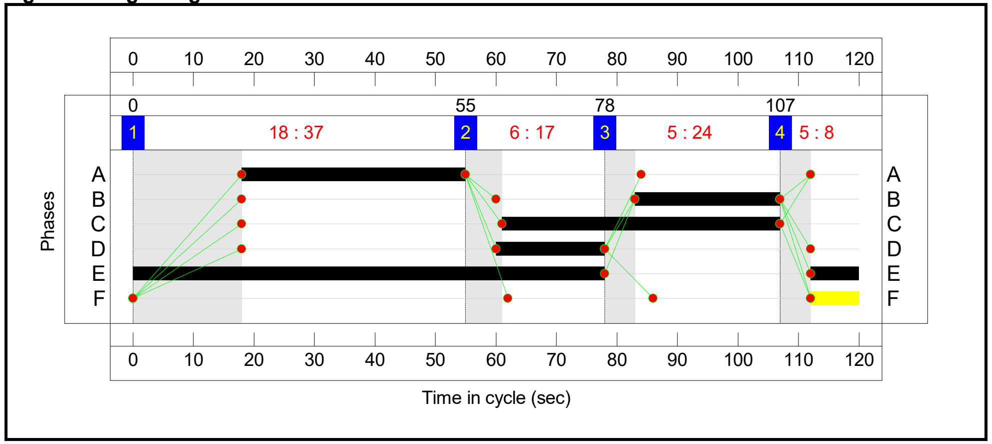
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	37	17	24	8
Change Point	0	55	78	107

Signal Timings Diagram



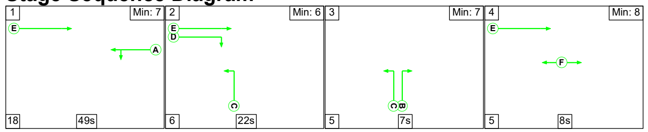
Full Input Data And Results
Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**71.7%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**71.7%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	37		451	1955:1819	629	71.7%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	24:46		593	1777:1756	827	71.7%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	86:18		696	1955:1741	974	71.5%
4/1		U	N/A	N/A	-		-	-	-	719	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	240	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	781	1	Inf	0.0%

Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**13.8**	**3.7**	**0.0**	**17.5**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**13.8**	**3.7**	**0.0**	**17.5**	-	-	-	-
1/2+1/1	451	451	-	-	-	4.5	1.2	-	5.7	45.8	12.8	1.2	14.0
2/2+2/1	593	593	-	-	-	5.6	1.3	-	6.9	41.6	9.0	1.3	10.3
3/1+3/2	696	696	-	-	-	3.7	1.2	-	4.9	25.4	6.8	1.2	8.0
4/1	719	719	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	240	240	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	781	781	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 25.6 Total Delay for Signalled Lanes (pcuHr): 17.51
PRC Over All Lanes (%): 25.6 Total Delay Over All Lanes(pcuHr): 17.51 Cycle Time (s): 120

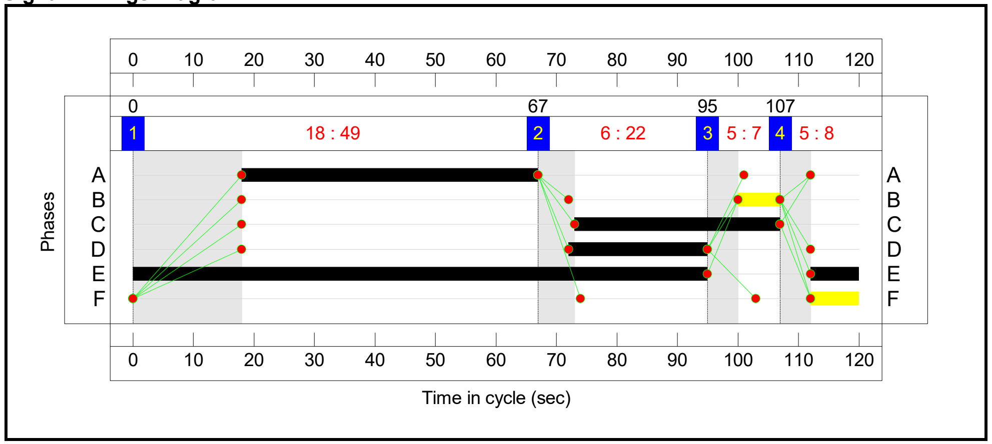
Full Input Data And Results
Scenario 6: '2029 PM without Dev' (FG6: '2029 PM without Dev', Plan 1: 'with Peds')
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	49	22	7	8
Change Point	0	67	95	107

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**96.8%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**96.8%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	49		784	1955:1819	818	95.9%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	7:34		226	1777:1756	517	43.7%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	103:23		1071	1955:1741	1107	96.8%
4/1		U	N/A	N/A	-		-	-	-	743	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	350	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	988	1	Inf	0.0%

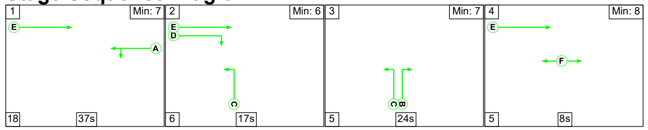
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	0	0	0	14.4	18.0	0.0	32.4	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	0	0	0	14.4	18.0	0.0	32.4	-	-	-	-
1/2+1/1	784	784	-	-	-	7.4	7.9	-	15.3	70.3	25.2	7.9	33.1
2/2+2/1	226	226	-	-	-	2.2	0.4	-	2.6	41.2	5.8	0.4	6.2
3/1+3/2	1071	1071	-	-	-	4.8	9.7	-	14.5	48.9	11.1	9.7	20.9
4/1	743	743	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	350	350	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	988	988	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -7.5 Total Delay for Signalled Lanes (pcuHr): 32.43
PRC Over All Lanes (%): -7.5 Total Delay Over All Lanes(pcuHr): 32.43 Cycle Time (s): 120

Full Input Data And Results

Scenario 7: '2039 AM without Dev' (FG7: '2039 AM without Dev', Plan 1: 'with Peds')

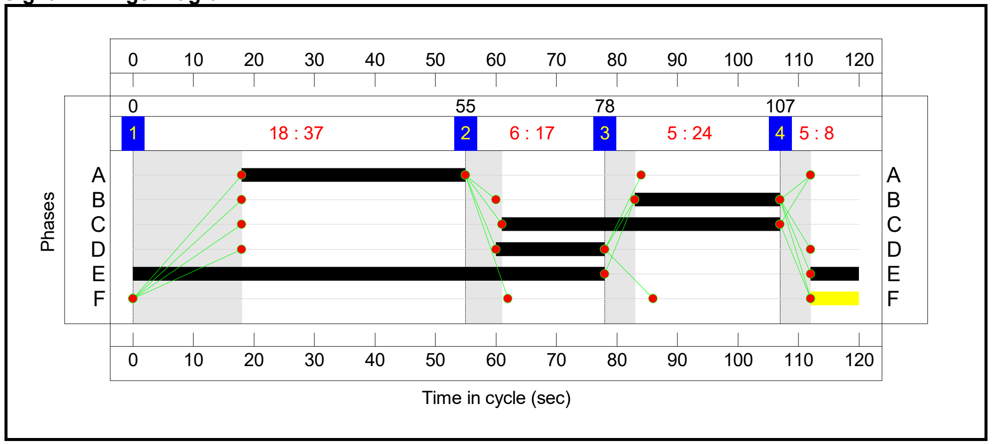
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	37	17	24	8
Change Point	0	55	78	107

Signal Timings Diagram



Full Input Data And Results
Network Results

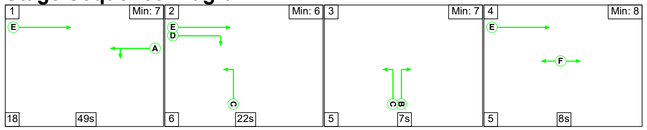
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**80.6%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**80.6%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	37		507	1955:1819	629	80.6%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	24:46		661	1777:1756	830	79.6%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	86:18		777	1955:1741	984	79.0%
4/1		U	N/A	N/A	-		-	-	-	802	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	267	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	876	1	Inf	0.0%

Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**15.8**	**5.8**	**0.0**	**21.6**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**15.8**	**5.8**	**0.0**	**21.6**	-	-	-	-
1/2+1/1	507	507	-	-	-	5.2	2.0	-	7.2	51.5	15.0	2.0	17.0
2/2+2/1	661	661	-	-	-	6.4	1.9	-	8.3	45.2	11.1	1.9	13.0
3/1+3/2	777	777	-	-	-	4.2	1.8	-	6.0	27.9	7.6	1.8	9.5
4/1	802	802	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	267	267	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	876	876	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 11.7 Total Delay for Signalled Lanes (pcuHr): 21.58
PRC Over All Lanes (%): 11.7 Total Delay Over All Lanes(pcuHr): 21.58 Cycle Time (s): 120

Full Input Data And Results
Scenario 8: '2039 PM without Dev' (FG8: '2039 PM without Dev', Plan 1: 'with Peds')

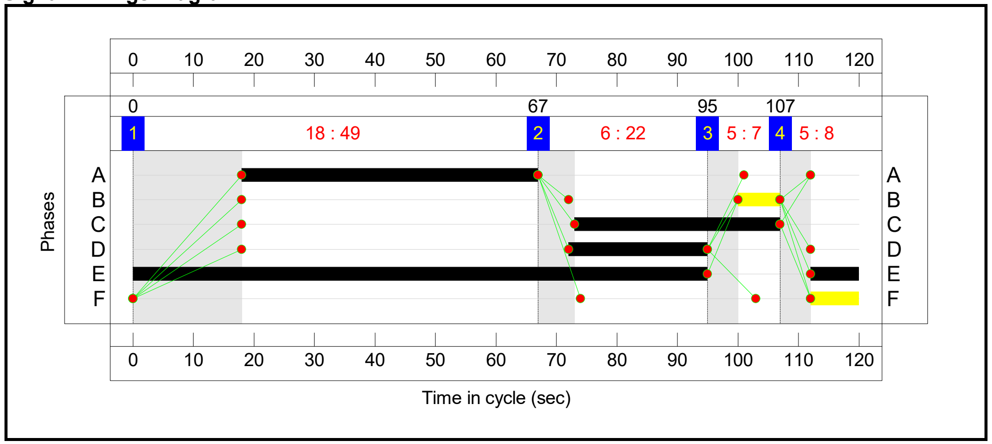
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	49	22	7	8
Change Point	0	67	95	107

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**107.7%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**107.7%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	49		876	1955:1819	818	107.2%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	7:34		251	1777:1756	517	48.5%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	103:23		1193	1955:1741	1108	107.7%
4/1		U	N/A	N/A	-		-	-	-	828	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	389	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	1103	1	Inf	0.0%

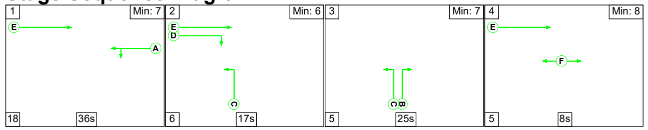
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**20.7**	**84.6**	**0.0**	**105.4**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**20.7**	**84.6**	**0.0**	**105.4**	-	-	-	-
1/2+1/1	876	818	-	-	-	11.7	35.4	-	47.1	193.5	32.3	35.4	67.7
2/2+2/1	251	251	-	-	-	2.5	0.5	-	3.0	42.3	6.6	0.5	7.0
3/1+3/2	1193	1166	-	-	-	6.6	48.7	-	55.3	166.9	13.4	48.7	62.1
4/1	828	828	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	361	361	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	1045	1045	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -19.7 Total Delay for Signalled Lanes (pcuHr): 105.35
PRC Over All Lanes (%): -19.7 Total Delay Over All Lanes(pcuHr): 105.35 Cycle Time (s): 120

Full Input Data And Results

Scenario 9: '2024 AM with Dev' (FG9: '2024 AM with Dev', Plan 1: 'with Peds')

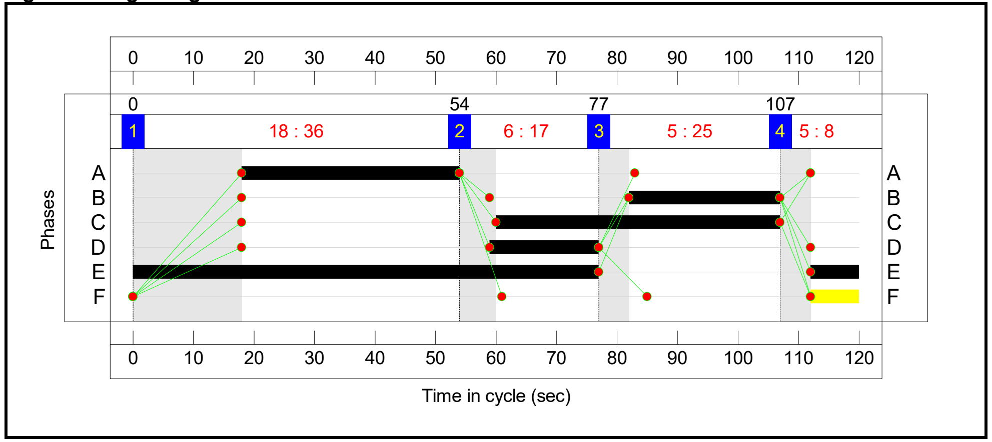
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	36	17	25	8
Change Point	0	54	77	107

Signal Timings Diagram



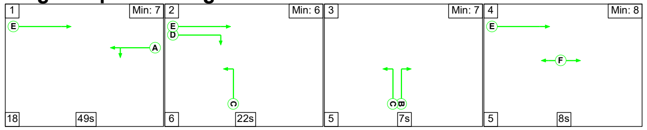
Full Input Data And Results
Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**67.3%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**67.3%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	36		413	1955:1819	613	67.3%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	25:47		552	1777:1756	828	66.7%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	85:18		639	1955:1741	988	64.7%
4/1		U	N/A	N/A	-		-	-	-	667	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	221	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	716	1	Inf	0.0%

Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**12.5**	**2.9**	**0.0**	**15.4**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**12.5**	**2.9**	**0.0**	**15.4**	-	-	-	-
1/2+1/1	413	413	-	-	-	4.1	1.0	-	5.1	44.7	11.5	1.0	12.6
2/2+2/1	552	552	-	-	-	5.0	1.0	-	6.0	39.4	8.0	1.0	9.0
3/1+3/2	639	639	-	-	-	3.4	0.9	-	4.3	24.1	6.2	0.9	7.1
4/1	667	667	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	221	221	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	716	716	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 33.6 Total Delay for Signalled Lanes (pcuHr): 15.45
PRC Over All Lanes (%): 33.6 Total Delay Over All Lanes(pcuHr): 15.45 Cycle Time (s): 120

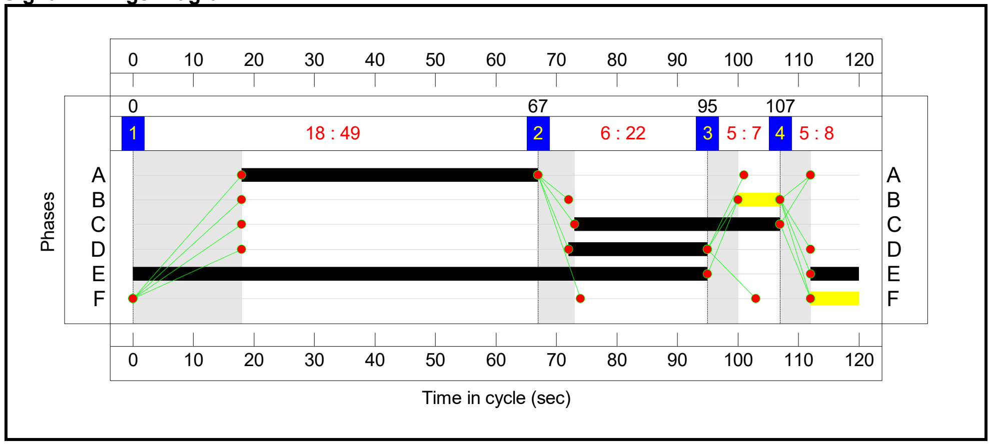
Full Input Data And Results
Scenario 10: '2024 PM with Dev' (FG10: '2024 PM with Dev', Plan 1: 'with Peds')
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	49	22	7	8
Change Point	0	67	95	107

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**89.0%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**89.0%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	49		729	1955:1819	820	89.0%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	7:34		208	1777:1756	517	40.2%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	103:23		984	1955:1741	1105	89.0%
4/1		U	N/A	N/A	-		-	-	-	682	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	332	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	907	1	Inf	0.0%

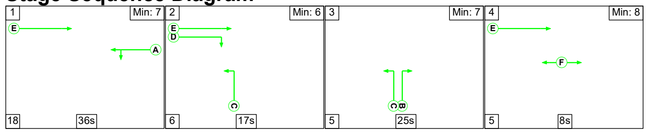
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**12.9**	**7.9**	**0.0**	**20.7**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**12.9**	**7.9**	**0.0**	**20.7**	-	-	-	-
1/2+1/1	729	729	-	-	-	6.5	3.7	-	10.2	50.6	22.3	3.7	26.0
2/2+2/1	208	208	-	-	-	2.0	0.3	-	2.3	40.5	5.3	0.3	5.6
3/1+3/2	984	984	-	-	-	4.3	3.8	-	8.1	29.8	10.0	3.8	13.8
4/1	682	682	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	332	332	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	907	907	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 1.1 Total Delay for Signalled Lanes (pcuHr): 20.74
PRC Over All Lanes (%): 1.1 Total Delay Over All Lanes(pcuHr): 20.74 Cycle Time (s): 120

Full Input Data And Results

Scenario 11: '2029 AM with Dev' (FG11: '2029 AM with Dev', Plan 1: 'with Peds')

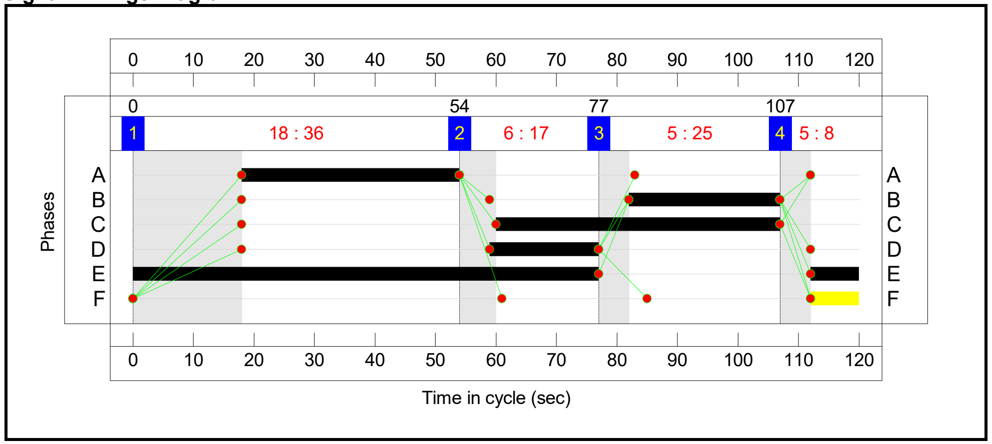
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	36	17	25	8
Change Point	0	54	77	107

Signal Timings Diagram



Full Input Data And Results
Network Results

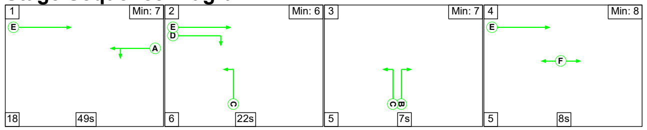
Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**73.6%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**73.6%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	36		451	1955:1819	613	73.6%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	25:47		600	1777:1756	829	72.4%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	85:18		696	1955:1741	995	69.9%
4/1		U	N/A	N/A	-		-	-	-	726	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	240	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	781	1	Inf	0.0%

Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**13.9**	**3.8**	**0.0**	**17.7**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**13.9**	**3.8**	**0.0**	**17.7**	-	-	-	-
1/2+1/1	451	451	-	-	-	4.6	1.4	-	6.0	47.6	12.9	1.4	14.3
2/2+2/1	600	600	-	-	-	5.6	1.3	-	6.9	41.2	8.9	1.3	10.2
3/1+3/2	696	696	-	-	-	3.7	1.2	-	4.9	25.2	6.8	1.2	8.0
4/1	726	726	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	240	240	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	781	781	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 22.4 Total Delay for Signalled Lanes (pcuHr): 17.71
PRC Over All Lanes (%): 22.4 Total Delay Over All Lanes(pcuHr): 17.71 Cycle Time (s): 120

Full Input Data And Results
Scenario 12: '2029 PM with Dev' (FG12: '2029 PM with Dev', Plan 1: 'with Peds')

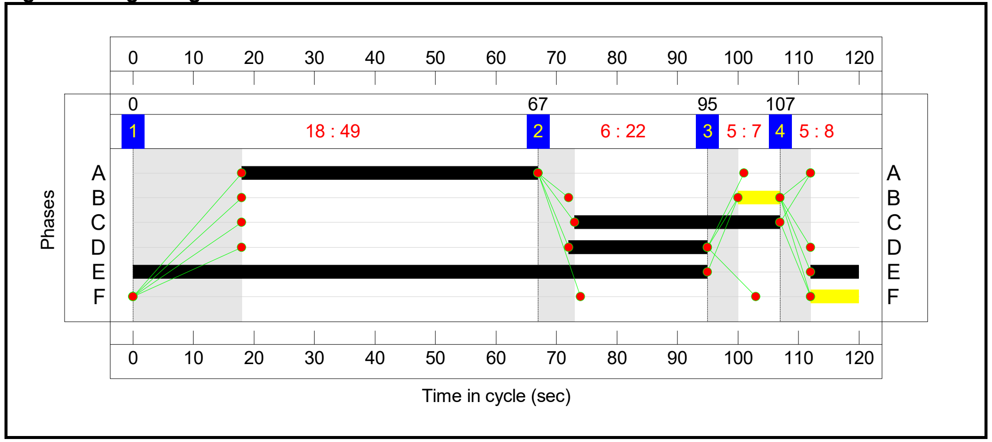
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	49	22	7	8
Change Point	0	67	95	107

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**96.9%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**96.9%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	49		794	1955:1819	819	96.9%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	7:34		226	1777:1756	517	43.7%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	103:23		1071	1955:1741	1107	96.8%
4/1		U	N/A	N/A	-		-	-	-	743	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	360	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	988	1	Inf	0.0%

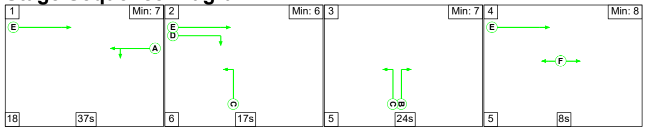
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**14.5**	**19.2**	**0.0**	**33.7**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**14.5**	**19.2**	**0.0**	**33.7**	-	-	-	-
1/2+1/1	794	794	-	-	-	7.5	9.1	-	16.6	75.4	25.6	9.1	34.7
2/2+2/1	226	226	-	-	-	2.2	0.4	-	2.6	41.2	5.8	0.4	6.2
3/1+3/2	1071	1071	-	-	-	4.8	9.7	-	14.5	48.9	11.1	9.7	20.9
4/1	743	743	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	360	360	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	988	988	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -7.7 Total Delay for Signalled Lanes (pcuHr): 33.74
PRC Over All Lanes (%): -7.7 Total Delay Over All Lanes(pcuHr): 33.74 Cycle Time (s): 120

Full Input Data And Results

Scenario 13: '2039 AM with Dev' (FG13: '2039 AM with Dev', Plan 1: 'with Peds')

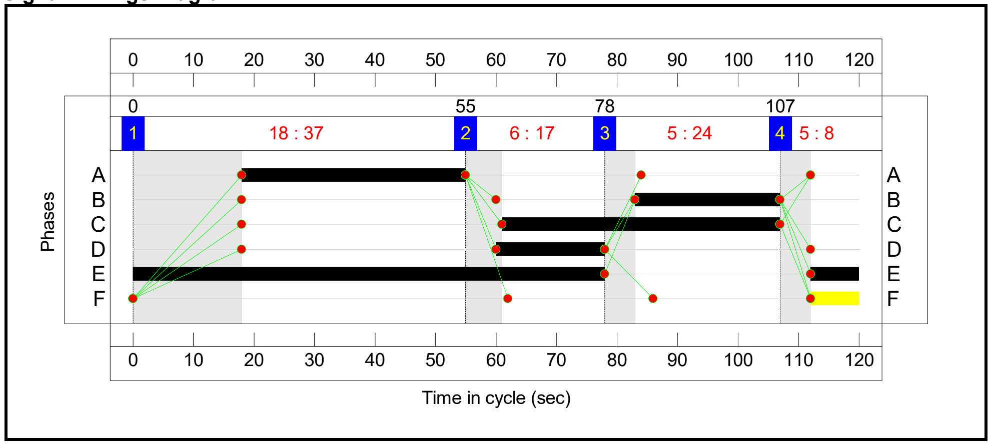
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	37	17	24	8
Change Point	0	55	78	107

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**81.6%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**81.6%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	37		507	1955:1819	629	80.6%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	24:46		668	1777:1756	818	81.6%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	86:18		777	1955:1741	984	79.0%
4/1		U	N/A	N/A	-		-	-	-	809	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	267	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	876	1	Inf	0.0%

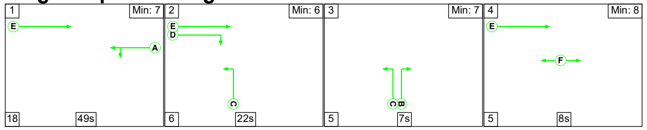
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**15.9**	**6.0**	**0.0**	**21.9**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**15.9**	**6.0**	**0.0**	**21.9**	-	-	-	-
1/2+1/1	507	507	-	-	-	5.2	2.0	-	7.2	51.5	15.0	2.0	17.0
2/2+2/1	668	668	-	-	-	6.5	2.2	-	8.7	46.7	11.1	2.2	13.3
3/1+3/2	777	777	-	-	-	4.2	1.8	-	6.0	27.9	7.6	1.8	9.5
4/1	809	809	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	267	267	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	876	876	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 10.3 Total Delay for Signalled Lanes (pcuHr): 21.93
PRC Over All Lanes (%): 10.3 Total Delay Over All Lanes(pcuHr): 21.93 Cycle Time (s): 120

Full Input Data And Results

Scenario 14: '2039 PM with Dev' (FG14: '2039 PM with Dev', Plan 1: 'with Peds')

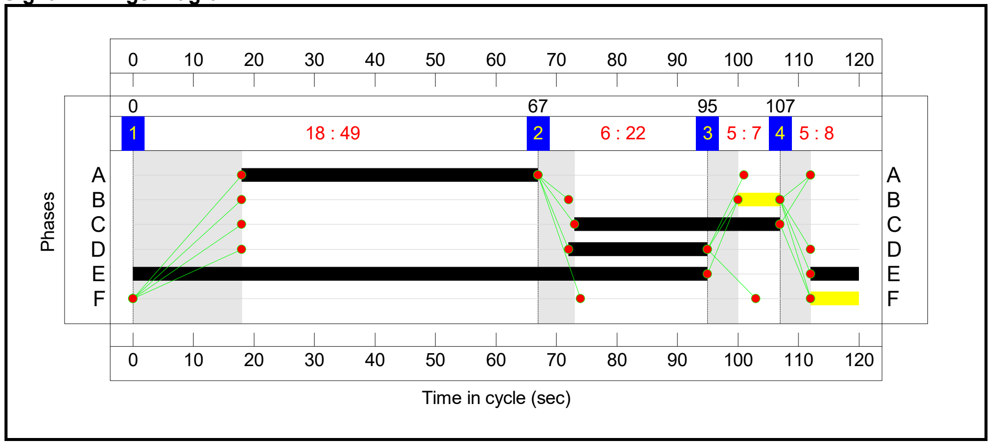
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4
Duration	49	22	7	8
Change Point	0	67	95	107

Signal Timings Diagram



Full Input Data And Results
Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_R338 Junction	-	-	-	-	-	-	-	-	-	-	-	-	**108.2%**
Old Dublin Rd/R338 Coast Road Junction	-	-	-	-	-	-	-	-	-	-	-	-	**108.2%**
1/2+1/1	Dublin Rd East Left Ahead	U	N/A	N/A	A		1	49		886	1955:1819	819	108.2%
2/2+2/1	R338 Coast Road Right Left	U	N/A	N/A	B C		1	7:34		251	1777:1756	517	48.5%
3/1+3/2	Dublin Rd West Ahead Right	U	N/A	N/A	E D		1	103:23		1193	1955:1741	1108	107.7%
4/1		U	N/A	N/A	-		-	-	-	828	1	Inf	0.0%
5/1		U	N/A	N/A	-		-	-	-	399	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	1103	1	Inf	0.0%

Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_R338 Junction	-	-	**0**	**0**	**0**	**21.3**	**88.3**	**0.0**	**109.6**	-	-	-	-
Old Dublin Rd/R338 Coast Road Junction	-	-	**0**	**0**	**0**	**21.3**	**88.3**	**0.0**	**109.6**	-	-	-	-
1/2+1/1	886	819	-	-	-	12.2	39.1	-	51.3	208.6	32.8	39.1	71.9
2/2+2/1	251	251	-	-	-	2.5	0.5	-	3.0	42.3	6.6	0.5	7.0
3/1+3/2	1193	1166	-	-	-	6.6	48.7	-	55.3	166.9	13.4	48.7	62.1
4/1	828	828	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
5/1	370	370	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	1038	1038	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -20.2 Total Delay for Signalled Lanes (pcuHr): 109.59
PRC Over All Lanes (%): -20.2 Total Delay Over All Lanes(pcuHr): 109.59 Cycle Time (s): 120

APPENDIX E3

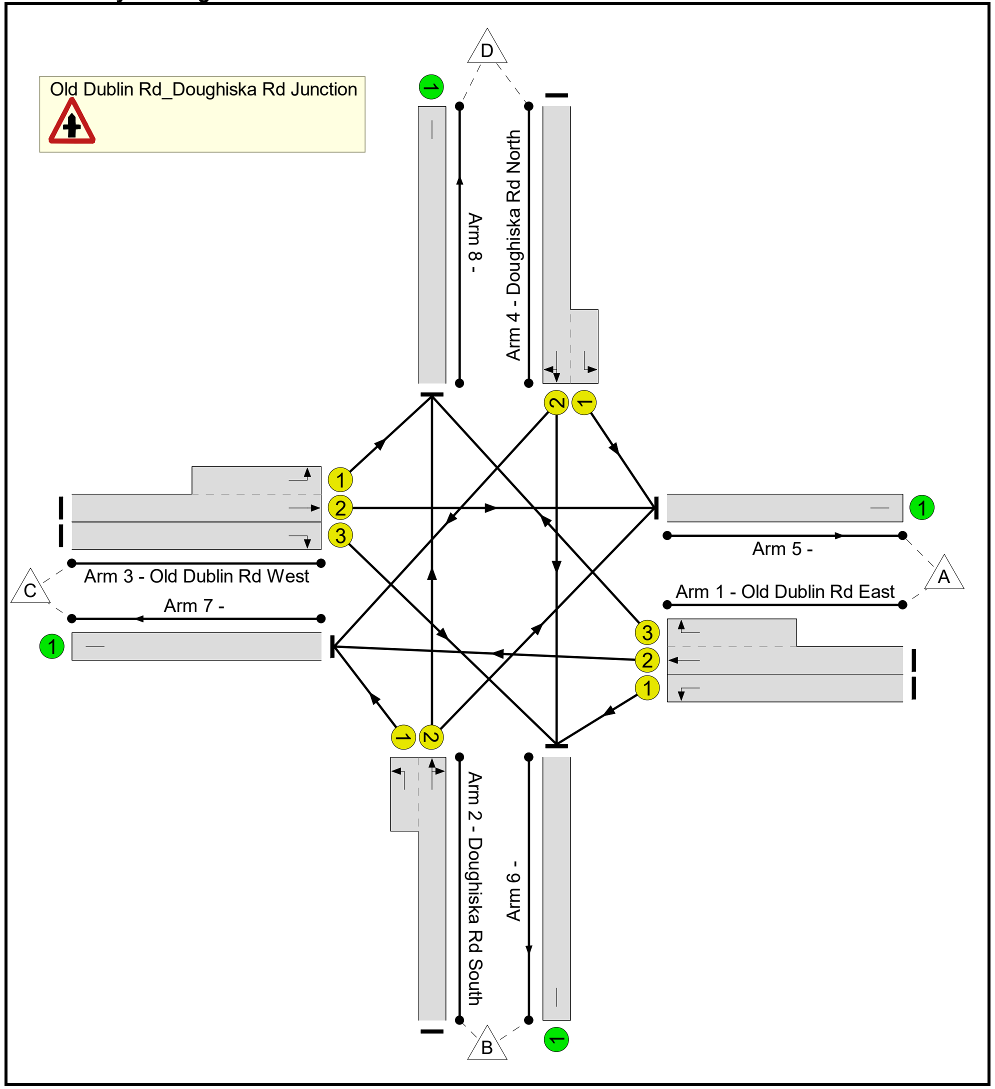
LinSig Analysis – Junction between R921 Old Dublin Road-Doughiska Road

Full Input Data And Results

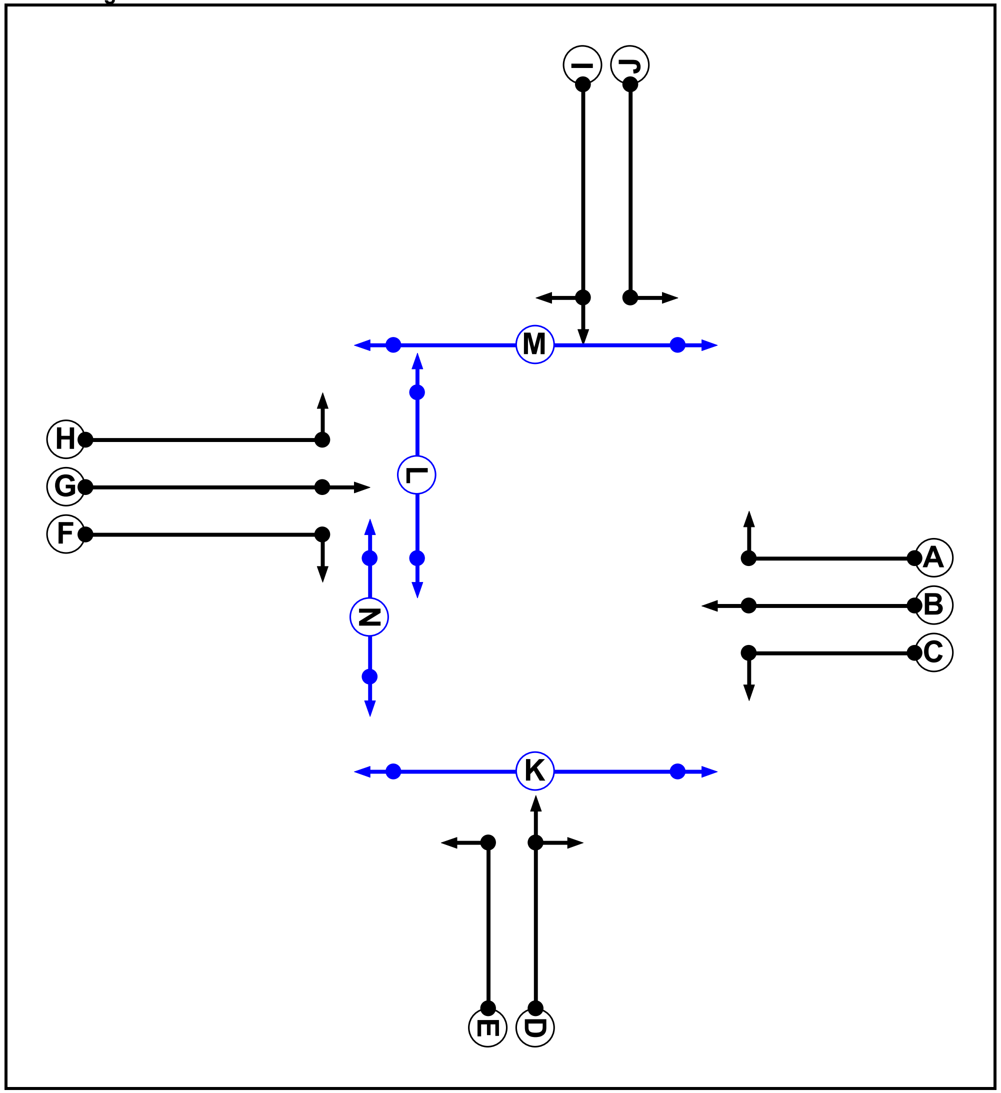
User and Project Details

Project:	**Proposed Residential Development at Rosshill, Galway City**
Title:	**Dublin Rd_Doughiska Rd Junction**
Location:	Rosshill, Galway City
File name:	119209 Dublin Rd_Doughiska Rd Signalised Junction.lsg3x
Author:	J Noone
Company:	CST Group
Address:	1 O'Connell Street, Sligo
Notes:	

Network Layout Diagram



Phase Diagram



Full Input Data And Results

Phase Input Data

Phase Name	Phase type	Assoc Phase	Street Min	Cont Min
A	Traffic		7	7
B	Traffic		7	7
C	Traffic		7	7
D	Traffic		7	7
E	Traffic		7	7
F	Traffic		7	7
G	Traffic		7	7
H	Traffic		7	7
I	Traffic		7	7
J	Traffic		7	7
K	Pedestrian		6	6
L	Pedestrian		4	4
M	Pedestrian		6	6
N	Pedestrian		3	3

Phase Intergreens Matrix

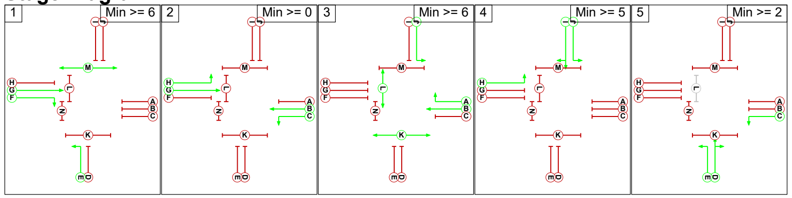
Starting Phase (columns); Terminating Phase (rows)

Terminating Phase	A	B	C	D	E	F	G	H	I	J	K	L	M	N
A		-	-	5	-	-	5	5	5	-	-	-	9	-
B	-		-	7	9	7	-	-	5	-	-	-	-	11
C	-	-		-	-	6	-	-	5	-	10	-	-	-
D	5	5	-		-	5	5	5	5	7	5	-	10	-
E	-	5	-	-		-	-	-	5	-	5	-	-	7
F	-	5	5	6	-		-	-	5	-	8	5	-	-
G	7	-	-	6	-	-		-	6	8	-	5	-	-
H	6	-	-	5	-	-	-		-	-	-	5	10	-
I	5	5	5	5	10	6	5	-		-	10	-	5	11
J	-	-	-	5	-	-	5	-	-		-	-	5	-
K	-	-	13	13	13	13	-	-	13	-		-	-	-
L	-	-	-	-	-	10	10	10	-	-	-		-	-
M	14	-	-	14	-	-	-	14	14	14	-	-		-
N	-	8	-	-	8	-	-	-	8	-	-	-	-	

Phases in Stage

Stage No.	Phases in Stage
1	E F G M
2	B C G H
3	A B J K L
4	H I J
5	C D E

Stage Diagram



Lane Input Data

Junction: Old Dublin Rd_Doughiska Rd Junction

Lane	Lane Type	Phases	Start Disp.	End Disp.	Physical Length (PCU)	Sat Flow Type	Def User Saturation Flow (PCU/Hr)	Lane Width (m)	Gradient	Nearside Lane	Turns	Turning Radius (m)
1/1 (Old Dublin Rd East)	U	C	2	3	60.0	Geom	-	3.10	0.00	Y	Arm 6 Left	10.00
1/2 (Old Dublin Rd East)	U	B	2	3	60.0	Geom	-	3.10	0.00	Y	Arm 7 Ahead	Inf
1/3 (Old Dublin Rd East)	U	A	2	3	7.0	Geom	-	3.20	0.00	Y	Arm 8 Right	15.00
2/1 (Doughiska Rd South)	U	E	2	3	4.0	Geom	-	3.40	0.00	Y	Arm 7 Left	12.00
2/2 (Doughiska Rd South)	U	D	2	3	60.0	Geom	-	3.20	0.00	Y	Arm 5 Right	15.00
											Arm 8 Ahead	Inf
3/1 (Old Dublin Rd West)	U	H	2	3	7.0	Geom	-	2.90	0.00	Y	Arm 8 Left	12.00
3/2 (Old Dublin Rd West)	U	G	2	3	60.0	Geom	-	3.30	0.00	Y	Arm 5 Ahead	Inf
3/3 (Old Dublin Rd West)	U	F	2	3	60.0	Geom	-	3.10	0.00	Y	Arm 6 Right	15.00
4/1 (Doughiska Rd North)	U	J	2	3	4.0	Geom	-	3.00	0.00	Y	Arm 5 Left	12.00
4/2 (Doughiska Rd North)	U	I	2	3	60.0	Geom	-	3.00	0.00	Y	Arm 6 Ahead	Inf
											Arm 7 Right	15.00
5/1	U		2	3	60.0	Inf	-	-	-	-	-	-
6/1	U		2	3	60.0	Inf	-	-	-	-	-	-
7/1	U		2	3	60.0	Inf	-	-	-	-	-	-
8/1	U		2	3	60.0	Inf	-	-	-	-	-	-

Full Input Data And Results

Traffic Flow Groups

Flow Group	Start Time	End Time	Duration	Formula
1: '2019 AM Survey Year'	08:15	09:15	01:00	
2: '2019 PM Survey Year'	17:15	18:15	01:00	
3: '2024 AM without Dev'	08:15	09:15	01:00	
4: '2024 PM without Dev'	17:15	18:15	01:00	
5: '2029 AM without Dev'	08:15	09:15	01:00	
6: '2029 PM without Dev'	17:15	18:15	01:00	
7: '2039 AM without Dev'	08:15	09:15	01:00	
8: '2039 PM without Dev'	17:15	18:15	01:00	
9: '2024 AM with Dev'	08:15	09:15	01:00	F3+F15
10: '2024 PM with Dev'	17:15	18:15	01:00	F4+F16
11: '2029 AM with Dev'	08:15	09:15	01:00	F5+F15
12: '2029 PM with Dev'	17:15	18:15	01:00	F6+F16
13: '2039 AM with Dev'	08:15	09:15	01:00	F7+F15
14: '2039 PM with Dev'	17:15	18:15	01:00	F8+F16

Traffic Flows, Desired

Scenario 1: '2019 AM Survey Year' (FG1: '2019 AM Survey Year', Plan 1: 'with Peds')

Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	60	317	311	688
	B	80	0	37	180	297
	C	264	50	0	162	476
	D	143	67	53	0	263
	Tot.	487	177	407	653	1724

Scenario 2: '2019 PM Survey Year' (FG2: '2019 PM Survey Year', Plan 1: 'with Peds')
Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	237	475	105	817
	B	91	0	73	56	220
	C	488	105	0	46	639
	D	202	137	58	0	397
	Tot.	781	479	606	207	2073

Scenario 3: '2024 AM without Dev' (FG3: '2024 AM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	66	346	339	751
	B	87	0	41	196	324
	C	288	54	0	177	519
	D	155	73	58	0	286
	Tot.	530	193	445	712	1880

Scenario 4: '2024 PM without Dev' (FG4: '2024 PM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	258	517	115	890
	B	99	0	79	61	239
	C	531	114	0	50	695
	D	220	149	63	0	432
	Tot.	850	521	659	226	2256

Scenario 5: '2029 AM without Dev' (FG5: '2029 AM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	72	378	369	819
	B	95	0	44	213	352
	C	314	59	0	192	565
	D	169	79	64	0	312
	Tot.	578	210	486	774	2048

Full Input Data And Results

Scenario 6: '2029 PM without Dev' (FG6: '2029 PM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	281	564	125	970
	B	108	0	86	66	260
	C	579	124	0	55	758
	D	239	162	69	0	470
	Tot.	926	567	719	246	2458

Scenario 7: '2039 AM without Dev' (FG7: '2039 AM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	82	425	411	918
	B	106	0	50	236	392
	C	352	66	0	215	633
	D	189	88	72	0	349
	Tot.	647	236	547	862	2292

Scenario 8: '2039 PM without Dev' (FG8: '2039 PM without Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	312	630	140	1082
	B	120	0	95	73	288
	C	645	137	0	62	844
	D	265	180	78	0	523
	Tot.	1030	629	803	275	2737

Scenario 9: '2024 AM with Dev' (FG9: '2024 AM with Dev', Plan 1: 'with Peds')
Desired Flow :

		Destination				
		A	B	C	D	Tot.
Origin	A	0	66	346	339	751
	B	87	0	41	196	324
	C	292	55	0	179	526
	D	155	73	58	0	286
	Tot.	534	194	445	714	1887

Scenario 10: '2024 PM with Dev' (FG10: '2024 PM with Dev', Plan 1: 'with Peds')
Desired Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	258	524	115	897
	B	99	0	80	61	240
	C	531	114	0	50	695
	D	220	149	64	0	433
	Tot.	850	521	668	226	2265

Scenario 11: '2029 AM with Dev' (FG11: '2029 AM with Dev', Plan 1: 'with Peds')
Desired Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	72	378	369	819
	B	95	0	44	213	352
	C	318	60	0	194	572
	D	169	79	64	0	312
	Tot.	582	211	486	776	2055

Scenario 12: '2029 PM with Dev' (FG12: '2029 PM with Dev', Plan 1: 'with Peds')
Desired Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	281	571	125	977
	B	108	0	87	66	261
	C	579	124	0	55	758
	D	239	162	70	0	471
	Tot.	926	567	728	246	2467

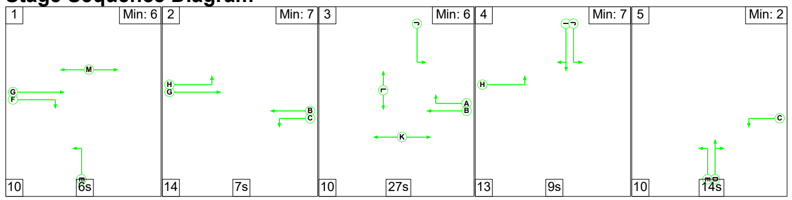
Scenario 13: '2039 AM with Dev' (FG13: '2039 AM with Dev', Plan 1: 'with Peds')
Desired Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	82	425	411	918
	B	106	0	50	236	392
	C	356	67	0	217	640
	D	189	88	72	0	349
	Tot.	651	237	547	864	2299

Scenario 14: '2039 PM with Dev' (FG14: '2039 PM with Dev', Plan 1: 'with Peds')
Desired Flow :

	Destination					
		A	B	C	D	Tot.
Origin	A	0	312	637	140	1089
	B	120	0	96	73	289
	C	645	137	0	62	844
	D	265	180	79	0	524
	Tot.	1030	629	812	275	2746

Scenario 1: '2019 AM Survey Year' (FG1: '2019 AM Survey Year', Plan 1: 'with Peds')
Stage Sequence Diagram

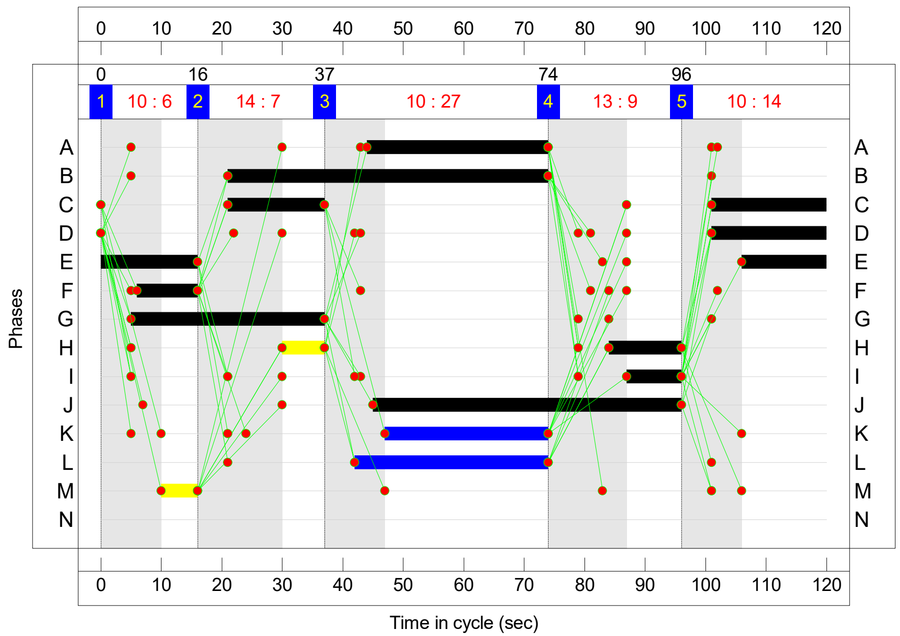


Stage Timings

Stage	1	2	3	4	5
Duration	6	7	27	9	14
Change Point	0	16	37	74	96

Full Input Data And Results

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**92.0%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**92.0%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	35	-	60	1674	516	11.6%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	53:30		628	1925:1759	685	91.7%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	19:30		297	1877:1738	323	92.0%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	32:19		426	1945:1693	646	66.0%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	50	1750	160	31.2%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	9:51		263	1834:1702	292	90.0%
5/1		U	N/A	N/A	-		-	-	-	487	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	177	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	407	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	653	1	Inf	0.0%

Full Input Data And Results

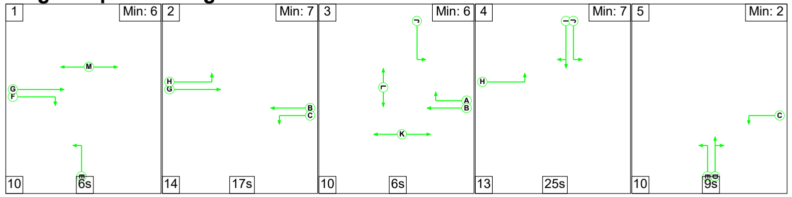
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**17.0**	**13.9**	**0.0**	**30.9**	**-**	**-**	**-**	**-**
Old Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**17.0**	**13.9**	**0.0**	**30.9**	**-**	**-**	**-**	**-**
1/1	60	60	-	-	-	0.3	0.1	-	0.4	22.9	1.1	0.1	1.1
1/2+1/3	628	628	-	-	-	5.7	4.8	-	10.4	59.9	12.9	4.8	17.7
2/2+2/1	297	297	-	-	-	3.9	4.3	-	8.2	99.5	9.2	4.3	13.5
3/2+3/1	426	426	-	-	-	3.7	1.0	-	4.7	39.4	7.7	1.0	8.7
3/3	50	50	-	-	-	0.7	0.2	-	0.9	67.2	1.6	0.2	1.8
4/2+4/1	263	263	-	-	-	2.6	3.6	-	6.2	85.3	3.9	3.6	7.5
5/1	487	487	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	177	177	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	407	407	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	653	653	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -2.2 Total Delay for Signalled Lanes (pcuHr): 30.86
PRC Over All Lanes (%): -2.2 Total Delay Over All Lanes(pcuHr): 30.86 Cycle Time (s): 120

Full Input Data And Results

Scenario 2: '2019 PM Survey Year' (FG2: '2019 PM Survey Year', Plan 1: 'with Peds')

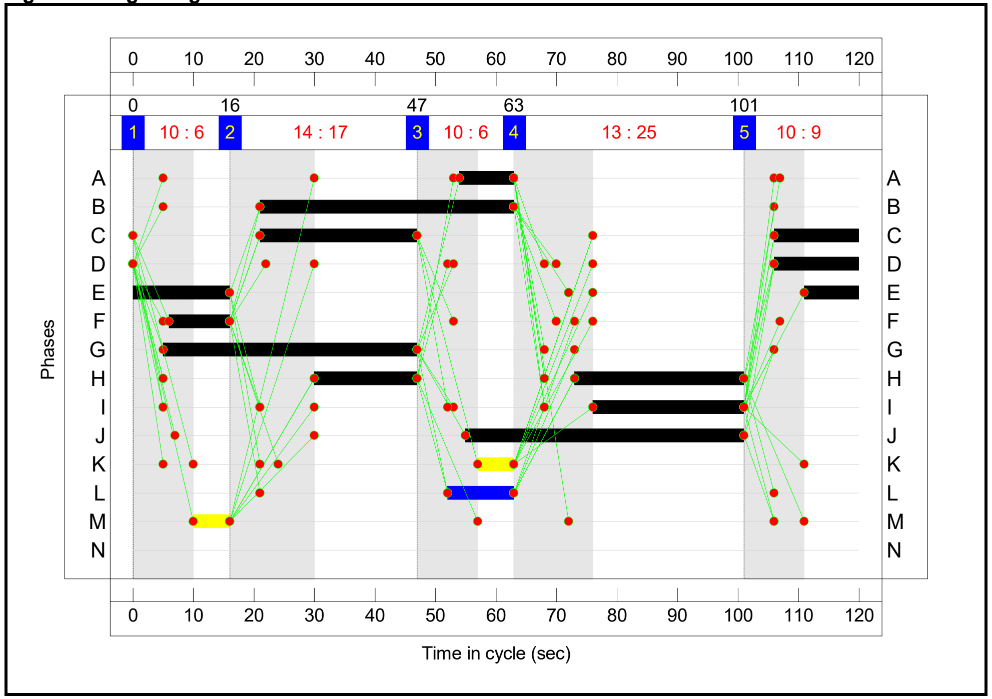
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	17	6	25	9
Change Point	0	16	47	63	101

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**79.5%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**79.5%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	40	-	237	1674	586	40.5%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	42:9		580	1925:1759	730	79.5%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	14:25		220	1822:1738	284	77.4%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	42:45		534	1945:1693	710	75.2%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	105	1750	160	65.5%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	25:46		397	1860:1702	511	77.7%
5/1		U	N/A	N/A	-		-	-	-	781	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	479	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	606	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	207	1	Inf	0.0%

Full Input Data And Results

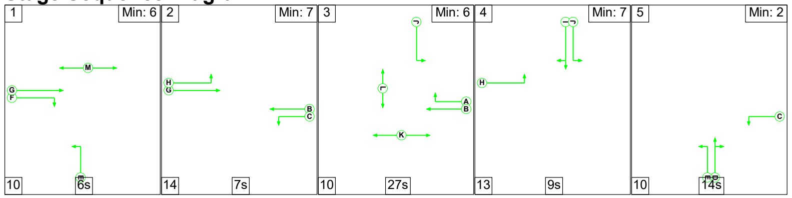
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**20.1**	**8.0**	**0.0**	**28.1**	-	-	-	-
Old Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**20.1**	**8.0**	**0.0**	**28.1**	-	-	-	-
1/1	237	237	-	-	-	1.2	0.3	-	1.5	23.4	4.4	0.3	4.7
1/2+1/3	580	580	-	-	-	6.0	1.9	-	7.9	48.8	15.5	1.9	17.4
2/2+2/1	220	220	-	-	-	2.8	1.6	-	4.5	72.9	5.0	1.6	6.7
3/2+3/1	534	534	-	-	-	4.7	1.5	-	6.2	41.6	14.8	1.5	16.3
3/3	105	105	-	-	-	1.5	0.9	-	2.5	84.1	3.4	0.9	4.3
4/2+4/1	397	397	-	-	-	3.9	1.7	-	5.6	50.7	8.3	1.7	10.0
5/1	781	781	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	479	479	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	606	606	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	207	207	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 13.2 Total Delay for Signalled Lanes (pcuHr): 28.08
PRC Over All Lanes (%): 13.2 Total Delay Over All Lanes(pcuHr): 28.08 Cycle Time (s): 120

Full Input Data And Results

Scenario 3: '2024 AM without Dev' (FG3: '2024 AM without Dev', Plan 1: 'with Peds')

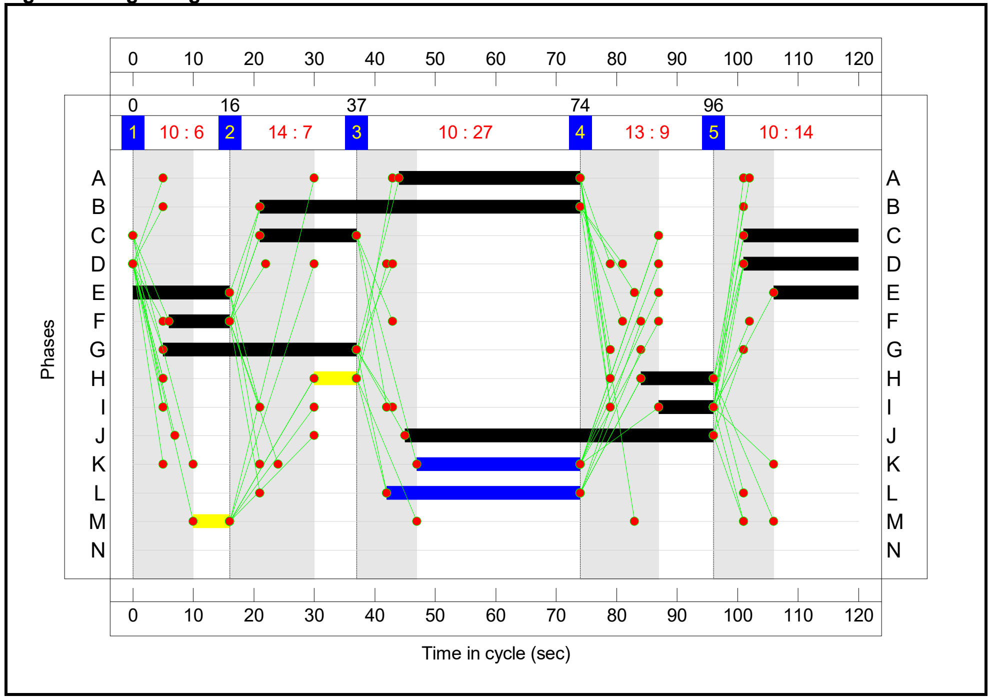
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	7	27	9	14
Change Point	0	16	37	74	96

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**100.2%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**100.2%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	35	-	66	1674	516	12.8%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	53:30		685	1925:1759	685	100.0%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	19:30		324	1877:1738	323	100.2%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	32:19		465	1945:1693	646	72.0%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	54	1750	160	33.7%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	9:51		286	1834:1702	291	98.2%
5/1		U	N/A	N/A	-		-	-	-	530	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	193	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	445	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	712	1	Inf	0.0%

Full Input Data And Results

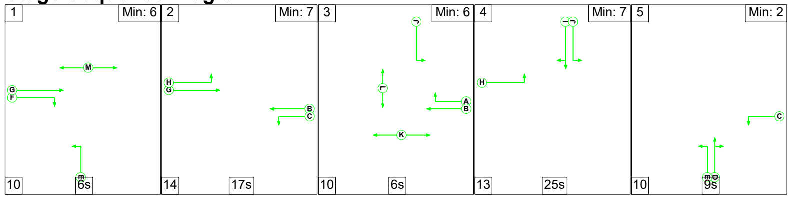
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**19.1**	**31.1**	**0.0**	**50.2**	**-**	**-**	**-**	**-**
Old Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**19.1**	**31.1**	**0.0**	**50.2**	**-**	**-**	**-**	**-**
1/1	66	66	-	-	-	0.3	0.1	-	0.4	23.0	1.2	0.1	1.3
1/2+1/3	685	685	-	-	-	6.6	13.1	-	19.7	103.6	15.9	13.1	29.1
2/2+2/1	324	323	-	-	-	4.4	9.2	-	13.6	150.6	10.2	9.2	19.4
3/2+3/1	465	465	-	-	-	4.1	1.3	-	5.4	41.5	9.1	1.3	10.4
3/3	54	54	-	-	-	0.8	0.3	-	1.0	67.9	1.7	0.3	1.9
4/2+4/1	286	286	-	-	-	2.9	7.2	-	10.1	127.6	4.8	7.2	12.0
5/1	530	530	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	193	193	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	445	445	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	711	711	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -11.4 Total Delay for Signalled Lanes (pcuHr): 50.21
PRC Over All Lanes (%): -11.4 Total Delay Over All Lanes(pcuHr): 50.21 Cycle Time (s): 120

Full Input Data And Results

Scenario 4: '2024 PM without Dev' (FG4: '2024 PM without Dev', Plan 1: 'with Peds')

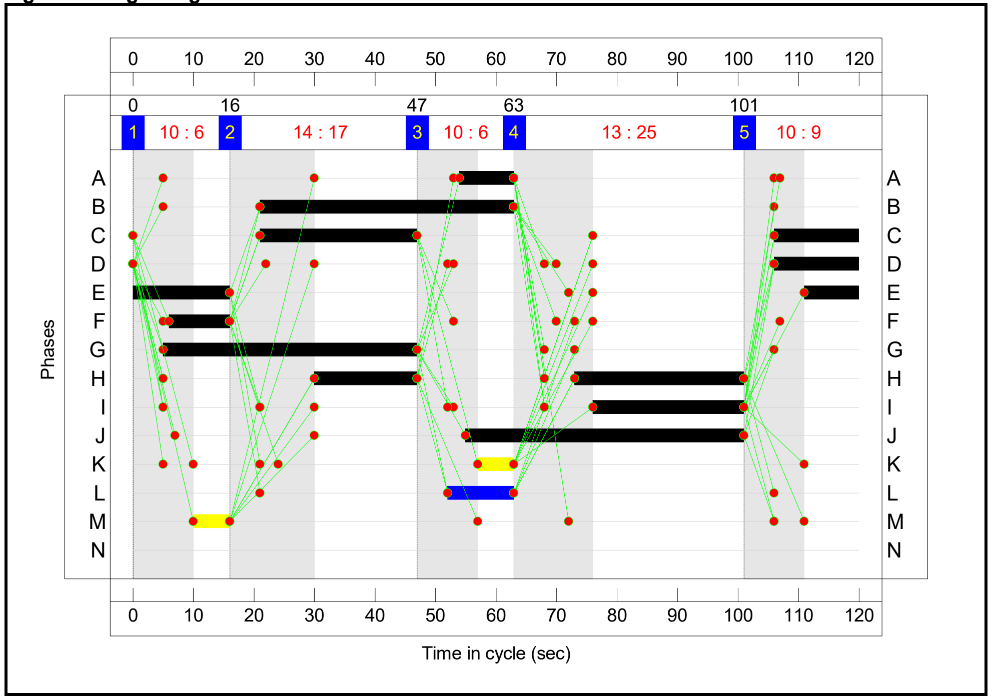
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	17	6	25	9
Change Point	0	16	47	63	101

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**86.6%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**86.6%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	40	-	258	1674	586	44.0%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	42:9		632	1925:1759	730	86.6%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	14:25		239	1822:1738	284	84.2%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	42:45		581	1945:1693	710	81.8%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	114	1750	160	71.1%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	25:46		432	1860:1702	511	84.6%
5/1		U	N/A	N/A	-		-	-	-	850	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	521	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	659	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	226	1	Inf	0.0%

Full Input Data And Results

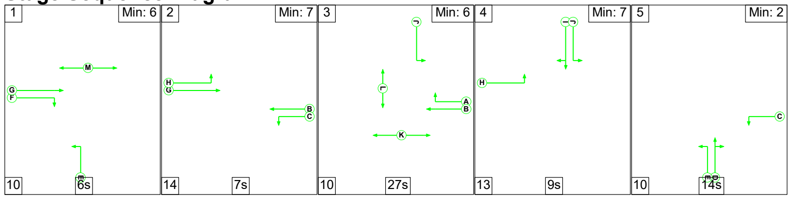
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**22.5**	**11.8**	**0.0**	**34.3**	-	-	-	-
Old Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**22.5**	**11.8**	**0.0**	**34.3**	-	-	-	-
1/1	258	258	-	-	-	1.3	0.4	-	1.7	24.0	4.9	0.4	5.3
1/2+1/3	632	632	-	-	-	6.7	3.0	-	9.7	55.5	17.8	3.0	20.8
2/2+2/1	239	239	-	-	-	3.1	2.4	-	5.5	82.9	5.7	2.4	8.1
3/2+3/1	581	581	-	-	-	5.3	2.2	-	7.5	46.3	16.8	2.2	19.0
3/3	114	114	-	-	-	1.7	1.2	-	2.8	89.9	3.7	1.2	4.8
4/2+4/1	432	432	-	-	-	4.4	2.6	-	7.0	58.1	9.6	2.6	12.2
5/1	850	850	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	521	521	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	659	659	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	226	226	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 3.9 Total Delay for Signalled Lanes (pcuHr): 34.26
PRC Over All Lanes (%): 3.9 Total Delay Over All Lanes(pcuHr): 34.26 Cycle Time (s): 120

Full Input Data And Results

Scenario 5: '2029 AM without Dev' (FG5: '2029 AM without Dev', Plan 1: 'with Peds')

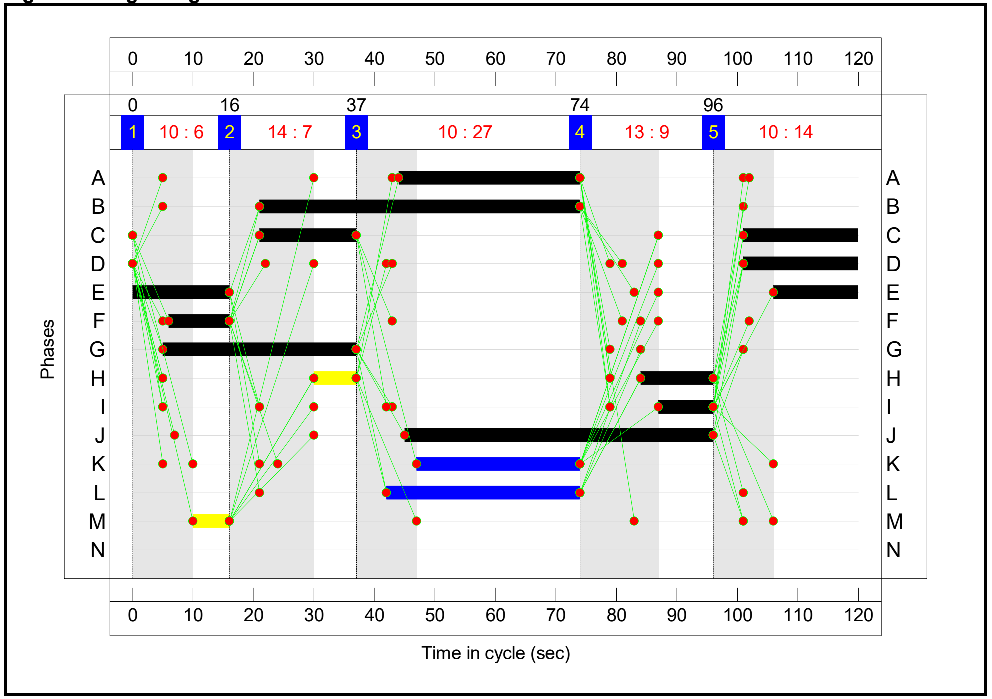
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	7	27	9	14
Change Point	0	16	37	74	96

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**109.0%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**109.0%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	35	-	72	1674	516	13.9%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	53:30		747	1925:1759	686	108.9%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	19:30		352	1877:1738	323	109.0%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	32:19		506	1945:1693	645	78.4%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	59	1750	160	36.8%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	9:51		312	1833:1702	291	107.2%
5/1		U	N/A	N/A	-		-	-	-	578	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	210	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	486	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	774	1	Inf	0.0%

Full Input Data And Results

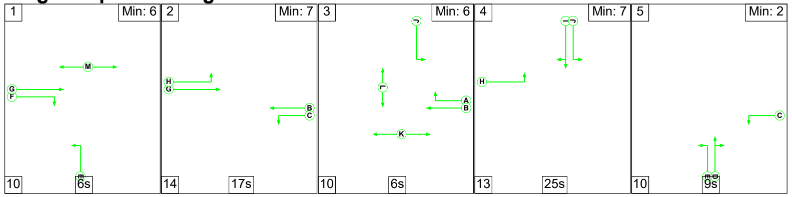
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	-	-	0	0	0	26.5	72.6	0.0	99.1	-	-	-	-
Old Dublin Rd_Doughiska Rd Junction	-	-	0	0	0	26.5	72.6	0.0	99.1	-	-	-	-
1/1	72	72	-	-	-	0.4	0.1	-	0.5	23.1	1.3	0.1	1.4
1/2+1/3	747	686	-	-	-	10.3	35.9	-	46.2	222.5	21.2	35.9	57.1
2/2+2/1	352	323	-	-	-	6.4	19.1	-	25.5	261.0	12.7	19.1	31.8
3/2+3/1	506	506	-	-	-	4.5	1.8	-	6.3	44.9	10.8	1.8	12.5
3/3	59	59	-	-	-	0.8	0.3	-	1.1	68.9	1.8	0.3	2.1
4/2+4/1	312	291	-	-	-	4.0	15.5	-	19.5	224.7	6.7	15.5	22.2
5/1	559	559	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	205	205	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	447	447	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	726	726	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -21.1 Total Delay for Signalled Lanes (pcuHr): 99.07
PRC Over All Lanes (%): -21.1 Total Delay Over All Lanes(pcuHr): 99.07 Cycle Time (s): 120

Full Input Data And Results

Scenario 6: '2029 PM without Dev' (FG6: '2029 PM without Dev', Plan 1: 'with Peds')

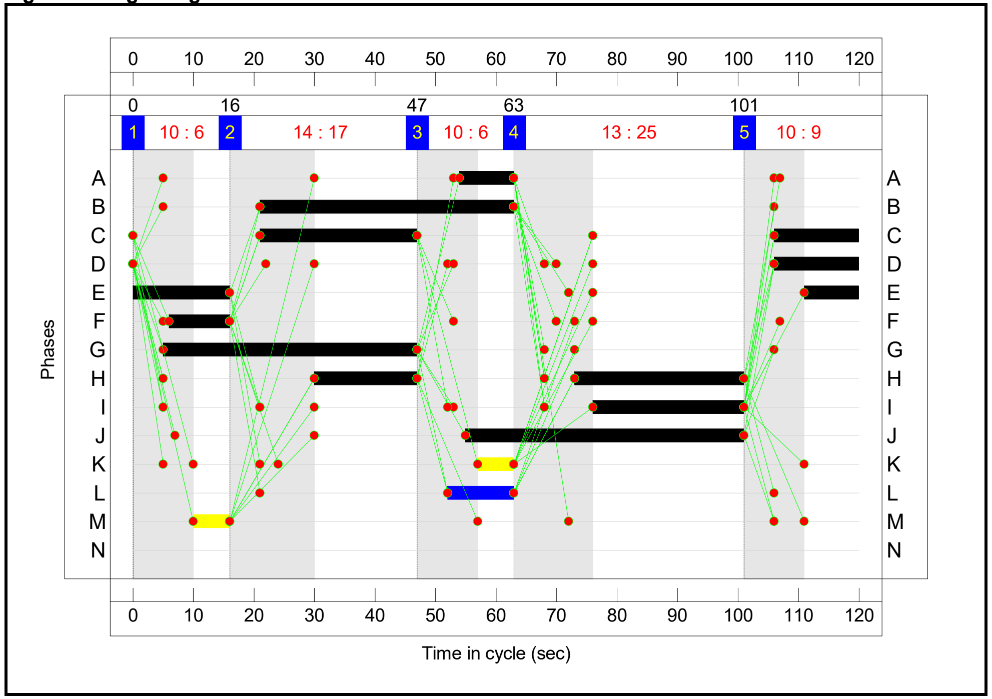
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	17	6	25	9
Change Point	0	16	47	63	101

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**94.4%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**94.4%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	40	-	281	1674	586	48.0%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	42:9		689	1925:1759	730	94.4%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	14:25		260	1822:1738	284	91.6%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	42:45		634	1945:1693	710	89.3%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	124	1750	160	77.3%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	25:46		470	1859:1702	511	92.1%
5/1		U	N/A	N/A	-		-	-	-	926	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	567	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	719	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	246	1	Inf	0.0%

Full Input Data And Results

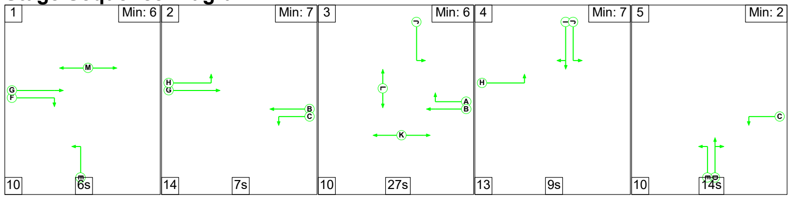
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**25.3**	**21.0**	**0.0**	**46.3**	-	-	-	-
Old Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**25.3**	**21.0**	**0.0**	**46.3**	-	-	-	-
1/1	281	281	-	-	-	1.5	0.5	-	1.9	24.7	5.4	0.5	5.8
1/2+1/3	689	689	-	-	-	7.6	6.4	-	14.0	73.1	20.5	6.4	26.9
2/2+2/1	260	260	-	-	-	3.4	4.1	-	7.5	103.3	6.5	4.1	10.6
3/2+3/1	634	634	-	-	-	6.0	3.8	-	9.8	55.8	19.1	3.8	22.9
3/3	124	124	-	-	-	1.8	1.6	-	3.4	98.8	4.0	1.6	5.6
4/2+4/1	470	470	-	-	-	5.0	4.7	-	9.7	74.2	11.3	4.7	16.0
5/1	926	926	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	567	567	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	719	719	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	246	246	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -4.9 Total Delay for Signalled Lanes (pcuHr): 46.30
PRC Over All Lanes (%): -4.9 Total Delay Over All Lanes(pcuHr): 46.30 Cycle Time (s): 120

Full Input Data And Results

Scenario 7: '2039 AM without Dev' (FG7: '2039 AM without Dev', Plan 1: 'with Peds')

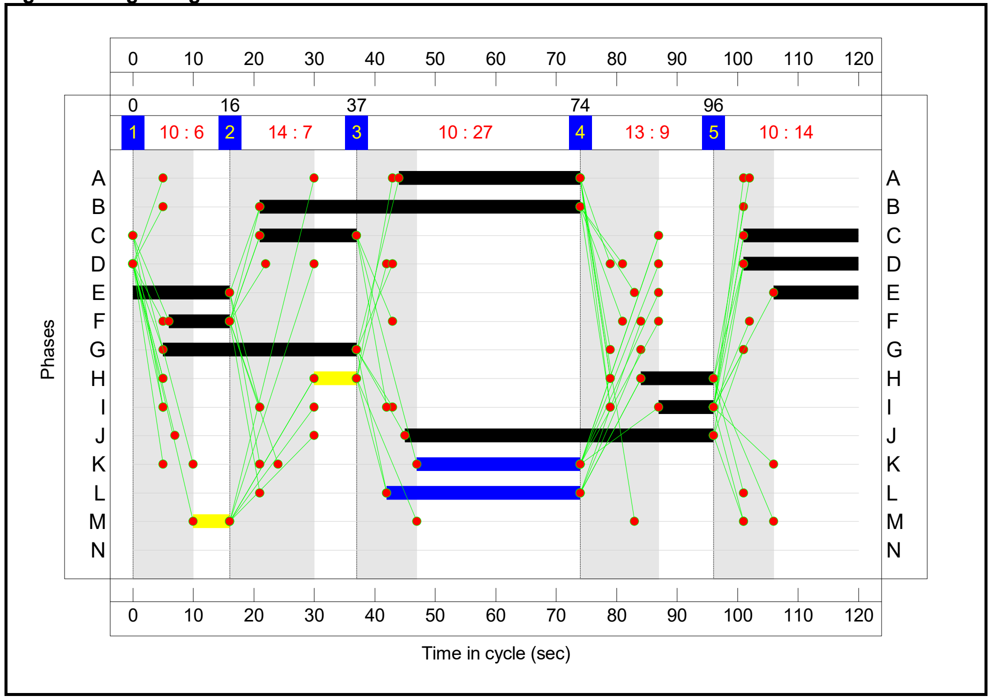
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	7	27	9	14
Change Point	0	16	37	74	96

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**121.6%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**121.6%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	35	-	82	1674	516	15.9%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	53:30		836	1925:1759	688	121.6%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	19:30		392	1877:1738	323	121.2%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	32:19		567	1945:1693	645	87.9%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	66	1750	160	41.1%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	9:51		349	1833:1702	291	119.9%
5/1		U	N/A	N/A	-		-	-	-	647	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	236	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	547	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	862	1	Inf	0.0%

Full Input Data And Results

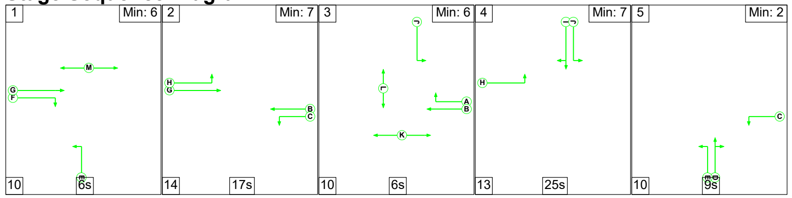
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**37.9**	**149.3**	**0.0**	**187.2**	**-**	**-**	**-**	**-**
Old Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**37.9**	**149.3**	**0.0**	**187.2**	**-**	**-**	**-**	**-**
1/1	82	82	-	-	-	0.4	0.1	-	0.5	23.3	1.5	0.1	1.6
1/2+1/3	836	688	-	-	-	15.7	76.8	-	92.6	398.6	27.2	76.8	104.0
2/2+2/1	392	323	-	-	-	9.5	37.0	-	46.5	427.2	16.8	37.0	53.8
3/2+3/1	567	567	-	-	-	5.2	3.3	-	8.6	54.5	13.4	3.3	16.7
3/3	66	66	-	-	-	0.9	0.3	-	1.3	70.4	2.1	0.3	2.4
4/2+4/1	349	291	-	-	-	6.0	31.7	-	37.7	389.4	10.6	31.7	42.3
5/1	597	597	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	221	221	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	451	451	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	748	748	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -35.1 Total Delay for Signalled Lanes (pcuHr): 187.23
PRC Over All Lanes (%): -35.1 Total Delay Over All Lanes(pcuHr): 187.23 Cycle Time (s): 120

Full Input Data And Results

Scenario 8: '2039 PM without Dev' (FG8: '2039 PM without Dev', Plan 1: 'with Peds')

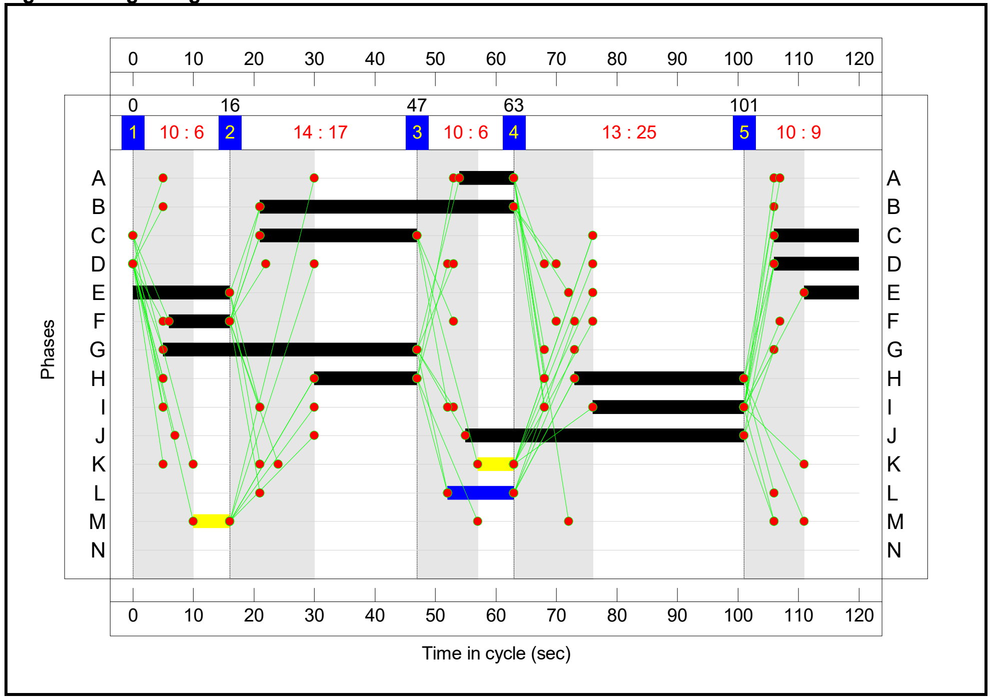
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	17	6	25	9
Change Point	0	16	47	63	101

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**105.5%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**105.5%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	40	-	312	1674	586	53.3%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	42:9		770	1925:1759	730	105.5%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	14:25		288	1822:1738	284	101.5%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	42:45		707	1945:1693	710	99.6%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	137	1750	160	85.4%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	25:46		523	1859:1702	510	102.6%
5/1		U	N/A	N/A	-		-	-	-	1030	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	629	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	803	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	275	1	Inf	0.0%

Full Input Data And Results

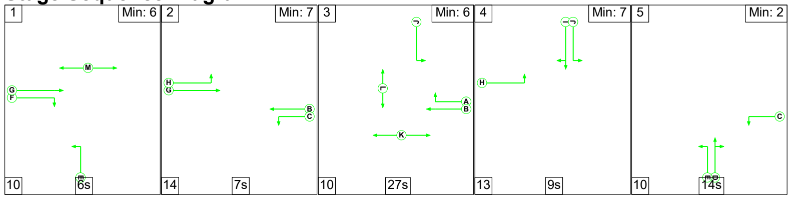
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**32.1**	**67.6**	**0.0**	**99.7**	-	-	-	-
Old Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**32.1**	**67.6**	**0.0**	**99.7**	-	-	-	-
1/1	312	312	-	-	-	1.7	0.6	-	2.2	25.8	6.2	0.6	6.7
1/2+1/3	770	730	-	-	-	10.9	27.2	-	38.1	178.0	26.7	27.2	53.9
2/2+2/1	288	284	-	-	-	4.0	9.6	-	13.6	170.0	7.7	9.6	17.3
3/2+3/1	707	707	-	-	-	7.2	12.5	-	19.7	100.3	22.7	12.5	35.2
3/3	137	137	-	-	-	2.0	2.4	-	4.5	117.4	4.5	2.4	6.9
4/2+4/1	523	510	-	-	-	6.4	15.2	-	21.6	148.7	14.3	15.2	29.5
5/1	1021	1021	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	624	624	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	767	767	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	267	267	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -17.2 Total Delay for Signalled Lanes (pcuHr): 99.69
PRC Over All Lanes (%): -17.2 Total Delay Over All Lanes(pcuHr): 99.69 Cycle Time (s): 120

Full Input Data And Results

Scenario 9: '2024 AM with Dev' (FG9: '2024 AM with Dev', Plan 1: 'with Peds')

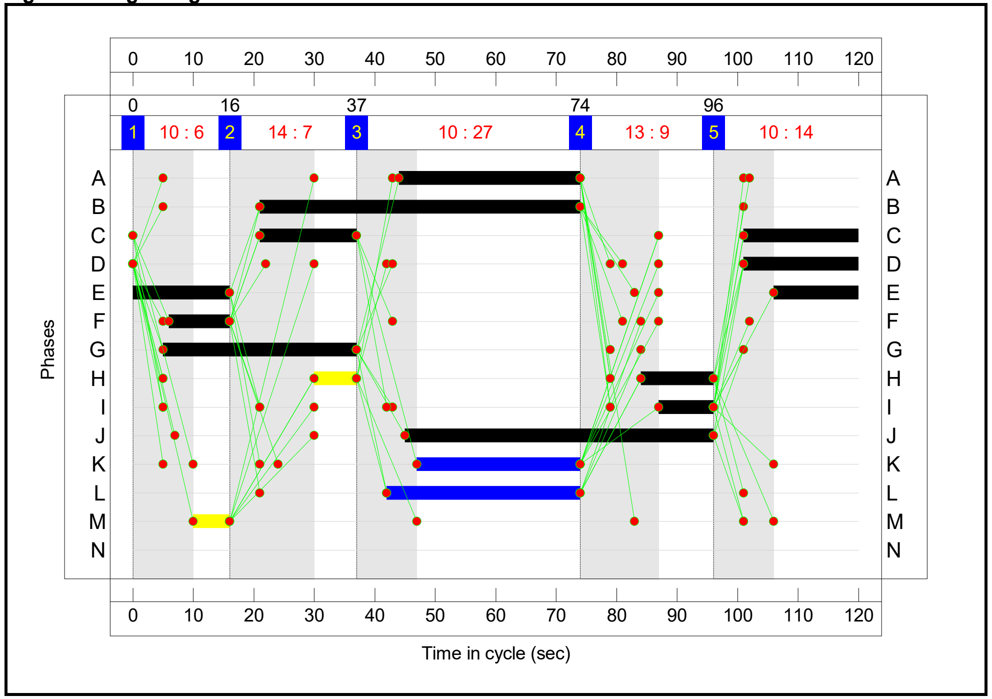
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	7	27	9	14
Change Point	0	16	37	74	96

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**100.2%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**100.2%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	35	-	66	1674	516	12.8%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	53:30		685	1925:1759	685	100.0%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	19:30		324	1877:1738	323	100.2%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	32:19		471	1945:1693	646	73.0%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	55	1750	160	34.3%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	9:51		286	1834:1702	291	98.2%
5/1		U	N/A	N/A	-		-	-	-	534	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	194	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	445	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	714	1	Inf	0.0%

Full Input Data And Results

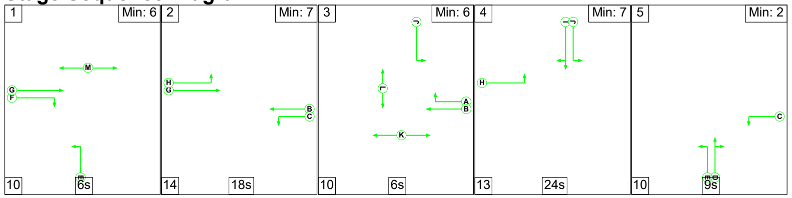
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**19.1**	**31.2**	**0.0**	**50.4**	**-**	**-**	**-**	**-**
Old Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**19.1**	**31.2**	**0.0**	**50.4**	**-**	**-**	**-**	**-**
1/1	66	66	-	-	-	0.3	0.1	-	0.4	23.0	1.2	0.1	1.3
1/2+1/3	685	685	-	-	-	6.6	13.1	-	19.7	103.6	15.9	13.1	29.1
2/2+2/1	324	323	-	-	-	4.4	9.2	-	13.6	150.6	10.2	9.2	19.4
3/2+3/1	471	471	-	-	-	4.2	1.3	-	5.5	42.0	9.3	1.3	10.6
3/3	55	55	-	-	-	0.8	0.3	-	1.0	68.1	1.7	0.3	2.0
4/2+4/1	286	286	-	-	-	2.9	7.2	-	10.1	127.6	4.8	7.2	12.0
5/1	534	534	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	194	194	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	445	445	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	713	713	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -11.4 Total Delay for Signalled Lanes (pcuHr): 50.36
PRC Over All Lanes (%): -11.4 Total Delay Over All Lanes(pcuHr): 50.36 Cycle Time (s): 120

Full Input Data And Results

Scenario 10: '2024 PM with Dev' (FG10: '2024 PM with Dev', Plan 1: 'with Peds')

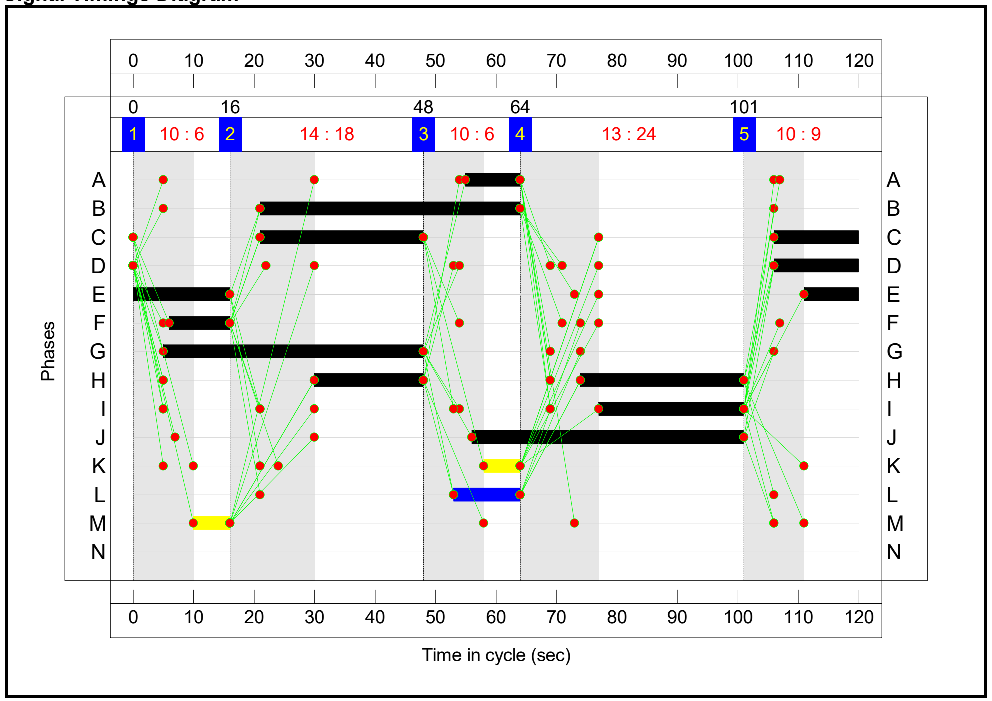
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	18	6	24	9
Change Point	0	16	48	64	101

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**87.4%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**87.4%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	41	-	258	1674	600	43.0%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	43:9		639	1925:1759	745	85.8%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	14:25		240	1822:1738	285	84.3%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	43:45		581	1945:1693	726	80.0%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	114	1750	160	71.1%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	24:45		433	1859:1702	496	87.4%
5/1		U	N/A	N/A	-		-	-	-	850	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	521	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	668	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	226	1	Inf	0.0%

Full Input Data And Results

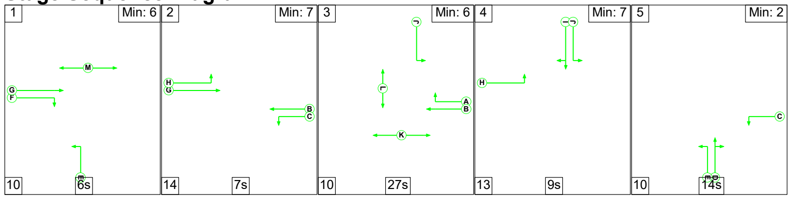
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**22.4**	**11.9**	**0.0**	**34.4**	-	-	-	-
Old Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**22.4**	**11.9**	**0.0**	**34.4**	-	-	-	-
1/1	258	258	-	-	-	1.3	0.4	-	1.7	23.2	4.8	0.4	5.2
1/2+1/3	639	639	-	-	-	6.7	2.9	-	9.5	53.7	17.8	2.9	20.7
2/2+2/1	240	240	-	-	-	3.1	2.4	-	5.5	83.0	5.7	2.4	8.2
3/2+3/1	581	581	-	-	-	5.2	2.0	-	7.1	44.0	16.6	2.0	18.6
3/3	114	114	-	-	-	1.7	1.2	-	2.8	89.9	3.7	1.2	4.8
4/2+4/1	433	433	-	-	-	4.5	3.1	-	7.7	63.9	9.8	3.1	13.0
5/1	850	850	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	521	521	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	668	668	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	226	226	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): 3.0 Total Delay for Signalled Lanes (pcuHr): 34.36
PRC Over All Lanes (%): 3.0 Total Delay Over All Lanes(pcuHr): 34.36 Cycle Time (s): 120

Full Input Data And Results

Scenario 11: '2029 AM with Dev' (FG11: '2029 AM with Dev', Plan 1: 'with Peds')

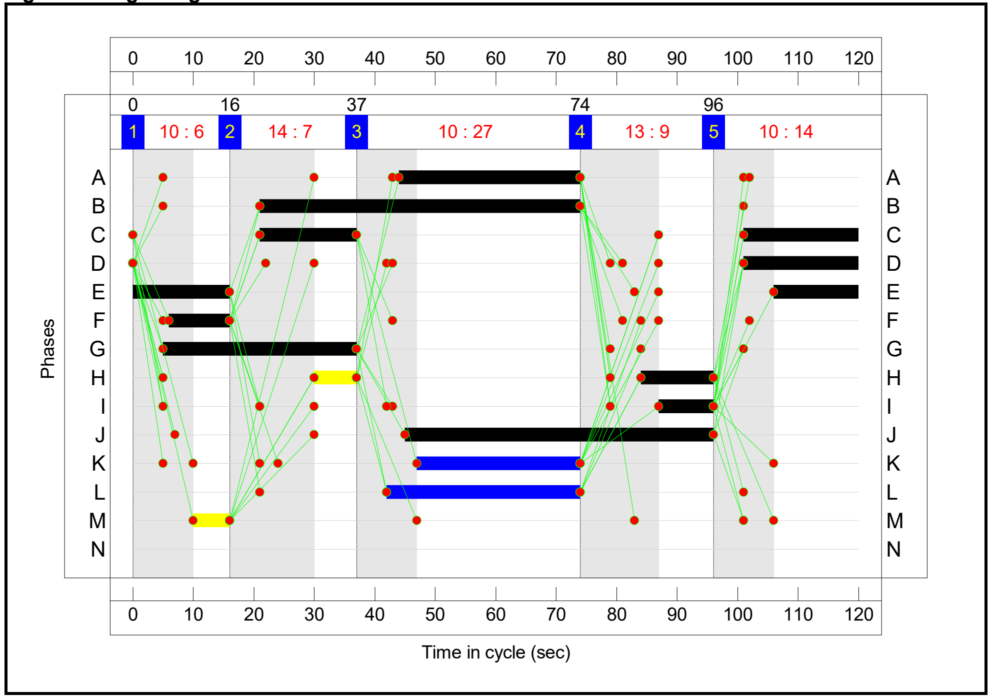
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	7	27	9	14
Change Point	0	16	37	74	96

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**109.0%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**109.0%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	35	-	72	1674	516	13.9%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	53:30		747	1925:1759	686	108.9%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	19:30		352	1877:1738	323	109.0%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	32:19		512	1945:1693	645	79.4%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	60	1750	160	37.4%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	9:51		312	1833:1702	291	107.2%
5/1		U	N/A	N/A	-		-	-	-	582	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	211	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	486	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	776	1	Inf	0.0%

Full Input Data And Results

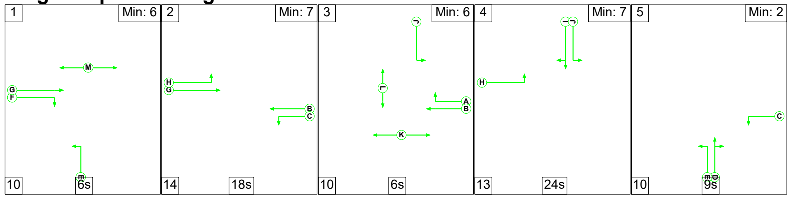
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**26.6**	**72.7**	**0.0**	**99.3**	**-**	**-**	**-**	**-**
Old Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**26.6**	**72.7**	**0.0**	**99.3**	**-**	**-**	**-**	**-**
1/1	72	72	-	-	-	0.4	0.1	-	0.5	23.1	1.3	0.1	1.4
1/2+1/3	747	686	-	-	-	10.3	35.9	-	46.2	222.5	21.2	35.9	57.1
2/2+2/1	352	323	-	-	-	6.4	19.1	-	25.5	261.0	12.7	19.1	31.8
3/2+3/1	512	512	-	-	-	4.6	1.9	-	6.5	45.6	10.9	1.9	12.8
3/3	60	60	-	-	-	0.9	0.3	-	1.2	69.1	1.9	0.3	2.2
4/2+4/1	312	291	-	-	-	4.0	15.5	-	19.5	224.7	6.7	15.5	22.2
5/1	563	563	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	206	206	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	447	447	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	728	728	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -21.1 Total Delay for Signalled Lanes (pcuHr): 99.26
PRC Over All Lanes (%): -21.1 Total Delay Over All Lanes(pcuHr): 99.26 Cycle Time (s): 120

Full Input Data And Results

Scenario 12: '2029 PM with Dev' (FG12: '2029 PM with Dev', Plan 1: 'with Peds')

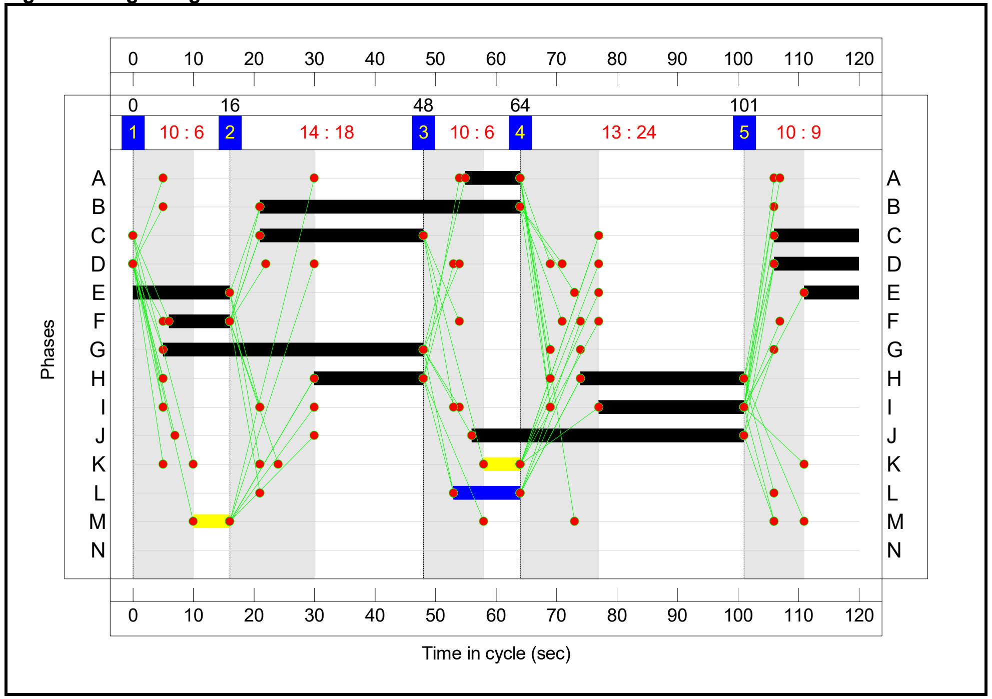
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	18	6	24	9
Change Point	0	16	48	64	101

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**95.1%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**95.1%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	41	-	281	1674	600	46.8%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	43:9		696	1925:1759	745	93.4%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	14:25		261	1822:1738	285	91.7%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	43:45		634	1945:1693	726	87.3%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	124	1750	160	77.3%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	24:45		471	1859:1702	495	95.1%
5/1		U	N/A	N/A	-		-	-	-	926	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	567	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	728	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	246	1	Inf	0.0%

Full Input Data And Results

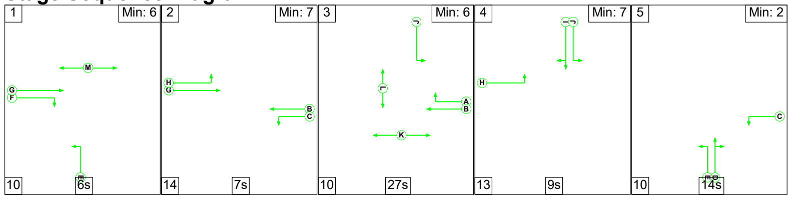
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**25.2**	**21.5**	**0.0**	**46.7**	-	-	-	-
Old Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**25.2**	**21.5**	**0.0**	**46.7**	-	-	-	-
1/1	281	281	-	-	-	1.4	0.4	-	1.9	23.9	5.3	0.4	5.7
1/2+1/3	696	696	-	-	-	7.5	5.8	-	13.3	68.6	20.7	5.8	26.5
2/2+2/1	261	261	-	-	-	3.4	4.1	-	7.5	103.7	6.6	4.1	10.7
3/2+3/1	634	634	-	-	-	5.9	3.2	-	9.1	51.6	18.9	3.2	22.1
3/3	124	124	-	-	-	1.8	1.6	-	3.4	98.8	4.0	1.6	5.6
4/2+4/1	471	471	-	-	-	5.1	6.4	-	11.5	87.9	11.4	6.4	17.8
5/1	926	926	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	567	567	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	728	728	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	246	246	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -5.7 Total Delay for Signalled Lanes (pcuHr): 46.65
PRC Over All Lanes (%): -5.7 Total Delay Over All Lanes(pcuHr): 46.65 Cycle Time (s): 120

Full Input Data And Results

Scenario 13: '2039 AM with Dev' (FG13: '2039 AM with Dev', Plan 1: 'with Peds')

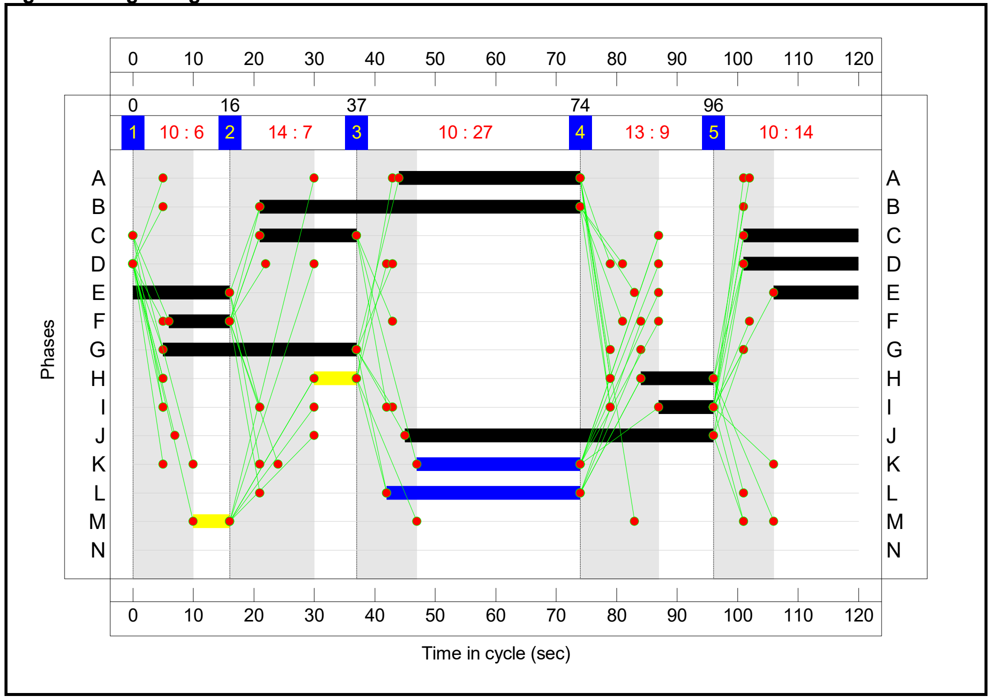
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	7	27	9	14
Change Point	0	16	37	74	96

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**121.6%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**121.6%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	35	-	82	1674	516	15.9%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	53:30		836	1925:1759	688	121.6%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	19:30		392	1877:1738	323	121.2%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	32:19		573	1945:1693	645	88.9%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	67	1750	160	41.8%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	9:51		349	1833:1702	291	119.9%
5/1		U	N/A	N/A	-		-	-	-	651	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	237	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	547	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	864	1	Inf	0.0%

Full Input Data And Results

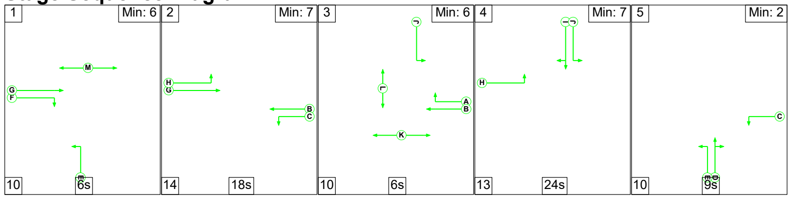
Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**38.0**	**149.6**	**0.0**	**187.6**	**-**	**-**	**-**	**-**
Old Dublin Rd_Doughiska Rd Junction	**-**	**-**	**0**	**0**	**0**	**38.0**	**149.6**	**0.0**	**187.6**	**-**	**-**	**-**	**-**
1/1	82	82	-	-	-	0.4	0.1	-	0.5	23.3	1.5	0.1	1.6
1/2+1/3	836	688	-	-	-	15.7	76.8	-	92.6	398.6	27.2	76.8	104.0
2/2+2/1	392	323	-	-	-	9.5	37.0	-	46.5	427.2	16.8	37.0	53.8
3/2+3/1	573	573	-	-	-	5.3	3.6	-	8.9	56.2	13.7	3.6	17.3
3/3	67	67	-	-	-	1.0	0.4	-	1.3	70.6	2.1	0.4	2.5
4/2+4/1	349	291	-	-	-	6.0	31.7	-	37.7	389.4	10.6	31.7	42.3
5/1	601	601	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	222	222	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	451	451	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	750	750	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -35.1 Total Delay for Signalled Lanes (pcuHr): 187.61
PRC Over All Lanes (%): -35.1 Total Delay Over All Lanes(pcuHr): 187.61 Cycle Time (s): 120

Full Input Data And Results

Scenario 14: '2039 PM with Dev' (FG14: '2039 PM with Dev', Plan 1: 'with Peds')

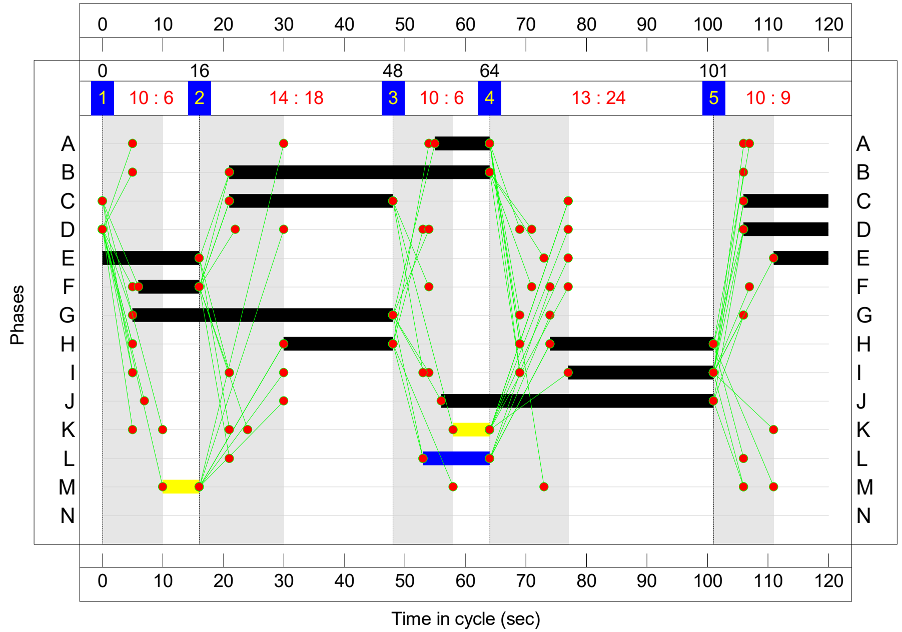
Stage Sequence Diagram



Stage Timings

Stage	1	2	3	4	5
Duration	6	18	6	24	9
Change Point	0	16	48	64	101

Signal Timings Diagram



Full Input Data And Results

Network Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)
Network: Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**106.0%**
Old Dublin Rd_Doughiska Rd Junction	-	-	-	-	-	-	-	-	-	-	-	-	**106.0%**
1/1	Old Dublin Rd East Left	U	N/A	N/A	C		2	41	-	312	1674	600	52.0%
1/2+1/3	Old Dublin Rd East Ahead Right	U	N/A	N/A	B A		1	43:9		777	1925:1759	745	104.3%
2/2+2/1	Doughiska Rd South Right Left Ahead	U	N/A	N/A	D E		1	14:25		289	1822:1738	284	101.7%
3/2+3/1	Old Dublin Rd West Ahead Left	U	N/A	N/A	G H		1:2	43:45		707	1945:1693	726	97.4%
3/3	Old Dublin Rd West Right	U	N/A	N/A	F		1	10	-	137	1750	160	85.4%
4/2+4/1	Doughiska Rd North Left Ahead Right	U	N/A	N/A	I J		1	24:45		524	1858:1702	494	106.0%
5/1		U	N/A	N/A	-		-	-	-	1030	1	Inf	0.0%
6/1		U	N/A	N/A	-		-	-	-	629	1	Inf	0.0%
7/1		U	N/A	N/A	-		-	-	-	812	1	Inf	0.0%
8/1		U	N/A	N/A	-		-	-	-	275	1	Inf	0.0%

Full Input Data And Results

Item	Entering (pcu)	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per Veh (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)
Network: Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**32.2**	**67.1**	**0.0**	**99.3**	-	-	-	-
Old Dublin Rd_Doughiska Rd Junction	-	-	**0**	**0**	**0**	**32.2**	**67.1**	**0.0**	**99.3**	-	-	-	-
1/1	312	312	-	-	-	1.6	0.5	-	2.2	24.9	6.1	0.5	6.6
1/2+1/3	777	745	-	-	-	10.4	24.0	-	34.5	159.6	26.7	24.0	50.7
2/2+2/1	289	284	-	-	-	4.0	9.8	-	13.8	171.3	7.7	9.8	17.5
3/2+3/1	707	707	-	-	-	7.0	9.3	-	16.3	83.0	22.5	9.3	31.8
3/3	137	137	-	-	-	2.0	2.4	-	4.5	117.4	4.5	2.4	6.9
4/2+4/1	524	494	-	-	-	7.1	21.1	-	28.2	193.7	15.1	21.1	36.2
5/1	1013	1013	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
6/1	619	619	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
7/1	780	780	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0
8/1	268	268	-	-	-	0.0	0.0	-	0.0	0.0	0.0	0.0	0.0

C1 PRC for Signalled Lanes (%): -17.8 Total Delay for Signalled Lanes (pcuHr): 99.34
PRC Over All Lanes (%): -17.8 Total Delay Over All Lanes(pcuHr): 99.34 Cycle Time (s): 120

APPENDIX E4

PICADY Analysis – Junction between R338 Coast Road-Rosshill Road

PICADY

GUI Version: 5.1 AD
Analysis Program Release: 4.0 (SEPT 2008)

For sales and distribution information, program advice and maintenance, contact:

TRL Limited
Crowthorne House
Nine Mile Ride
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Web: www.trlsoftware.co.uk

Run Analysis

Parameter	Values
File Run	I:\..\Coast Rd_Dublin Rd\119209 Coast Rd_Rosshill Rd PICADY Analysis.vpi
Date Run	13 December 2019
Time Run	13:22:53
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	Coast Rd East	100
Arm B	Rosshill Rd	100
Arm C	Coast Rd West	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	Coast Road/Rosshill Road T-junction
Location	Rosshill, Galway City
Date	18 July 2019
Enumerator	J Noone
Job Number	119209
Status	Preliminary
Client	Alber Homes
Description	-

Geometric Data

Geometric Parameters

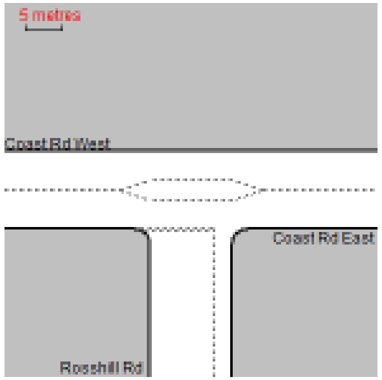
Parameter	Minor Arm B
Major Road Carriageway Width (m)	7.20
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	2.90
Minor Road Width 0m Back from Junction (m)	8.50
Minor Road Width 5m Back from Junction (m)	6.20
Minor Road Width 10m Back from Junction (m)	4.40
Minor Road Width 15m Back from Junction (m)	4.00
Minor Road Width 20m Back from Junction (m)	3.70
Minor Road Derived Flare Length (PCU)	1.000
Minor Road Visibility To Right (m)	15
Minor Road Visibility To Left (m)	15
Major Road Right Turn Visibility (m)	160
Major Road Right Turn Blocks Traffic	Yes

Slope and Intercept Values

Stream	Intercept for Stream B-A	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	0.000	0.000	0.000	0.000	0.000
B-C	0.000	0.000	0.000	-	-
C-B	717.407	0.263	0.263	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram



Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	07:15-08:45	90	15
Second Modelling Period	16:45-18:15	90	15

ODTAB Turning Counts

Demand Set: 2019 AM Survey Year
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	430.0	502.0
Arm B	27.0	0.0	2.0
Arm C	158.0	3.0	0.0

Demand Set: 2019 PM Survey Year
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	47.0	176.0
Arm B	144.0	0.0	1.0
Arm C	295.0	6.0	0.0

Demand Set: 2024 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	468.0	546.0
Arm B	29.0	0.0	2.0
Arm C	172.0	3.0	0.0

Demand Set: 2024 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	51.0	191.0
Arm B	156.0	0.0	1.0
Arm C	321.0	7.0	0.0

Demand Set: 2029 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	509.0	595.0
Arm B	32.0	0.0	2.0
Arm C	188.0	4.0	0.0

Demand Set: 2029 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	56.0	208.0
Arm B	170.0	0.0	1.0
Arm C	349.0	7.0	0.0

Demand Set: 2039 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	565.0	662.0
Arm B	35.0	0.0	3.0
Arm C	210.0	4.0	0.0

Demand Set: 2039 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	62.0	232.0
Arm B	188.0	0.0	1.0
Arm C	388.0	8.0	0.0

Demand Set: 2024 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	501.0	546.0
Arm B	127.0	0.0	9.0
Arm C	172.0	3.0	0.0

Demand Set: 2024 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	125.0	191.0
Arm B	199.0	0.0	1.0
Arm C	321.0	16.0	0.0

Demand Set: 2029 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	542.0	595.0
Arm B	129.0	0.0	10.0
Arm C	188.0	4.0	0.0

Demand Set: 2029 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	130.0	208.0
Arm B	212.0	0.0	1.0
Arm C	349.0	17.0	0.0

Demand Set: 2039 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	0.0	598.0	662.0
Arm B	133.0	0.0	10.0
Arm C	210.0	4.0	0.0

Demand Set: 2039 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	136.0	232.0
Arm B	231.0	0.0	2.0
Arm C	388.0	17.0	0.0

ODTAB Synthesised Flows

Demand Set: 2019 AM Survey Year
Modelling Period: 07:15-08:45

Arm	Rising Time	Rising Flow (veh/min)	Peak Time	Peak Flow (veh/min)	Falling Time	Falling Flow (veh/min)
Arm A	07:30	11.650	08:00	17.475	08:30	11.650
Arm B	07:30	0.363	08:00	0.544	08:30	0.363
Arm C	07:30	2.013	08:00	3.019	08:30	2.013

Heavy Vehicles Percentages

Demand Set: 2019 AM Survey Year
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2019 PM Survey Year
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 AM without Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 AM with Dev
Modelling Period: 07:15-08:45

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Default proportions of heavy vehicles are used

Queues & Delays

Demand Set: 2019 AM Survey Year
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-A	0.34	6.07	0.056	-	0.00	0.06	-	0.8	0.17
	B-C	0.03	6.52	0.004	-	0.00	0.00	-	0.1	0.15
	C-AB	0.04	7.79	0.005	-	0.00	0.00	-	0.1	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	5.40	-	-	-	-	-	-	-	-
	A-C	6.30	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-A	0.40	5.61	0.072	-	0.06	0.08	-	1.1	0.19
	B-C	0.03	6.17	0.005	-	0.00	0.00	-	0.1	0.16
	C-AB	0.04	7.19	0.006	-	0.00	0.01	-	0.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	6.44	-	-	-	-	-	-	-	-
	A-C	7.52	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-A	0.50	4.98	0.100	-	0.08	0.11	-	1.6	0.22
	B-C	0.04	5.68	0.006	-	0.00	0.01	-	0.1	0.18
	C-AB	0.06	6.36	0.009	-	0.01	0.01	-	0.1	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.89	-	-	-	-	-	-	-	-
	A-C	9.21	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	0.50	4.98	0.100	-	0.11	0.11	-	1.6	0.22
	B-C	0.04	5.68	0.006	-	0.01	0.01	-	0.1	0.18
	C-AB	0.06	6.36	0.009	-	0.01	0.01	-	0.1	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.89	-	-	-	-	-	-	-	-
	A-C	9.21	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-A	0.40	5.61	0.072	-	0.11	0.08	-	1.2	0.19
	B-C	0.03	6.17	0.005	-	0.01	0.00	-	0.1	0.16
	C-AB	0.04	7.19	0.006	-	0.01	0.01	-	0.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	6.44	-	-	-	-	-	-	-	-
	A-C	7.52	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	0.34	6.07	0.056	-	0.08	0.06	-	0.9	0.17
	B-C	0.03	6.52	0.004	-	0.00	0.00	-	0.1	0.15
	C-AB	0.04	7.79	0.005	-	0.01	0.00	-	0.1	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	5.40	-	-	-	-	-	-	-	-
	A-C	6.30	-	-	-	-	-	-	-	-

Demand Set: 2019 PM Survey Year
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	1.81	7.28	0.248	-	0.00	0.32	-	4.6	0.18
	B-C	0.01	7.15	0.002	-	0.00	0.00	-	0.0	0.14
	C-AB	0.08	10.13	0.007	-	0.00	0.01	-	0.1	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.59	-	-	-	-	-	-	-	-
	A-C	2.21	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	2.16	7.05	0.306	-	0.32	0.43	-	6.3	0.20
	B-C	0.01	6.85	0.002	-	0.00	0.00	-	0.0	0.15
	C-AB	0.09	9.99	0.009	-	0.01	0.01	-	0.1	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.70	-	-	-	-	-	-	-	-
	A-C	2.64	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	2.64	6.73	0.393	-	0.43	0.63	-	9.0	0.24
	B-C	0.02	6.35	0.003	-	0.00	0.00	-	0.0	0.16
	C-AB	0.11	9.79	0.011	-	0.01	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.86	-	-	-	-	-	-	-	-
	A-C	3.23	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	2.64	6.73	0.393	-	0.63	0.64	-	9.5	0.24
	B-C	0.02	6.34	0.003	-	0.00	0.00	-	0.0	0.16
	C-AB	0.11	9.79	0.011	-	0.01	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.86	-	-	-	-	-	-	-	-
	A-C	3.23	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	2.16	7.05	0.306	-	0.64	0.45	-	7.0	0.21
	B-C	0.01	6.84	0.002	-	0.00	0.00	-	0.0	0.15
	C-AB	0.09	9.99	0.009	-	0.01	0.01	-	0.1	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.70	-	-	-	-	-	-	-	-
	A-C	2.64	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-A	1.81	7.28	0.248	-	0.45	0.34	-	5.2	0.18
	B-C	0.01	7.14	0.002	-	0.00	0.00	-	0.0	0.14
	C-AB	0.08	10.13	0.007	-	0.01	0.01	-	0.1	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.59	-	-	-	-	-	-	-	-
	A-C	2.21	-	-	-	-	-	-	-	-

Demand Set: 2024 AM without Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-A	0.36	5.86	0.062	-	0.00	0.07	-	0.9	0.18
	B-C	0.03	6.36	0.004	-	0.00	0.00	-	0.1	0.16
	C-AB	0.04	7.52	0.005	-	0.00	0.00	-	0.1	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	5.87	-	-	-	-	-	-	-	-
	A-C	6.85	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-A	0.43	5.36	0.081	-	0.07	0.09	-	1.3	0.20
	B-C	0.03	5.98	0.005	-	0.00	0.00	-	0.1	0.17
	C-AB	0.04	6.87	0.007	-	0.00	0.01	-	0.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.01	-	-	-	-	-	-	-	-
	A-C	8.18	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-A	0.53	4.67	0.114	-	0.09	0.13	-	1.8	0.24
	B-C	0.04	5.44	0.007	-	0.00	0.01	-	0.1	0.19
	C-AB	0.06	5.97	0.009	-	0.01	0.01	-	0.1	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	8.59	-	-	-	-	-	-	-	-
	A-C	10.02	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	0.53	4.67	0.114	-	0.13	0.13	-	1.9	0.24
	B-C	0.04	5.44	0.007	-	0.01	0.01	-	0.1	0.19
	C-AB	0.06	5.97	0.009	-	0.01	0.01	-	0.1	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	8.59	-	-	-	-	-	-	-	-
	A-C	10.02	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-A	0.43	5.36	0.081	-	0.13	0.09	-	1.4	0.20
	B-C	0.03	5.97	0.005	-	0.01	0.01	-	0.1	0.17
	C-AB	0.04	6.87	0.007	-	0.01	0.01	-	0.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.01	-	-	-	-	-	-	-	-
	A-C	8.18	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	0.36	5.86	0.062	-	0.09	0.07	-	1.0	0.18
	B-C	0.03	6.36	0.004	-	0.01	0.00	-	0.1	0.16
	C-AB	0.04	7.52	0.005	-	0.01	0.01	-	0.1	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	5.87	-	-	-	-	-	-	-	-
	A-C	6.85	-	-	-	-	-	-	-	-

Demand Set: 2024 PM without Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	1.96	7.18	0.273	-	0.00	0.37	-	5.2	0.19
	B-C	0.01	7.03	0.002	-	0.00	0.00	-	0.0	0.14
	C-AB	0.09	10.07	0.009	-	0.00	0.01	-	0.1	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.64	-	-	-	-	-	-	-	-
	A-C	2.40	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	2.34	6.93	0.337	-	0.37	0.50	-	7.2	0.22
	B-C	0.01	6.68	0.002	-	0.00	0.00	-	0.0	0.15
	C-AB	0.10	9.91	0.011	-	0.01	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.76	-	-	-	-	-	-	-	-
	A-C	2.86	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	2.86	6.58	0.435	-	0.50	0.75	-	10.6	0.27
	B-C	0.02	6.07	0.003	-	0.00	0.00	-	0.0	0.17
	C-AB	0.13	9.70	0.013	-	0.01	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.94	-	-	-	-	-	-	-	-
	A-C	3.50	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	2.86	6.58	0.435	-	0.75	0.76	-	11.3	0.27
	B-C	0.02	6.06	0.003	-	0.00	0.00	-	0.0	0.17
	C-AB	0.13	9.70	0.013	-	0.01	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.94	-	-	-	-	-	-	-	-
	A-C	3.50	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	2.34	6.93	0.337	-	0.76	0.52	-	8.2	0.22
	B-C	0.01	6.66	0.002	-	0.00	0.00	-	0.0	0.15
	C-AB	0.10	9.91	0.011	-	0.01	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.76	-	-	-	-	-	-	-	-
	A-C	2.86	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-A	1.96	7.18	0.273	-	0.52	0.38	-	5.9	0.19
	B-C	0.01	7.01	0.002	-	0.00	0.00	-	0.0	0.14
	C-AB	0.09	10.07	0.009	-	0.01	0.01	-	0.1	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.64	-	-	-	-	-	-	-	-
	A-C	2.40	-	-	-	-	-	-	-	-

Demand Set: 2029 AM without Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-A	0.40	5.63	0.071	-	0.00	0.08	-	1.1	0.19
	B-C	0.03	6.18	0.004	-	0.00	0.00	-	0.1	0.16
	C-AB	0.05	7.22	0.007	-	0.00	0.01	-	0.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	6.39	-	-	-	-	-	-	-	-
	A-C	7.47	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-A	0.48	5.09	0.094	-	0.08	0.10	-	1.5	0.22
	B-C	0.03	5.76	0.005	-	0.00	0.01	-	0.1	0.17
	C-AB	0.06	6.51	0.009	-	0.01	0.01	-	0.1	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.63	-	-	-	-	-	-	-	-
	A-C	8.91	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-A	0.59	4.33	0.135	-	0.10	0.15	-	2.2	0.27
	B-C	0.04	5.17	0.007	-	0.01	0.01	-	0.1	0.19
	C-AB	0.07	5.53	0.013	-	0.01	0.01	-	0.2	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	9.34	-	-	-	-	-	-	-	-
	A-C	10.92	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	0.59	4.33	0.135	-	0.15	0.16	-	2.3	0.27
	B-C	0.04	5.16	0.007	-	0.01	0.01	-	0.1	0.20
	C-AB	0.07	5.53	0.013	-	0.01	0.01	-	0.2	0.18
	C-A	-	-	-	-	-	-	-	-	-
	A-B	9.34	-	-	-	-	-	-	-	-
	A-C	10.92	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-A	0.48	5.09	0.094	-	0.16	0.11	-	1.6	0.22
	B-C	0.03	5.75	0.005	-	0.01	0.01	-	0.1	0.17
	C-AB	0.06	6.51	0.009	-	0.01	0.01	-	0.1	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.63	-	-	-	-	-	-	-	-
	A-C	8.91	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	0.40	5.63	0.071	-	0.11	0.08	-	1.2	0.19
	B-C	0.03	6.18	0.004	-	0.01	0.00	-	0.1	0.16
	C-AB	0.05	7.22	0.007	-	0.01	0.01	-	0.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	6.39	-	-	-	-	-	-	-	-
	A-C	7.47	-	-	-	-	-	-	-	-

Demand Set: 2029 PM without Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	2.13	7.07	0.302	-	0.00	0.42	-	6.0	0.20
	B-C	0.01	6.88	0.002	-	0.00	0.00	-	0.0	0.15
	C-AB	0.09	10.00	0.009	-	0.00	0.01	-	0.1	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.70	-	-	-	-	-	-	-	-
	A-C	2.61	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	2.55	6.79	0.375	-	0.42	0.59	-	8.4	0.23
	B-C	0.01	6.46	0.002	-	0.00	0.00	-	0.0	0.16
	C-AB	0.10	9.83	0.011	-	0.01	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.84	-	-	-	-	-	-	-	-
	A-C	3.12	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	3.12	6.41	0.486	-	0.59	0.91	-	12.9	0.30
	B-C	0.02	5.71	0.003	-	0.00	0.00	-	0.0	0.18
	C-AB	0.13	9.59	0.013	-	0.01	0.01	-	0.2	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.03	-	-	-	-	-	-	-	-
	A-C	3.82	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	3.12	6.41	0.486	-	0.91	0.93	-	13.8	0.30
	B-C	0.02	5.69	0.003	-	0.00	0.00	-	0.0	0.18
	C-AB	0.13	9.59	0.013	-	0.01	0.01	-	0.2	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.03	-	-	-	-	-	-	-	-
	A-C	3.82	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	2.55	6.79	0.375	-	0.93	0.61	-	9.7	0.24
	B-C	0.01	6.43	0.002	-	0.00	0.00	-	0.0	0.16
	C-AB	0.10	9.83	0.011	-	0.01	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.84	-	-	-	-	-	-	-	-
	A-C	3.12	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-A	2.13	7.07	0.302	-	0.61	0.44	-	6.9	0.20
	B-C	0.01	6.86	0.002	-	0.00	0.00	-	0.0	0.15
	C-AB	0.09	10.00	0.009	-	0.01	0.01	-	0.1	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.70	-	-	-	-	-	-	-	-
	A-C	2.61	-	-	-	-	-	-	-	-

Demand Set: 2039 AM without Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-A	0.44	5.31	0.083	-	0.00	0.09	-	1.3	0.20
	B-C	0.04	5.96	0.006	-	0.00	0.01	-	0.1	0.17
	C-AB	0.05	6.81	0.007	-	0.00	0.01	-	0.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.09	-	-	-	-	-	-	-	-
	A-C	8.31	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-A	0.52	4.71	0.111	-	0.09	0.12	-	1.8	0.24
	B-C	0.04	5.49	0.008	-	0.01	0.01	-	0.1	0.18
	C-AB	0.06	6.03	0.010	-	0.01	0.01	-	0.2	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	8.47	-	-	-	-	-	-	-	-
	A-C	9.92	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-A	0.64	3.87	0.166	-	0.12	0.19	-	2.8	0.31
	B-C	0.06	4.82	0.011	-	0.01	0.01	-	0.2	0.21
	C-AB	0.07	4.94	0.015	-	0.01	0.01	-	0.2	0.21
	C-A	-	-	-	-	-	-	-	-	-
	A-B	10.37	-	-	-	-	-	-	-	-
	A-C	12.15	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	0.64	3.87	0.166	-	0.19	0.20	-	2.9	0.31
	B-C	0.06	4.81	0.011	-	0.01	0.01	-	0.2	0.21
	C-AB	0.07	4.94	0.015	-	0.01	0.01	-	0.2	0.21
	C-A	-	-	-	-	-	-	-	-	-
	A-B	10.37	-	-	-	-	-	-	-	-
	A-C	12.15	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-A	0.52	4.71	0.111	-	0.20	0.13	-	2.0	0.24
	B-C	0.04	5.48	0.008	-	0.01	0.01	-	0.1	0.18
	C-AB	0.06	6.03	0.010	-	0.01	0.01	-	0.2	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	8.47	-	-	-	-	-	-	-	-
	A-C	9.92	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	0.44	5.31	0.083	-	0.13	0.09	-	1.4	0.21
	B-C	0.04	5.96	0.006	-	0.01	0.01	-	0.1	0.17
	C-AB	0.05	6.81	0.007	-	0.01	0.01	-	0.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.09	-	-	-	-	-	-	-	-
	A-C	8.31	-	-	-	-	-	-	-	-

Demand Set: 2039 PM without Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	2.36	6.91	0.342	-	0.00	0.51	-	7.1	0.22
	B-C	0.01	6.66	0.002	-	0.00	0.00	-	0.0	0.15
	C-AB	0.10	9.90	0.010	-	0.00	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.78	-	-	-	-	-	-	-	-
	A-C	2.91	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	2.82	6.60	0.427	-	0.51	0.72	-	10.3	0.26
	B-C	0.01	6.12	0.002	-	0.00	0.00	-	0.0	0.16
	C-AB	0.12	9.71	0.012	-	0.01	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.93	-	-	-	-	-	-	-	-
	A-C	3.48	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	3.45	6.18	0.558	-	0.72	1.20	-	16.7	0.36
	B-C	0.02	5.13	0.004	-	0.00	0.00	-	0.1	0.20
	C-AB	0.15	9.45	0.016	-	0.01	0.02	-	0.2	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.14	-	-	-	-	-	-	-	-
	A-C	4.26	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	3.45	6.18	0.558	-	1.20	1.23	-	18.3	0.37
	B-C	0.02	5.09	0.004	-	0.00	0.00	-	0.1	0.20
	C-AB	0.15	9.45	0.016	-	0.02	0.02	-	0.2	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.14	-	-	-	-	-	-	-	-
	A-C	4.26	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	2.82	6.60	0.427	-	1.23	0.77	-	12.2	0.27
	B-C	0.01	6.08	0.002	-	0.00	0.00	-	0.0	0.16
	C-AB	0.12	9.71	0.012	-	0.02	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.93	-	-	-	-	-	-	-	-
	A-C	3.48	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-A	2.36	6.91	0.342	-	0.77	0.53	-	8.3	0.22
	B-C	0.01	6.63	0.002	-	0.00	0.00	-	0.0	0.15
	C-AB	0.10	9.90	0.010	-	0.01	0.01	-	0.2	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.78	-	-	-	-	-	-	-	-
	A-C	2.91	-	-	-	-	-	-	-	-

Demand Set: 2024 AM with Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-A	1.59	5.82	0.274	-	0.00	0.37	-	5.2	0.23
	B-C	0.11	5.88	0.019	-	0.00	0.02	-	0.3	0.17
	C-AB	0.04	7.41	0.005	-	0.00	0.00	-	0.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	6.29	-	-	-	-	-	-	-	-
	A-C	6.85	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-A	1.90	5.32	0.358	-	0.37	0.54	-	7.7	0.29
	B-C	0.13	5.27	0.026	-	0.02	0.03	-	0.4	0.19
	C-AB	0.04	6.74	0.007	-	0.00	0.01	-	0.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.51	-	-	-	-	-	-	-	-
	A-C	8.18	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-A	2.33	4.61	0.505	-	0.54	0.97	-	13.4	0.43
	B-C	0.17	4.23	0.039	-	0.03	0.04	-	0.6	0.25
	C-AB	0.06	5.81	0.009	-	0.01	0.01	-	0.1	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	9.19	-	-	-	-	-	-	-	-
	A-C	10.02	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/segment)	Delay (veh.min/segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	2.33	4.61	0.505	-	0.97	0.99	-	14.7	0.44
	B-C	0.17	4.20	0.039	-	0.04	0.04	-	0.6	0.25
	C-AB	0.06	5.81	0.009	-	0.01	0.01	-	0.1	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	9.19	-	-	-	-	-	-	-	-
	A-C	10.02	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-A	1.90	5.32	0.358	-	0.99	0.57	-	9.2	0.30
	B-C	0.13	5.24	0.026	-	0.04	0.03	-	0.4	0.20
	C-AB	0.04	6.74	0.007	-	0.01	0.01	-	0.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.51	-	-	-	-	-	-	-	-
	A-C	8.18	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	1.59	5.82	0.274	-	0.57	0.38	-	6.0	0.24
	B-C	0.11	5.86	0.019	-	0.03	0.02	-	0.3	0.17
	C-AB	0.04	7.41	0.005	-	0.01	0.01	-	0.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	6.29	-	-	-	-	-	-	-	-
	A-C	6.85	-	-	-	-	-	-	-	-

Demand Set: 2024 PM with Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	2.50	7.05	0.354	-	0.00	0.54	-	7.5	0.22
	B-C	0.01	6.64	0.002	-	0.00	0.00	-	0.0	0.15
	C-AB	0.20	9.83	0.020	-	0.00	0.02	-	0.3	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.57	-	-	-	-	-	-	-	-
	A-C	2.40	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	2.98	6.77	0.440	-	0.54	0.76	-	10.9	0.26
	B-C	0.01	6.08	0.002	-	0.00	0.00	-	0.0	0.16
	C-AB	0.24	9.62	0.025	-	0.02	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.87	-	-	-	-	-	-	-	-
	A-C	2.86	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	3.65	6.39	0.571	-	0.76	1.27	-	17.6	0.36
	B-C	0.02	5.07	0.004	-	0.00	0.00	-	0.1	0.20
	C-AB	0.29	9.34	0.031	-	0.03	0.03	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.29	-	-	-	-	-	-	-	-
	A-C	3.50	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	3.65	6.39	0.571	-	1.27	1.30	-	19.3	0.36
	B-C	0.02	5.03	0.004	-	0.00	0.00	-	0.1	0.20
	C-AB	0.29	9.34	0.031	-	0.03	0.03	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.29	-	-	-	-	-	-	-	-
	A-C	3.50	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	2.98	6.77	0.440	-	1.30	0.81	-	12.9	0.27
	B-C	0.01	6.04	0.002	-	0.00	0.00	-	0.0	0.17
	C-AB	0.24	9.62	0.025	-	0.03	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.87	-	-	-	-	-	-	-	-
	A-C	2.86	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-A	2.50	7.05	0.354	-	0.81	0.56	-	8.8	0.22
	B-C	0.01	6.61	0.002	-	0.00	0.00	-	0.0	0.15
	C-AB	0.20	9.83	0.020	-	0.03	0.02	-	0.3	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.57	-	-	-	-	-	-	-	-
	A-C	2.40	-	-	-	-	-	-	-	-

Demand Set: 2029 AM with Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-A	1.62	5.59	0.290	-	0.00	0.40	-	5.6	0.25
	B-C	0.13	5.69	0.022	-	0.00	0.02	-	0.3	0.18
	C-AB	0.05	7.11	0.007	-	0.00	0.01	-	0.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	6.80	-	-	-	-	-	-	-	-
	A-C	7.47	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-A	1.93	5.03	0.384	-	0.40	0.60	-	8.6	0.32
	B-C	0.15	5.01	0.030	-	0.02	0.03	-	0.4	0.21
	C-AB	0.06	6.38	0.009	-	0.01	0.01	-	0.1	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	8.12	-	-	-	-	-	-	-	-
	A-C	8.91	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-A	2.37	4.27	0.555	-	0.60	1.16	-	15.8	0.51
	B-C	0.18	3.80	0.048	-	0.03	0.05	-	0.7	0.28
	C-AB	0.07	5.37	0.014	-	0.01	0.01	-	0.2	0.19
	C-A	-	-	-	-	-	-	-	-	-
	A-B	9.95	-	-	-	-	-	-	-	-
	A-C	10.92	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	2.37	4.27	0.555	-	1.16	1.20	-	17.8	0.52
	B-C	0.18	3.76	0.049	-	0.05	0.05	-	0.8	0.28
	C-AB	0.07	5.37	0.014	-	0.01	0.01	-	0.2	0.19
	C-A	-	-	-	-	-	-	-	-	-
	A-B	9.95	-	-	-	-	-	-	-	-
	A-C	10.92	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-A	1.93	5.03	0.384	-	1.20	0.64	-	10.4	0.33
	B-C	0.15	4.97	0.030	-	0.05	0.03	-	0.5	0.21
	C-AB	0.06	6.38	0.009	-	0.01	0.01	-	0.1	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	8.12	-	-	-	-	-	-	-	-
	A-C	8.91	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	1.62	5.59	0.290	-	0.64	0.42	-	6.6	0.25
	B-C	0.13	5.66	0.022	-	0.03	0.02	-	0.4	0.18
	C-AB	0.05	7.11	0.007	-	0.01	0.01	-	0.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	6.80	-	-	-	-	-	-	-	-
	A-C	7.47	-	-	-	-	-	-	-	-

Demand Set: 2029 PM with Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	2.66	6.93	0.384	-	0.00	0.61	-	8.5	0.23
	B-C	0.01	6.47	0.002	-	0.00	0.00	-	0.0	0.15
	C-AB	0.21	9.75	0.022	-	0.00	0.02	-	0.3	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.63	-	-	-	-	-	-	-	-
	A-C	2.61	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	3.18	6.63	0.479	-	0.61	0.89	-	12.6	0.29
	B-C	0.01	5.80	0.003	-	0.00	0.00	-	0.0	0.17
	C-AB	0.25	9.54	0.027	-	0.02	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.95	-	-	-	-	-	-	-	-
	A-C	3.12	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	3.89	6.22	0.625	-	0.89	1.56	-	21.4	0.41
	B-C	0.02	4.56	0.004	-	0.00	0.00	-	0.1	0.22
	C-AB	0.31	9.24	0.034	-	0.03	0.03	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.39	-	-	-	-	-	-	-	-
	A-C	3.82	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	3.89	6.22	0.625	-	1.56	1.61	-	23.9	0.43
	B-C	0.02	4.50	0.004	-	0.00	0.00	-	0.1	0.22
	C-AB	0.31	9.24	0.034	-	0.03	0.03	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.39	-	-	-	-	-	-	-	-
	A-C	3.82	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	3.18	6.63	0.479	-	1.61	0.95	-	15.3	0.30
	B-C	0.01	5.74	0.003	-	0.00	0.00	-	0.0	0.17
	C-AB	0.25	9.54	0.027	-	0.03	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.95	-	-	-	-	-	-	-	-
	A-C	3.12	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-A	2.66	6.93	0.384	-	0.95	0.64	-	10.1	0.24
	B-C	0.01	6.42	0.002	-	0.00	0.00	-	0.0	0.16
	C-AB	0.21	9.75	0.022	-	0.03	0.02	-	0.3	0.10
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.63	-	-	-	-	-	-	-	-
	A-C	2.61	-	-	-	-	-	-	-	-

Demand Set: 2039 AM with Dev
Modelling Period: 07:15-08:45

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:15-07:30	B-A	1.67	5.27	0.316	-	0.00	0.45	-	6.3	0.27
	B-C	0.13	5.40	0.023	-	0.00	0.02	-	0.3	0.19
	C-AB	0.05	6.70	0.007	-	0.00	0.01	-	0.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.50	-	-	-	-	-	-	-	-
	A-C	8.31	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:30-07:45	B-A	1.99	4.66	0.428	-	0.45	0.72	-	10.1	0.37
	B-C	0.15	4.61	0.032	-	0.02	0.03	-	0.5	0.22
	C-AB	0.06	5.90	0.010	-	0.01	0.01	-	0.2	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	8.96	-	-	-	-	-	-	-	-
	A-C	9.92	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-A	2.44	3.81	0.641	-	0.72	1.59	-	20.9	0.68
	B-C	0.18	3.08	0.060	-	0.03	0.06	-	0.9	0.34
	C-AB	0.07	4.78	0.015	-	0.01	0.02	-	0.2	0.21
	C-A	-	-	-	-	-	-	-	-	-
	A-B	10.97	-	-	-	-	-	-	-	-
	A-C	12.15	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-A	2.44	3.81	0.641	-	1.59	1.68	-	24.7	0.72
	B-C	0.18	2.99	0.061	-	0.06	0.06	-	1.0	0.36
	C-AB	0.07	4.78	0.015	-	0.02	0.02	-	0.2	0.21
	C-A	-	-	-	-	-	-	-	-	-
	A-B	10.97	-	-	-	-	-	-	-	-
	A-C	12.15	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-A	1.99	4.66	0.428	-	1.68	0.78	-	12.8	0.39
	B-C	0.15	4.54	0.033	-	0.06	0.03	-	0.5	0.23
	C-AB	0.06	5.90	0.010	-	0.02	0.01	-	0.2	0.17
	C-A	-	-	-	-	-	-	-	-	-
	A-B	8.96	-	-	-	-	-	-	-	-
	A-C	9.92	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-A	1.67	5.27	0.316	-	0.78	0.48	-	7.5	0.28
	B-C	0.13	5.37	0.023	-	0.03	0.02	-	0.4	0.19
	C-AB	0.05	6.70	0.007	-	0.01	0.01	-	0.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	7.50	-	-	-	-	-	-	-	-
	A-C	8.31	-	-	-	-	-	-	-	-

Demand Set: 2039 PM with Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-A	2.90	6.78	0.428	-	0.00	0.73	-	10.1	0.25
	B-C	0.03	6.19	0.004	-	0.00	0.00	-	0.1	0.16
	C-AB	0.21	9.65	0.022	-	0.00	0.02	-	0.3	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.71	-	-	-	-	-	-	-	-
	A-C	2.91	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-A	3.46	6.45	0.537	-	0.73	1.11	-	15.6	0.33
	B-C	0.03	5.35	0.006	-	0.00	0.01	-	0.1	0.19
	C-AB	0.25	9.42	0.027	-	0.02	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.04	-	-	-	-	-	-	-	-
	A-C	3.48	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-A	4.24	5.99	0.708	-	1.11	2.17	-	28.9	0.53
	B-C	0.04	3.71	0.010	-	0.01	0.01	-	0.1	0.27
	C-AB	0.31	9.09	0.034	-	0.03	0.04	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.50	-	-	-	-	-	-	-	-
	A-C	4.26	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-A	4.24	5.99	0.708	-	2.17	2.28	-	33.6	0.56
	B-C	0.04	3.59	0.010	-	0.01	0.01	-	0.2	0.28
	C-AB	0.31	9.09	0.034	-	0.04	0.04	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.50	-	-	-	-	-	-	-	-
	A-C	4.26	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-A	3.46	6.45	0.537	-	2.28	1.21	-	19.8	0.35
	B-C	0.03	5.24	0.006	-	0.01	0.01	-	0.1	0.19
	C-AB	0.25	9.42	0.027	-	0.04	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.04	-	-	-	-	-	-	-	-
	A-C	3.48	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-A	2.90	6.77	0.428	-	1.21	0.77	-	12.2	0.26
	B-C	0.03	6.13	0.004	-	0.01	0.00	-	0.1	0.16
	C-AB	0.21	9.65	0.022	-	0.03	0.02	-	0.3	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.71	-	-	-	-	-	-	-	-
	A-C	2.91	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: 2019 AM Survey Year
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	37.2	24.8	7.3	0.2	7.3	0.2
B-C	2.8	1.8	0.5	0.2	0.5	0.2
C-AB	4.1	2.8	0.6	0.1	0.6	0.1
C-A	-	-	-	-	-	-
A-B	591.9	394.6	-	-	-	-
A-C	691.0	460.6	-	-	-	-
All	**1544.4**	**1029.6**	**8.4**	**0.0**	**8.4**	**0.0**

Demand Set: 2019 PM Survey Year
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	198.2	132.1	41.7	0.2	41.7	0.2
B-C	1.4	0.9	0.2	0.1	0.2	0.1
C-AB	8.3	5.5	0.8	0.1	0.8	0.1
C-A	-	-	-	-	-	-
A-B	64.7	43.1	-	-	-	-
A-C	242.3	161.5	-	-	-	-
All	**920.8**	**613.9**	**42.7**	**0.0**	**42.7**	**0.0**

Demand Set: 2024 AM without Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	39.9	26.6	8.4	0.2	8.4	0.2
B-C	2.8	1.8	0.5	0.2	0.5	0.2
C-AB	4.1	2.8	0.6	0.2	0.6	0.2
C-A	-	-	-	-	-	-
A-B	644.2	429.4	-	-	-	-
A-C	751.5	501.0	-	-	-	-
All	**1679.2**	**1119.5**	**9.5**	**0.0**	**9.5**	**0.0**

Demand Set: 2024 PM without Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	214.7	143.1	48.5	0.2	48.5	0.2
B-C	1.4	0.9	0.2	0.2	0.2	0.2
C-AB	9.6	6.4	1.0	0.1	1.0	0.1
C-A	-	-	-	-	-	-
A-B	70.2	46.8	-	-	-	-
A-C	262.9	175.3	-	-	-	-
All	**1000.7**	**667.1**	**49.7**	**0.0**	**49.7**	**0.0**

Demand Set: 2029 AM without Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	44.0	29.4	10.0	0.2	10.0	0.2
B-C	2.8	1.8	0.5	0.2	0.5	0.2
C-AB	5.5	3.7	0.9	0.2	0.9	0.2
C-A	-	-	-	-	-	-
A-B	700.6	467.1	-	-	-	-
A-C	819.0	546.0	-	-	-	-
All	**1830.6**	**1220.4**	**11.3**	**0.0**	**11.3**	**0.0**

Demand Set: 2029 PM without Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	234.0	156.0	57.7	0.2	57.8	0.2
B-C	1.4	0.9	0.2	0.2	0.2	0.2
C-AB	9.6	6.4	1.0	0.1	1.0	0.1
C-A	-	-	-	-	-	-
A-B	77.1	51.4	-	-	-	-
A-C	286.3	190.9	-	-	-	-
All	**1088.8**	**725.8**	**59.0**	**0.1**	**59.0**	**0.1**

Demand Set: 2039 AM without Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	48.2	32.1	12.2	0.3	12.2	0.3
B-C	4.1	2.8	0.8	0.2	0.8	0.2
C-AB	5.5	3.7	1.0	0.2	1.0	0.2
C-A	-	-	-	-	-	-
A-B	777.7	518.5	-	-	-	-
A-C	911.2	607.5	-	-	-	-
All	**2035.7**	**1357.2**	**13.9**	**0.0**	**13.9**	**0.0**

Demand Set: 2039 PM without Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	258.8	172.5	73.0	0.3	73.0	0.3
B-C	1.4	0.9	0.2	0.2	0.2	0.2
C-AB	11.0	7.3	1.2	0.1	1.2	0.1
C-A	-	-	-	-	-	-
A-B	85.3	56.9	-	-	-	-
A-C	319.3	212.9	-	-	-	-
All	**1209.9**	**806.6**	**74.4**	**0.1**	**74.4**	**0.1**

Demand Set: 2024 AM with Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	174.8	116.5	56.3	0.3	56.3	0.3
B-C	12.4	8.3	2.6	0.2	2.6	0.2
C-AB	4.1	2.8	0.6	0.2	0.6	0.2
C-A	-	-	-	-	-	-
A-B	689.6	459.7	-	-	-	-
A-C	751.5	501.0	-	-	-	-
All	**1869.2**	**1246.1**	**59.5**	**0.0**	**59.5**	**0.0**

Demand Set: 2024 PM with Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	273.9	182.6	77.1	0.3	77.1	0.3
B-C	1.4	0.9	0.2	0.2	0.2	0.2
C-AB	22.0	14.7	2.4	0.1	2.4	0.1
C-A	-	-	-	-	-	-
A-B	172.1	114.7	-	-	-	-
A-C	262.9	175.3	-	-	-	-
All	**1174.1**	**782.7**	**79.7**	**0.1**	**79.7**	**0.1**

Demand Set: 2029 AM with Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	177.6	118.4	64.7	0.4	64.7	0.4
B-C	13.8	9.2	3.1	0.2	3.1	0.2
C-AB	5.5	3.7	0.9	0.2	0.9	0.2
C-A	-	-	-	-	-	-
A-B	746.0	497.3	-	-	-	-
A-C	819.0	546.0	-	-	-	-
All	**2020.6**	**1347.1**	**68.7**	**0.0**	**68.7**	**0.0**

Demand Set: 2029 PM with Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	291.8	194.5	91.7	0.3	91.7	0.3
B-C	1.4	0.9	0.3	0.2	0.3	0.2
C-AB	23.4	15.6	2.5	0.1	2.5	0.1
C-A	-	-	-	-	-	-
A-B	178.9	119.3	-	-	-	-
A-C	286.3	190.9	-	-	-	-
All	**1262.2**	**841.5**	**94.5**	**0.1**	**94.5**	**0.1**

Demand Set: 2039 AM with Dev
Modelling Period: 07:15-08:45

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	183.1	122.0	82.3	0.4	82.3	0.4
B-C	13.8	9.2	3.6	0.3	3.6	0.3
C-AB	5.5	3.7	1.0	0.2	1.0	0.2
C-A	-	-	-	-	-	-
A-B	823.1	548.7	-	-	-	-
A-C	911.2	607.5	-	-	-	-
All	**2225.7**	**1483.8**	**86.9**	**0.0**	**86.9**	**0.0**

Demand Set: 2039 PM with Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-A	318.0	212.0	120.1	0.4	120.2	0.4
B-C	2.8	1.8	0.6	0.2	0.6	0.2
C-AB	23.4	15.6	2.6	0.1	2.6	0.1
C-A	-	-	-	-	-	-
A-B	187.2	124.8	-	-	-	-
A-C	319.3	212.9	-	-	-	-
All	**1384.7**	**923.1**	**123.3**	**0.1**	**123.3**	**0.1**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful

APPENDIX E5

PICADY Analysis – Development Junction

PICADY

GUI Version: 5.1 AD
Analysis Program Release: 4.0 (SEPT 2008)

For sales and distribution information, program advice and maintenance, contact:

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The user of this computer program for the solution of an engineering problem is in no way relieved of their responsibility for the correctness of the solution

Run Analysis

Parameter	Values
File Run	I:\..\Rosshill Rd_Rosshill Stud Farm Rd\119209 Rosshill Rd_Rosshill Stud Farm Rd PICADY Analysis.vpi
Date Run	13 December 2019
Time Run	17:15:25
Driving Side	Drive On The Left

Arm Names and Flow Scaling Factors

Arm	Arm Name	Flow Scaling Factor (%)
Arm A	Rosshill Rd East	100
Arm B	Rosshill Stud Farm Rd	100
Arm C	Rosshill Rd West	100

Stream Labelling Convention

Stream A-B contains traffic going from A to B etc.

Run Information

Parameter	Values
Run Title	Rosshill Road/Rosshill Stud Farm T-junction
Location	Rosshill, Galway City
Date	18 July 2019
Enumerator	J Noone
Job Number	119209
Status	Preliminary
Client	Alber Homes
Description	-

Geometric Data

Geometric Parameters

Parameter	Minor Arm B
Major Road Carriageway Width (m)	6.20
Major Road Kerbed Central Reserve Width (m)	0.00
Major Road Right Turning Lane Width (m)	2.20
Minor Road First Lane Width (m)	3.65
Minor Road Visibility To Right (m)	15
Minor Road Visibility To Left (m)	15
Major Road Right Turn Visibility (m)	90
Major Road Right Turn Blocks Traffic	Yes

Slope and Intercept Values

Stream	Intercept for Stream B-A	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
B-A	521.761	0.094	0.238	0.150	0.340
B-C	674.597	0.103	0.259	-	-
C-B	626.083	0.240	0.240	-	-

Note: Streams may be combined in which case capacity will be adjusted
These values do not allow for any site-specific corrections

Junction Diagram

Demand Data

Modelling Periods

Parameter	Period	Duration (min)	Segment Length (min)
First Modelling Period	07:45-09:15	90	15
Second Modelling Period	16:45-18:15	90	15

ODTAB Turning Counts

Demand Set: 2019 AM Survey Year
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	12.0	421.0
Arm B	16.0	0.0	13.0
Arm C	12.0	8.0	0.0

Demand Set: 2019 PM Survey Year
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	24.0	29.0
Arm B	22.0	0.0	7.0
Arm C	112.0	17.0	0.0

Demand Set: 2024 AM without Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	13.0	458.0
Arm B	17.0	0.0	14.0
Arm C	13.0	9.0	0.0

Demand Set: 2024 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	26.0	31.0
Arm B	24.0	0.0	8.0
Arm C	121.0	18.0	0.0

Demand Set: 2029 AM without Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	14.0	498.0
Arm B	19.0	0.0	15.0
Arm C	15.0	9.0	0.0

Demand Set: 2029 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	28.0	34.0
Arm B	26.0	0.0	8.0
Arm C	132.0	20.0	0.0

Demand Set: 2039 AM without Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	16.0	553.0
Arm B	21.0	0.0	17.0
Arm C	17.0	10.0	0.0

Demand Set: 2039 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	31.0	38.0
Arm B	29.0	0.0	9.0
Arm C	147.0	22.0	0.0

Demand Set: 2024 AM with Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	47.0	458.0
Arm B	122.0	0.0	99.0
Arm C	13.0	31.0	0.0

Demand Set: 2024 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	110.0	31.0
Arm B	67.0	0.0	21.0
Arm C	121.0	78.0	0.0

Demand Set: 2029 AM with Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	48.0	498.0
Arm B	124.0	0.0	100.0
Arm C	15.0	32.0	0.0

Demand Set: 2029 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	112.0	34.0
Arm B	69.0	0.0	22.0
Arm C	132.0	79.0	0.0

Demand Set: 2039 AM with Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	49.0	553.0
Arm B	126.0	0.0	102.0
Arm C	17.0	33.0	0.0

Demand Set: 2039 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	0.0	115.0	38.0
Arm B	72.0	0.0	23.0
Arm C	147.0	82.0	0.0

ODTAB Synthesised Flows

Demand Set: 2019 AM Survey Year
Modelling Period: 07:45-09:15

Arm	Rising Time	Rising Flow (veh/min)	Peak Time	Peak Flow (veh/min)	Falling Time	Falling Flow (veh/min)
Arm A	08:00	5.412	08:30	8.119	09:00	5.412
Arm B	08:00	0.363	08:30	0.544	09:00	0.363
Arm C	08:00	0.250	08:30	0.375	09:00	0.250

Heavy Vehicles Percentages

Demand Set: 2019 AM Survey Year
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2019 PM Survey Year
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 AM without Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 AM without Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 AM without Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 PM without Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 AM with Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2024 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 AM with Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2029 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 AM with Dev
Modelling Period: 07:45-09:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Demand Set: 2039 PM with Dev
Modelling Period: 16:45-18:15

From/To	Arm A	Arm B	Arm C
Arm A	-	10.0	10.0
Arm B	10.0	-	10.0
Arm C	10.0	10.0	-

Default proportions of heavy vehicles are used

Queues & Delays

Demand Set: 2019 AM Survey Year
Modelling Period: 07:45-09:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	0.36	7.43	0.049	-	0.00	0.05	-	0.7	0.14
	C-AB	0.10	8.18	0.012	-	0.00	0.01	-	0.2	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.15	-	-	-	-	-	-	-	-
	A-C	5.28	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	0.43	7.16	0.061	-	0.05	0.06	-	0.9	0.15
	C-AB	0.12	7.93	0.015	-	0.01	0.02	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.18	-	-	-	-	-	-	-	-
	A-C	6.31	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	0.53	6.79	0.078	-	0.06	0.08	-	1.2	0.16
	C-AB	0.15	7.58	0.019	-	0.02	0.02	-	0.3	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.22	-	-	-	-	-	-	-	-
	A-C	7.73	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	0.53	6.79	0.078	-	0.08	0.08	-	1.3	0.16
	C-AB	0.15	7.58	0.019	-	0.02	0.02	-	0.3	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.22	-	-	-	-	-	-	-	-
	A-C	7.73	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-AC	0.43	7.16	0.061	-	0.08	0.07	-	1.0	0.15
	C-AB	0.12	7.93	0.015	-	0.02	0.02	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.18	-	-	-	-	-	-	-	-
	A-C	6.31	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-AC	0.36	7.43	0.049	-	0.07	0.05	-	0.8	0.14
	C-AB	0.10	8.18	0.012	-	0.02	0.01	-	0.2	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.15	-	-	-	-	-	-	-	-
	A-C	5.28	-	-	-	-	-	-	-	-

Demand Set: 2019 PM Survey Year
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-AC	0.36	8.00	0.045	-	0.00	0.05	-	0.7	0.13
	C-AB	0.21	9.33	0.023	-	0.00	0.02	-	0.3	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.30	-	-	-	-	-	-	-	-
	A-C	0.36	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	0.43	7.93	0.055	-	0.05	0.06	-	0.8	0.13
	C-AB	0.25	9.30	0.027	-	0.02	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.36	-	-	-	-	-	-	-	-
	A-C	0.43	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	0.53	7.83	0.068	-	0.06	0.07	-	1.1	0.14
	C-AB	0.31	9.25	0.034	-	0.03	0.03	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.44	-	-	-	-	-	-	-	-
	A-C	0.53	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	0.53	7.83	0.068	-	0.07	0.07	-	1.1	0.14
	C-AB	0.31	9.25	0.034	-	0.03	0.04	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.44	-	-	-	-	-	-	-	-
	A-C	0.53	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	0.43	7.93	0.055	-	0.07	0.06	-	0.9	0.13
	C-AB	0.25	9.30	0.027	-	0.04	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.36	-	-	-	-	-	-	-	-
	A-C	0.43	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	0.36	8.00	0.045	-	0.06	0.05	-	0.7	0.13
	C-AB	0.21	9.33	0.023	-	0.03	0.02	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.30	-	-	-	-	-	-	-	-
	A-C	0.36	-	-	-	-	-	-	-	-

Demand Set: 2024 AM without Dev
Modelling Period: 07:45-09:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	0.39	7.31	0.053	-	0.00	0.06	-	0.8	0.14
	C-AB	0.11	8.06	0.014	-	0.00	0.01	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.16	-	-	-	-	-	-	-	-
	A-C	5.75	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	0.46	7.02	0.066	-	0.06	0.07	-	1.0	0.15
	C-AB	0.13	7.79	0.017	-	0.01	0.02	-	0.3	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.19	-	-	-	-	-	-	-	-
	A-C	6.86	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	0.57	6.62	0.086	-	0.07	0.09	-	1.4	0.17
	C-AB	0.17	7.41	0.022	-	0.02	0.02	-	0.3	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	8.40	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	0.57	6.62	0.086	-	0.09	0.09	-	1.4	0.17
	C-AB	0.17	7.41	0.022	-	0.02	0.02	-	0.3	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	8.40	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-AC	0.46	7.02	0.066	-	0.09	0.07	-	1.1	0.15
	C-AB	0.13	7.79	0.017	-	0.02	0.02	-	0.3	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.19	-	-	-	-	-	-	-	-
	A-C	6.86	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-AC	0.39	7.31	0.053	-	0.07	0.06	-	0.9	0.14
	C-AB	0.11	8.06	0.014	-	0.02	0.01	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.16	-	-	-	-	-	-	-	-
	A-C	5.75	-	-	-	-	-	-	-	-

Demand Set: 2024 PM without Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-AC	0.40	7.99	0.050	-	0.00	0.05	-	0.8	0.13
	C-AB	0.23	9.31	0.024	-	0.00	0.02	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.33	-	-	-	-	-	-	-	-
	A-C	0.39	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	0.48	7.92	0.061	-	0.05	0.06	-	0.9	0.13
	C-AB	0.27	9.28	0.029	-	0.02	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.39	-	-	-	-	-	-	-	-
	A-C	0.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	0.59	7.81	0.075	-	0.06	0.08	-	1.2	0.14
	C-AB	0.33	9.23	0.036	-	0.03	0.04	-	0.6	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.48	-	-	-	-	-	-	-	-
	A-C	0.57	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	0.59	7.81	0.075	-	0.08	0.08	-	1.2	0.14
	C-AB	0.33	9.23	0.036	-	0.04	0.04	-	0.6	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.48	-	-	-	-	-	-	-	-
	A-C	0.57	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	0.48	7.92	0.061	-	0.08	0.07	-	1.0	0.13
	C-AB	0.27	9.28	0.029	-	0.04	0.03	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.39	-	-	-	-	-	-	-	-
	A-C	0.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	0.40	7.99	0.050	-	0.07	0.05	-	0.8	0.13
	C-AB	0.23	9.31	0.024	-	0.03	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.33	-	-	-	-	-	-	-	-
	A-C	0.39	-	-	-	-	-	-	-	-

Demand Set: 2029 AM without Dev
Modelling Period: 07:45-09:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	0.43	7.16	0.060	-	0.00	0.06	-	0.9	0.15
	C-AB	0.11	7.94	0.014	-	0.00	0.01	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.18	-	-	-	-	-	-	-	-
	A-C	6.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	0.51	6.85	0.074	-	0.06	0.08	-	1.2	0.16
	C-AB	0.13	7.64	0.018	-	0.01	0.02	-	0.3	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.21	-	-	-	-	-	-	-	-
	A-C	7.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	0.62	6.41	0.097	-	0.08	0.11	-	1.6	0.17
	C-AB	0.17	7.23	0.023	-	0.02	0.02	-	0.3	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.26	-	-	-	-	-	-	-	-
	A-C	9.14	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	0.62	6.41	0.097	-	0.11	0.11	-	1.6	0.17
	C-AB	0.17	7.23	0.023	-	0.02	0.02	-	0.4	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.26	-	-	-	-	-	-	-	-
	A-C	9.14	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-AC	0.51	6.85	0.074	-	0.11	0.08	-	1.3	0.16
	C-AB	0.13	7.64	0.018	-	0.02	0.02	-	0.3	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.21	-	-	-	-	-	-	-	-
	A-C	7.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-AC	0.43	7.16	0.060	-	0.08	0.06	-	1.0	0.15
	C-AB	0.11	7.94	0.014	-	0.02	0.01	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.18	-	-	-	-	-	-	-	-

	A-C	6.25	-	-	-	-	-	-	-	-

Demand Set: 2029 PM without Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-AC	0.43	7.93	0.054	-	0.00	0.06	-	0.8	0.13
	C-AB	0.25	9.30	0.027	-	0.00	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.35	-	-	-	-	-	-	-	-
	A-C	0.43	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	0.51	7.84	0.065	-	0.06	0.07	-	1.0	0.14
	C-AB	0.30	9.26	0.032	-	0.03	0.03	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.42	-	-	-	-	-	-	-	-
	A-C	0.51	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	0.62	7.73	0.081	-	0.07	0.09	-	1.3	0.14
	C-AB	0.37	9.21	0.040	-	0.03	0.04	-	0.6	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.51	-	-	-	-	-	-	-	-
	A-C	0.62	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	0.62	7.73	0.081	-	0.09	0.09	-	1.3	0.14
	C-AB	0.37	9.21	0.040	-	0.04	0.04	-	0.6	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.51	-	-	-	-	-	-	-	-
	A-C	0.62	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	0.51	7.84	0.065	-	0.09	0.07	-	1.1	0.14
	C-AB	0.30	9.26	0.032	-	0.04	0.03	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.42	-	-	-	-	-	-	-	-
	A-C	0.51	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	0.43	7.92	0.054	-	0.07	0.06	-	0.9	0.13
	C-AB	0.25	9.30	0.027	-	0.03	0.03	-	0.4	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.35	-	-	-	-	-	-	-	-
	A-C	0.43	-	-	-	-	-	-	-	-

Demand Set: 2039 AM without Dev
Modelling Period: 07:45-09:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	0.48	7.00	0.068	-	0.00	0.07	-	1.0	0.15
	C-AB	0.13	7.77	0.016	-	0.00	0.02	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.20	-	-	-	-	-	-	-	-
	A-C	6.94	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	0.57	6.64	0.086	-	0.07	0.09	-	1.4	0.16
	C-AB	0.15	7.44	0.020	-	0.02	0.02	-	0.3	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	8.29	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	0.70	6.16	0.113	-	0.09	0.13	-	1.8	0.18
	C-AB	0.18	6.98	0.026	-	0.02	0.03	-	0.4	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.29	-	-	-	-	-	-	-	-
	A-C	10.15	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	0.70	6.16	0.113	-	0.13	0.13	-	1.9	0.18
	C-AB	0.18	6.98	0.026	-	0.03	0.03	-	0.4	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.29	-	-	-	-	-	-	-	-
	A-C	10.15	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-AC	0.57	6.64	0.086	-	0.13	0.09	-	1.5	0.16
	C-AB	0.15	7.44	0.020	-	0.03	0.02	-	0.3	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.24	-	-	-	-	-	-	-	-
	A-C	8.29	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-AC	0.48	6.99	0.068	-	0.09	0.07	-	1.1	0.15
	C-AB	0.13	7.77	0.016	-	0.02	0.02	-	0.2	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.20	-	-	-	-	-	-	-	-
	A-C	6.94	-	-	-	-	-	-	-	-

Demand Set: 2039 PM without Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-AC	0.48	7.88	0.061	-	0.00	0.06	-	0.9	0.13
	C-AB	0.28	9.28	0.030	-	0.00	0.03	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.39	-	-	-	-	-	-	-	-
	A-C	0.48	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	0.57	7.79	0.073	-	0.06	0.08	-	1.1	0.14
	C-AB	0.33	9.24	0.036	-	0.03	0.04	-	0.6	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.46	-	-	-	-	-	-	-	-
	A-C	0.57	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	0.70	7.66	0.091	-	0.08	0.10	-	1.5	0.14
	C-AB	0.40	9.18	0.044	-	0.04	0.05	-	0.7	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.57	-	-	-	-	-	-	-	-
	A-C	0.70	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	0.70	7.66	0.091	-	0.10	0.10	-	1.5	0.14
	C-AB	0.40	9.18	0.044	-	0.05	0.05	-	0.7	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.57	-	-	-	-	-	-	-	-
	A-C	0.70	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	0.57	7.79	0.073	-	0.10	0.08	-	1.2	0.14
	C-AB	0.33	9.24	0.036	-	0.05	0.04	-	0.6	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.46	-	-	-	-	-	-	-	-
	A-C	0.57	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	0.48	7.88	0.061	-	0.08	0.06	-	1.0	0.14
	C-AB	0.28	9.28	0.030	-	0.04	0.03	-	0.5	0.11
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.39	-	-	-	-	-	-	-	-
	A-C	0.48	-	-	-	-	-	-	-	-

Demand Set: 2024 AM with Dev
Modelling Period: 07:45-09:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	2.77	7.20	0.385	-	0.00	0.61	-	8.6	0.22
	C-AB	0.39	7.96	0.049	-	0.00	0.05	-	0.8	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.59	-	-	-	-	-	-	-	-
	A-C	5.75	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	3.31	6.88	0.481	-	0.61	0.90	-	12.7	0.28
	C-AB	0.46	7.67	0.061	-	0.05	0.06	-	1.0	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.70	-	-	-	-	-	-	-	-

	A-C	6.86	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	4.06	6.45	0.629	-	0.90	1.59	-	21.7	0.40
	C-AB	0.57	7.26	0.078	-	0.06	0.08	-	1.3	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.86	-	-	-	-	-	-	-	-
	A-C	8.40	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	4.06	6.45	0.629	-	1.59	1.64	-	24.2	0.42
	C-AB	0.57	7.26	0.078	-	0.08	0.08	-	1.3	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.86	-	-	-	-	-	-	-	-
	A-C	8.40	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-AC	3.31	6.88	0.481	-	1.64	0.96	-	15.4	0.29
	C-AB	0.46	7.67	0.061	-	0.08	0.07	-	1.0	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.70	-	-	-	-	-	-	-	-
	A-C	6.86	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-AC	2.77	7.20	0.385	-	0.96	0.64	-	10.1	0.23
	C-AB	0.39	7.96	0.049	-	0.07	0.05	-	0.8	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.59	-	-	-	-	-	-	-	-
	A-C	5.75	-	-	-	-	-	-	-	-

Demand Set: 2024 PM with Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-AC	1.10	7.64	0.144	-	0.00	0.17	-	2.4	0.15
	C-AB	0.98	9.06	0.108	-	0.00	0.12	-	1.8	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.38	-	-	-	-	-	-	-	-
	A-C	0.39	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	1.32	7.50	0.176	-	0.17	0.21	-	3.1	0.16
	C-AB	1.17	8.98	0.130	-	0.12	0.15	-	2.3	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.65	-	-	-	-	-	-	-	-
	A-C	0.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	1.61	7.31	0.221	-	0.21	0.28	-	4.1	0.18
	C-AB	1.43	8.86	0.161	-	0.15	0.20	-	3.0	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.02	-	-	-	-	-	-	-	-
	A-C	0.57	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	1.61	7.31	0.221	-	0.28	0.28	-	4.2	0.18
	C-AB	1.43	8.86	0.161	-	0.20	0.20	-	3.0	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.02	-	-	-	-	-	-	-	-
	A-C	0.57	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	1.32	7.50	0.176	-	0.28	0.22	-	3.3	0.16
	C-AB	1.17	8.98	0.130	-	0.20	0.16	-	2.3	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.65	-	-	-	-	-	-	-	-
	A-C	0.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	1.10	7.64	0.144	-	0.22	0.17	-	2.6	0.15
	C-AB	0.98	9.06	0.108	-	0.16	0.12	-	1.9	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.38	-	-	-	-	-	-	-	-

	A-C	0.39	-	-	-	-	-	-	-	-

Demand Set: 2029 AM with Dev
Modelling Period: 07:45-09:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	2.81	7.06	0.398	-	0.00	0.64	-	9.0	0.23
	C-AB	0.40	7.84	0.051	-	0.00	0.05	-	0.8	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.60	-	-	-	-	-	-	-	-
	A-C	6.25	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	3.36	6.72	0.499	-	0.64	0.96	-	13.6	0.29
	C-AB	0.48	7.52	0.064	-	0.05	0.07	-	1.0	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.72	-	-	-	-	-	-	-	-
	A-C	7.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	4.11	6.25	0.657	-	0.96	1.77	-	24.0	0.44
	C-AB	0.59	7.08	0.083	-	0.07	0.09	-	1.3	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.88	-	-	-	-	-	-	-	-
	A-C	9.14	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	4.11	6.25	0.657	-	1.77	1.84	-	27.2	0.46
	C-AB	0.59	7.08	0.083	-	0.09	0.09	-	1.4	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.88	-	-	-	-	-	-	-	-
	A-C	9.14	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-AC	3.36	6.72	0.499	-	1.84	1.03	-	16.7	0.31
	C-AB	0.48	7.52	0.064	-	0.09	0.07	-	1.0	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.72	-	-	-	-	-	-	-	-
	A-C	7.46	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-AC	2.81	7.06	0.398	-	1.03	0.68	-	10.7	0.24
	C-AB	0.40	7.84	0.051	-	0.07	0.05	-	0.8	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.60	-	-	-	-	-	-	-	-
	A-C	6.25	-	-	-	-	-	-	-	-

Demand Set: 2029 PM with Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-AC	1.14	7.62	0.150	-	0.00	0.17	-	2.5	0.15
	C-AB	0.99	9.05	0.110	-	0.00	0.12	-	1.8	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.41	-	-	-	-	-	-	-	-
	A-C	0.43	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	1.36	7.47	0.183	-	0.17	0.22	-	3.2	0.16
	C-AB	1.18	8.96	0.132	-	0.12	0.16	-	2.3	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.68	-	-	-	-	-	-	-	-
	A-C	0.51	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	1.67	7.26	0.230	-	0.22	0.29	-	4.3	0.18
	C-AB	1.45	8.84	0.164	-	0.16	0.20	-	3.0	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.06	-	-	-	-	-	-	-	-
	A-C	0.62	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	1.67	7.26	0.230	-	0.29	0.30	-	4.4	0.18
	C-AB	1.45	8.84	0.164	-	0.20	0.20	-	3.1	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.06	-	-	-	-	-	-	-	-
	A-C	0.62	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	1.36	7.47	0.183	-	0.30	0.23	-	3.5	0.16
	C-AB	1.18	8.96	0.132	-	0.20	0.16	-	2.4	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.68	-	-	-	-	-	-	-	-
	A-C	0.51	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	1.14	7.62	0.150	-	0.23	0.18	-	2.7	0.15
	C-AB	0.99	9.05	0.110	-	0.16	0.13	-	1.9	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.41	-	-	-	-	-	-	-	-
	A-C	0.43	-	-	-	-	-	-	-	-

Demand Set: 2039 AM with Dev
Modelling Period: 07:45-09:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
07:45-08:00	B-AC	2.86	6.88	0.416	-	0.00	0.69	-	9.6	0.24
	C-AB	0.41	7.67	0.054	-	0.00	0.06	-	0.8	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.61	-	-	-	-	-	-	-	-
	A-C	6.94	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:00-08:15	B-AC	3.42	6.51	0.525	-	0.69	1.06	-	14.9	0.32
	C-AB	0.49	7.32	0.068	-	0.06	0.07	-	1.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.73	-	-	-	-	-	-	-	-
	A-C	8.29	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:15-08:30	B-AC	4.18	5.99	0.699	-	1.06	2.09	-	27.8	0.52
	C-AB	0.61	6.83	0.089	-	0.07	0.10	-	1.4	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.90	-	-	-	-	-	-	-	-
	A-C	10.15	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:30-08:45	B-AC	4.18	5.99	0.699	-	2.09	2.19	-	32.3	0.55
	C-AB	0.61	6.83	0.089	-	0.10	0.10	-	1.5	0.16
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.90	-	-	-	-	-	-	-	-
	A-C	10.15	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
08:45-09:00	B-AC	3.42	6.51	0.525	-	2.19	1.15	-	18.7	0.34
	C-AB	0.49	7.32	0.068	-	0.10	0.07	-	1.1	0.15
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.73	-	-	-	-	-	-	-	-
	A-C	8.29	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
09:00-09:15	B-AC	2.86	6.88	0.416	-	1.15	0.73	-	11.6	0.25
	C-AB	0.41	7.67	0.054	-	0.07	0.06	-	0.9	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	0.61	-	-	-	-	-	-	-	-
	A-C	6.94	-	-	-	-	-	-	-	-

Demand Set: 2039 PM with Dev
Modelling Period: 16:45-18:15

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
16:45-17:00	B-AC	1.19	7.57	0.158	-	0.00	0.18	-	2.7	0.16
	C-AB	1.03	9.02	0.114	-	0.00	0.13	-	1.9	0.12
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.44	-	-	-	-	-	-	-	-
	A-C	0.48	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:00-17:15	B-AC	1.42	7.41	0.192	-	0.18	0.23	-	3.4	0.17
	C-AB	1.23	8.93	0.138	-	0.13	0.16	-	2.5	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.72	-	-	-	-	-	-	-	-
	A-C	0.57	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:15-17:30	B-AC	1.74	7.19	0.243	-	0.23	0.32	-	4.6	0.18
	C-AB	1.50	8.81	0.171	-	0.16	0.21	-	3.2	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.11	-	-	-	-	-	-	-	-
	A-C	0.70	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:30-17:45	B-AC	1.74	7.19	0.243	-	0.32	0.32	-	4.8	0.18
	C-AB	1.50	8.81	0.171	-	0.21	0.22	-	3.3	0.14
	C-A	-	-	-	-	-	-	-	-	-
	A-B	2.11	-	-	-	-	-	-	-	-
	A-C	0.70	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
17:45-18:00	B-AC	1.42	7.41	0.192	-	0.32	0.24	-	3.7	0.17
	C-AB	1.23	8.93	0.138	-	0.22	0.17	-	2.5	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.72	-	-	-	-	-	-	-	-
	A-C	0.57	-	-	-	-	-	-	-	-

Segment	Stream	Demand (veh/min)	Capacity (veh/min)	RFC	Ped. Flow (ped/min)	Start Queue (veh)	End Queue (veh)	Geometric Delay (veh.min/ segment)	Delay (veh.min/ segment)	Mean Arriving Vehicle Delay (min)
18:00-18:15	B-AC	1.19	7.56	0.158	-	0.24	0.19	-	2.9	0.16
	C-AB	1.03	9.02	0.114	-	0.17	0.13	-	2.0	0.13
	C-A	-	-	-	-	-	-	-	-	-
	A-B	1.44	-	-	-	-	-	-	-	-
	A-C	0.48	-	-	-	-	-	-	-	-

Entry capacities marked with an '(X)' are dominated by a pedestrian crossing in that time segment.
In time segments marked with a '(B)', traffic leaving the junction may block back from a crossing so impairing normal operation of the junction.
Delays marked with '##' could not be calculated.

Overall Queues & Delays

Queueing Delay Information Over Whole Period

Demand Set: 2019 AM Survey Year
Modelling Period: 07:45-09:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	39.9	26.6	6.0	0.1	6.0	0.1
C-AB	11.0	7.3	1.4	0.1	1.4	0.1
C-A	-	-	-	-	-	-
A-B	16.5	11.0	-	-	-	-
A-C	579.5	386.3	-	-	-	-
All	**663.4**	**442.3**	**7.4**	**0.0**	**7.4**	**0.0**

Demand Set: 2019 PM Survey Year
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	39.9	26.6	5.3	0.1	5.3	0.1
C-AB	23.4	15.6	2.6	0.1	2.6	0.1
C-A	-	-	-	-	-	-
A-B	33.0	22.0	-	-	-	-
A-C	39.9	26.6	-	-	-	-
All	**290.4**	**193.6**	**7.9**	**0.0**	**7.9**	**0.0**

Demand Set: 2024 AM without Dev
Modelling Period: 07:45-09:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	42.7	28.4	6.6	0.2	6.6	0.2
C-AB	12.4	8.3	1.6	0.1	1.6	0.1
C-A	-	-	-	-	-	-
A-B	17.9	11.9	-	-	-	-
A-C	630.4	420.3	-	-	-	-
All	**721.2**	**480.8**	**8.2**	**0.0**	**8.2**	**0.0**

Demand Set: 2024 PM without Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	44.0	29.4	5.9	0.1	5.9	0.1
C-AB	24.8	16.5	2.8	0.1	2.8	0.1
C-A	-	-	-	-	-	-
A-B	35.8	23.9	-	-	-	-
A-C	42.7	28.4	-	-	-	-
All	**313.8**	**209.2**	**8.7**	**0.0**	**8.7**	**0.0**

Demand Set: 2029 AM without Dev
Modelling Period: 07:45-09:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	46.8	31.2	7.5	0.2	7.5	0.2
C-AB	12.4	8.3	1.7	0.1	1.7	0.1
C-A	-	-	-	-	-	-
A-B	19.3	12.8	-	-	-	-
A-C	685.5	457.0	-	-	-	-
All	**784.6**	**523.0**	**9.1**	**0.0**	**9.1**	**0.0**

Demand Set: 2029 PM without Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	46.8	31.2	6.4	0.1	6.4	0.1
C-AB	27.5	18.4	3.1	0.1	3.1	0.1
C-A	-	-	-	-	-	-
A-B	38.5	25.7	-	-	-	-
A-C	46.8	31.2	-	-	-	-
All	**341.4**	**227.6**	**9.5**	**0.0**	**9.5**	**0.0**

Demand Set: 2039 AM without Dev
Modelling Period: 07:45-09:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	52.3	34.9	8.7	0.2	8.7	0.2
C-AB	13.8	9.2	1.9	0.1	1.9	0.1
C-A	-	-	-	-	-	-
A-B	22.0	14.7	-	-	-	-
A-C	761.2	507.4	-	-	-	-
All	**872.7**	**581.8**	**10.7**	**0.0**	**10.7**	**0.0**

Demand Set: 2039 PM without Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	52.3	34.9	7.2	0.1	7.2	0.1
C-AB	30.3	20.2	3.4	0.1	3.4	0.1
C-A	-	-	-	-	-	-
A-B	42.7	28.4	-	-	-	-
A-C	52.3	34.9	-	-	-	-
All	**379.9**	**253.3**	**10.7**	**0.0**	**10.7**	**0.0**

Demand Set: 2024 AM with Dev
Modelling Period: 07:45-09:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	304.2	202.8	92.8	0.3	92.8	0.3
C-AB	42.7	28.4	6.0	0.1	6.0	0.1
C-A	-	-	-	-	-	-
A-B	64.7	43.1	-	-	-	-
A-C	630.4	420.3	-	-	-	-
All	**1059.8**	**706.6**	**98.8**	**0.1**	**98.8**	**0.1**

Demand Set: 2024 PM with Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	121.1	80.8	19.7	0.2	19.7	0.2
C-AB	107.4	71.6	14.3	0.1	14.3	0.1
C-A	-	-	-	-	-	-
A-B	151.4	100.9	-	-	-	-
A-C	42.7	28.4	-	-	-	-
All	**589.1**	**392.7**	**34.0**	**0.1**	**34.0**	**0.1**

Demand Set: 2029 AM with Dev
Modelling Period: 07:45-09:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	308.3	205.5	101.3	0.3	101.3	0.3
C-AB	44.0	29.4	6.4	0.1	6.4	0.1
C-A	-	-	-	-	-	-
A-B	66.1	44.0	-	-	-	-
A-C	685.5	457.0	-	-	-	-
All	**1124.5**	**749.7**	**107.7**	**0.1**	**107.7**	**0.1**

Demand Set: 2029 PM with Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	125.3	83.5	20.7	0.2	20.7	0.2
C-AB	108.7	72.5	14.6	0.1	14.6	0.1
C-A	-	-	-	-	-	-
A-B	154.2	102.8	-	-	-	-
A-C	46.8	31.2	-	-	-	-
All	**616.6**	**411.1**	**35.2**	**0.1**	**35.2**	**0.1**

Demand Set: 2039 AM with Dev
Modelling Period: 07:45-09:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	313.8	209.2	115.0	0.4	115.1	0.4
C-AB	45.4	30.3	6.8	0.1	6.8	0.1
C-A	-	-	-	-	-	-
A-B	67.4	45.0	-	-	-	-
A-C	761.2	507.4	-	-	-	-
All	**1211.3**	**807.5**	**121.8**	**0.1**	**121.9**	**0.1**

Demand Set: 2039 PM with Dev
Modelling Period: 16:45-18:15

Stream	Total Demand (veh)	Total Demand (veh/h)	Queueing Delay (min)	Queueing Delay (min/veh)	Inclusive Delay (min)	Inclusive Delay (min/veh)
B-AC	130.8	87.2	22.1	0.2	22.1	0.2
C-AB	112.9	75.2	15.3	0.1	15.3	0.1
C-A	-	-	-	-	-	-
A-B	158.3	105.5	-	-	-	-
A-C	52.3	34.9	-	-	-	-
All	**656.6**	**437.7**	**37.4**	**0.1**	**37.4**	**0.1**

Delay is that occurring only within the time period.
Inclusive delay includes delay suffered by vehicles which are still queuing after the end of the time period.
These will only be significantly different if there is a large queue remaining at the end of the time period.

PICADY 5 Run Successful