May 2025

Environmental Impact Assessment Report - Volume 3 - Appendices

Application for Continuation of the Murrens Quarry

JJ Flood & Sons Manufacturing Limited

Murrens Quarry Oldcastle, Co. Meath

MALONE O'REGAN

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QUALITY
ISO 9001:2015
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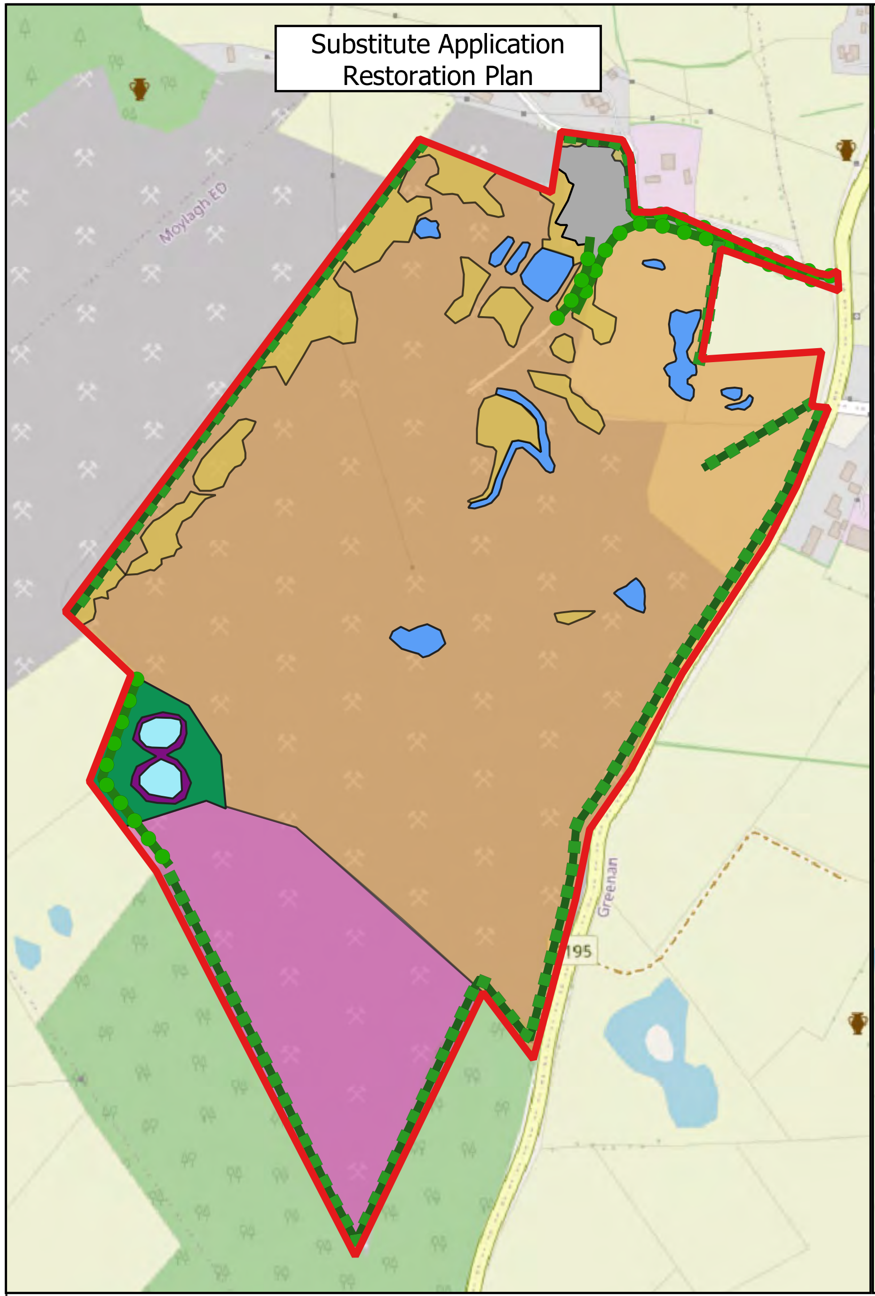
APPENDICES

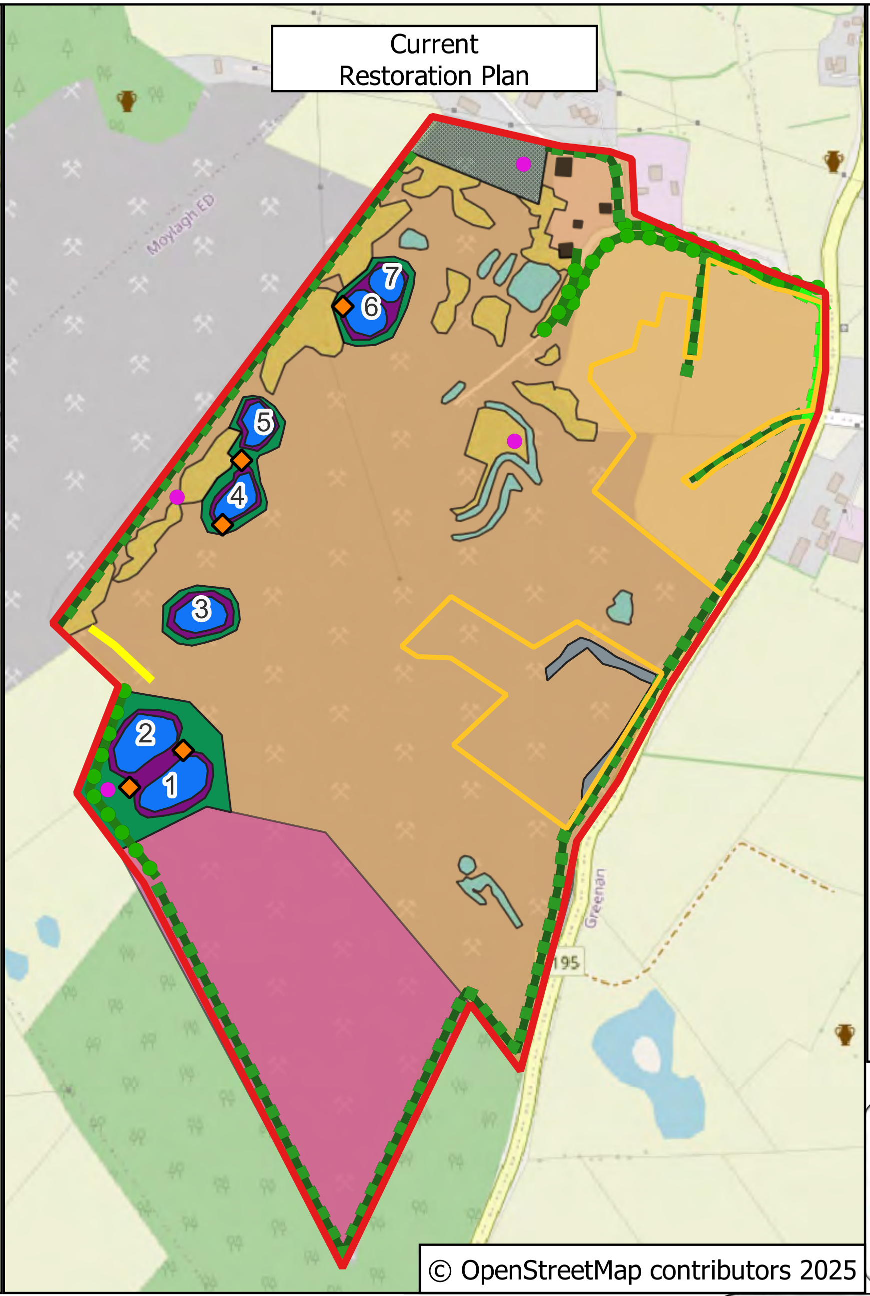
Appendix 3

APPENDIX 3-1

Substitute Application
Restoration Plan



Current
Restoration Plan



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Legend

- 🟥 Site Boundary
- 🟨 Proposed Extraction Areas
- ● Habitat Piles
- ◆ Hibernacula
- WL1 / WL2 - Retained Hedgerow / Treeline
- WL1 - Retained Hedgerow
- WL1 / WL2 - Proposed Hedgerow Treeline
- Proposed Regrade Slopes
- ▨ Retained Buildings and Artificial Surfaces
- 🟩 Proposed Wet Grassland
- 🟨 WS1 - Retained Scrub
- 🟪 Proposed Woodland Planting
- 🟧 Proposed Low Nutrient Landscape
- 🟦 Retained Ponds
- 🟪 Proposed Aquatic and Marginal Planting
- 🟦 Proposed Ponds
- ▨ WD1 - Retained (Mixed) Broadleaved Woodland
- 🟦 FL8 - Retained Other Artificial Lakes and Ponds
- ⬛ BL3 - Retained Buildings
- ▨ Retained Steep Sided Slopes
- 🟦 Proposed Ponds

N

0 200 400 600 m

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Client				Job No.
JJ Flood & Sons Manufacturing				E2343
Drawing				
RESTORATION PLAN				
Drawing No.	Status	Sheet Size & Scale	Date	Drawn
01	A4	1:7,000	09/05/2025	Pamela Alves de Nadai

APPENDIX 3-2

Notes

Elevations in metres to Ordnance Datum Malin
Irish Grid
2 metre contour interval

Site Boundary - 40.41 Hectares	🟦
Application Area - 40.12 Hectares	🟥
Extraction Area A 23,892 m3	▬
Extraction Area B 39,639 m3	🟧
Total Extraction Volume	461,500m3
Cross Sections	▬
Road Edge	🟨
Verge	🟩
Fence / Wall	🟫
Vegetation	🟩
Water Features	🟦
Powerlines	▬
Site Buildings	🟪
Visibility Splays	▬

No.	Revision	Drg by	Chk by

Drg by TD | Chk by LW | App by LW

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Murrens Quarry
Oldcastle, Co Meath

Proposed Site Layout

SixWest

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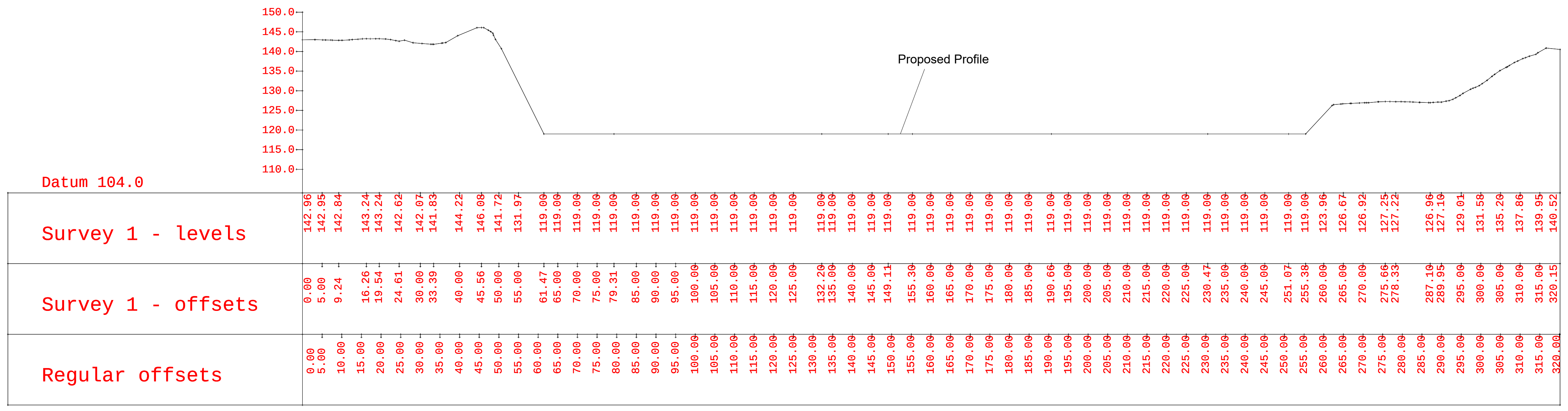
Scale 1:1000 (A0)
Date April 28th, 2025

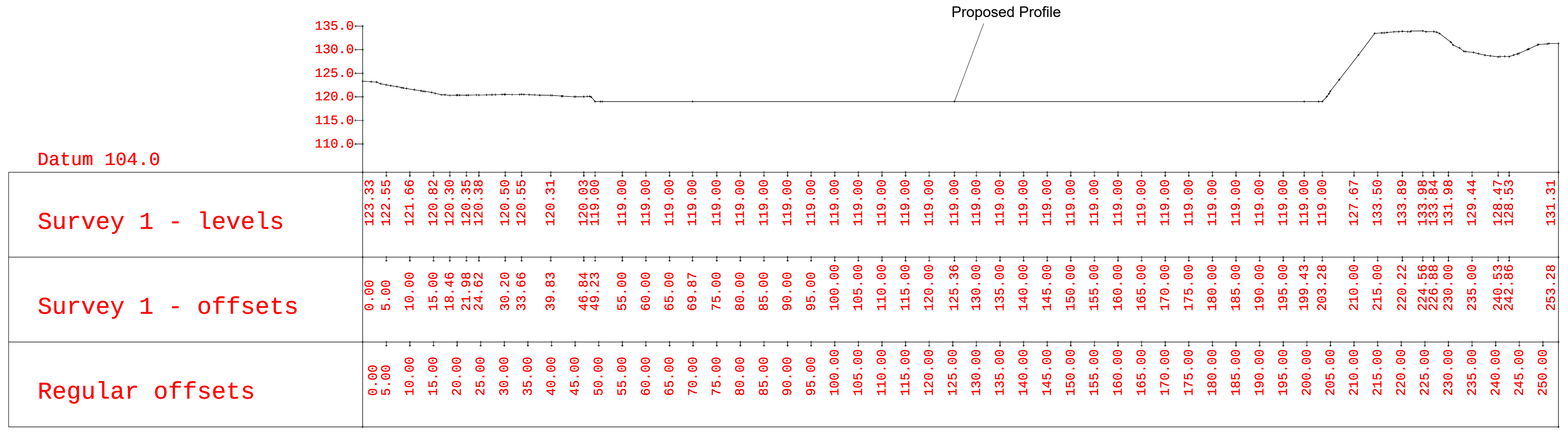
Drawing No. MM250507-12

Revision

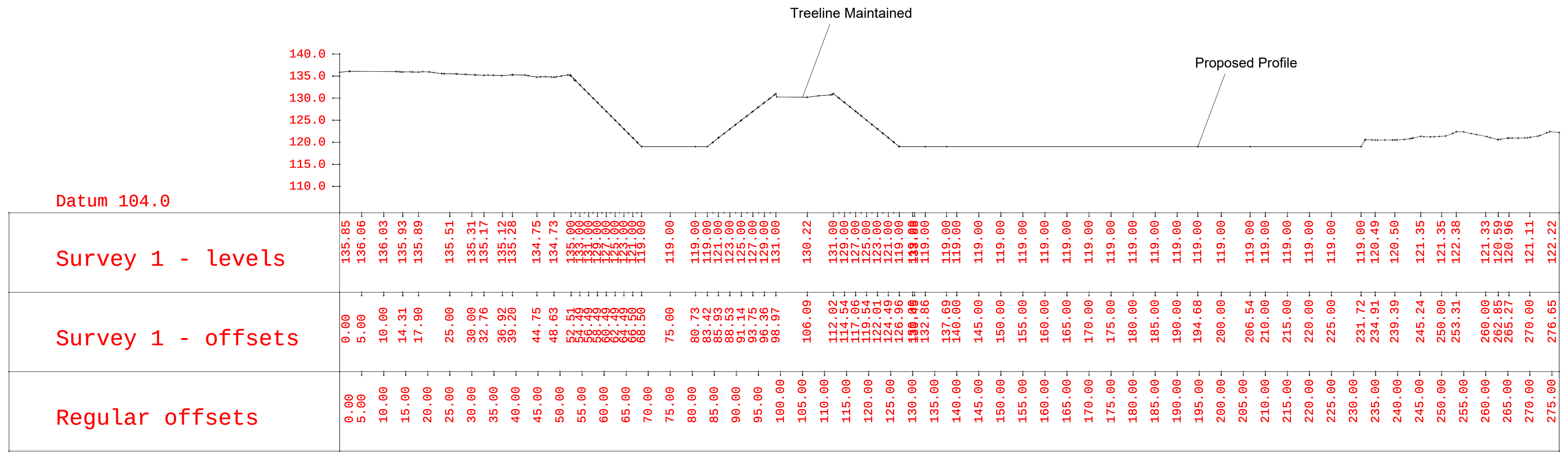
Notes



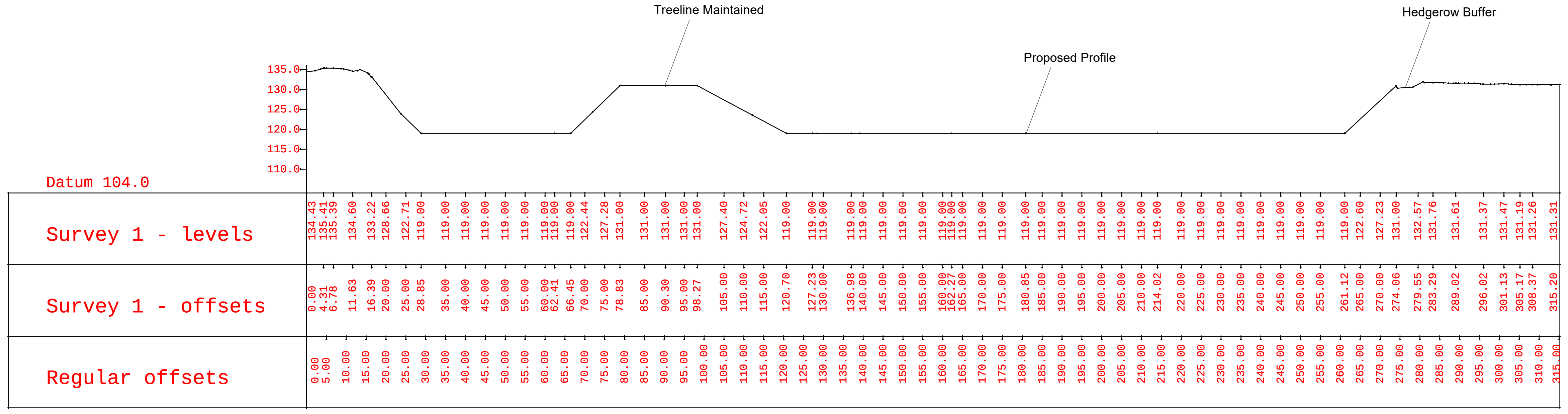
Section A



Section B



Section C



Section D

No.	Revision	Drg by	Chk by

Drg by TD
Chk by LW
App by LW

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Murrens Quarry
Oldcastle, Co Meath

Cross Sections - Proposed

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Scale 1:750 (A0)
Date April 28th, 2025

Drawing No. MM250507-15

Revision

APPENDIX 6

Appendix 6-1

May 2025

Amphibian Survey Report

Application for Continuation of the Murrens Quarry

JJ Flood & Sons Manufacturing Limited

Murrens Quarry, Oldcastle

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Form ES - 04

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Title: Amphibian Survey Report, Application for Continuation of the Murrens Quarry, JJ Flood & Sons Manufacturing Limited, Murrens Quarry, Oldcastle

Job Number: E2343

Prepared By: Emma Dolan **Signed:** Emma Dh

Checked By: Dyfrig Hubble **Signed:**

Approved By: Dyfrig Hubble **Signed:**

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	02/05/25	Report	Final	ED	DH	DH

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Amphibian Survey Report
Application for Continuation of the Murrens Quarry
JJ Flood & Sons Manufacturing Limited
Murrens Quarry, Oldcastle

Contents

FIGURES

TABLES

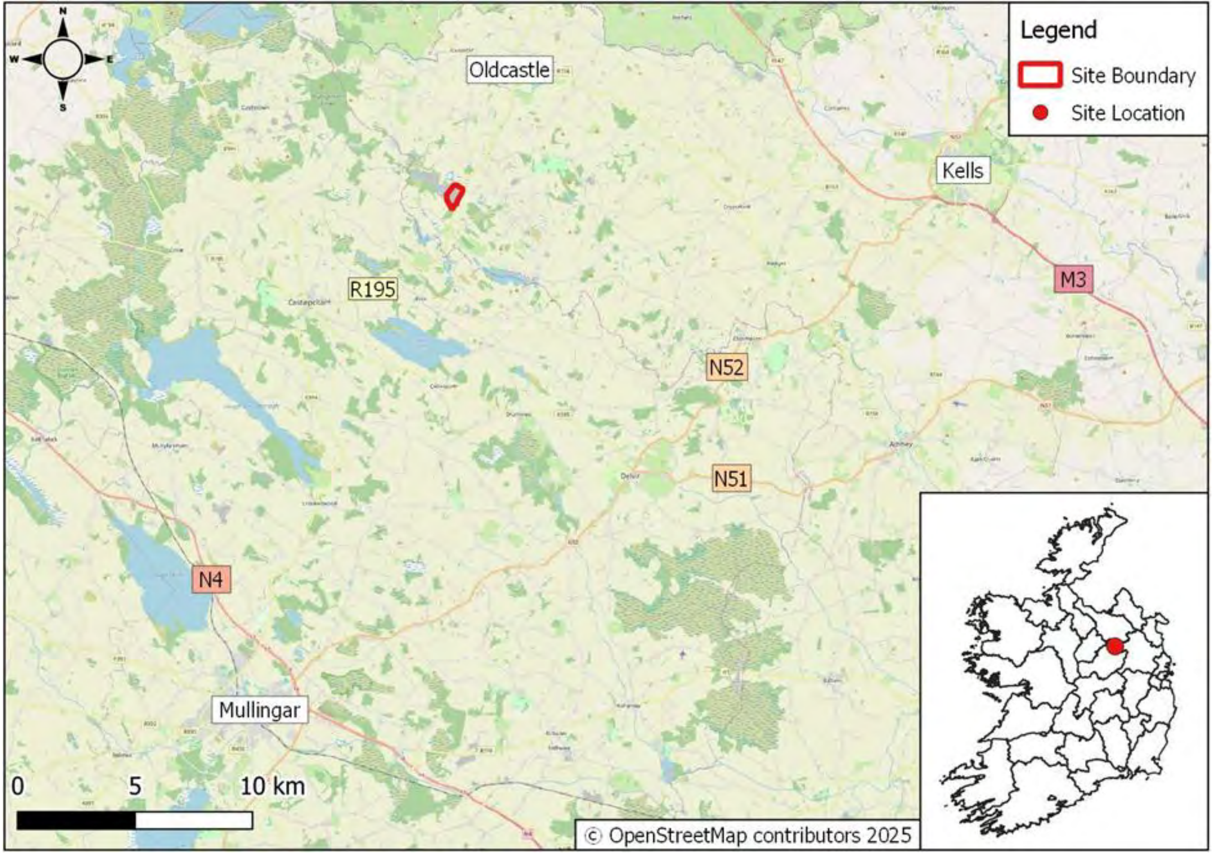
1 INTRODUCTION

This report has been prepared by Malone O'Regan Environmental Services ('MOR Environmental') on behalf of our client JJ Flood & Sons Manufacturing Ltd ('the Applicant'), to detail the findings of an amphibian survey for smooth newt (*Lissotriton vulgaris*) and common frog (*Rana temporaria*), undertaken at the Murrens Quarry, Oldcastle, Co. Meath ('the Site').

The Site lies in the townland of Murrens, Oldcastle, Co Meath (ITM 649474 818324), covering an area of circa ('ca.') 40.12 hectares ('ha'). This assessment relates to the land used for excavations and processing of aggregate, along with adjoining lands integral to the operations within the Site.

The location of the Site is shown in Figure 1-1.

Figure 1-1: Site Location



1.1 Background

The Applicant operates a gravel pit and soft rock quarry, known as Murrens Quarry, south of Oldcastle in County Meath. The quarry is recognised as having pre-1963 origins.

Substitute Consent is being sought under Section 177E of the Planning and Development Act, 2000, as amended, to regularise a ca. 39ha area of land within the Applicant's landholding which has been subjected to gravel and soft rock extraction and processing. The application for Substitute Consent was submitted to An Bord Pleanála ('ABP') on the 31st March 2025, case number ABP-322189-25.

Following on from the submission of the Substitute Consent application, this application has been prepared in support of a planning application for future development and restoration of the same quarry.

1.2 Statement of Authority

This report was reviewed and approved by Mr. Dyfrig Hubble, Associate Director - Ecologist. Dyfrig is a full member of the Chartered Institute of Ecology and Environmental Management (‘CIEEM’). Dyfrig has over 18 years’ experience working in the ecological consultancy sector, including habitat surveys and appraisals and specialist protected species surveys, including extensive experience in undertaking surveys for herpetological fauna in support of Ecological Impact Assessments.

1.3 Project Objective

The objective of this assessment was to identify the presence / absence of amphibians on the Site and the potential impacts, if any, of the development and associated works on amphibians.

1.4 Site Context and Description

The Site lies in the townland of Murrens, Oldcastle, Co Meath (ITM 652523 774771) and covers an area of ca. 40.12ha. The Site is bounded to the west by a quarry operated by BD Flood Ltd. and to the east by the R195 road. The Site is bounded to the north and south by agricultural and forested land.

The Site is situated ca. 5.5km south of the town centre of Oldcastle and ca. 7.3km northeast of the town centre of Castlepollard, which are connected by the regional road R195, which passes along the eastern boundary of the Site.

The R195 runs in a north-to-south direction and connects to the R194 west of Virginia town, ca. 14.5km to the north of the Site. The R195 immediately to the east of the Site provides the primary transport route for Heavy Goods Vehicles (‘HGVs’) accessing and egressing the Site.

The lands around the Site are primarily agricultural with scattered single-dwelling developments along the regional road and the access road into the Site. The western boundary of the Site is shared with an adjoining quarry development, with an embankment of untouched ground separating the two developments. To the south is a forested area.

The Site covers the majority of the land holding. The Site is primarily comprised of exposed gravel deposits and exposed bedrock, with the main processing area located centrally. The water usage within the Site consists of a series of settlement ponds located in the north of the Site and a settlement canal located adjacent to the main processing area. No water is discharged off site. Refer to Figure 1-2.

Figure 1-2: Site Boundary

1.5 Legislation Relevant to Amphibians

There are three native amphibians in Ireland: the Common Frog, the Natterjack Toad and the Smooth Newt. The smooth newt is the sole native newt species found in Ireland.

All three of these native amphibians are European protected species and are subject to a regime of strict legal protection in Ireland. These amphibians are protected under the Annex V and Annex IV of the EC Habitats Directive (European Council 1992).

Furthermore, these amphibians, are protected under national legislation, Wildlife Act 1976 and Wildlife (Amendment Act, 2000).

Under this legislation, it is an offence to:

a) Intentionally kill, injure or take (handle) any protected wild animal;

b) Intentionally interfere with or destroy the breeding place or resting place of any protected wild animal;

c) Intentionally or recklessly damage, destroy or obstruct access to any structure or place used for shelter or protection by any protected wild animal; and,

d) Possess or control any live or dead specimen or anything derived from a protected species.

The legislation applies to all life stages of amphibians. The Natural Parks and Wildlife Service can issue licences for amphibians 'in respect of development' to permit otherwise unlawful activities (identified above) to take place.

1.4 Purpose of Survey Work

The implication of this legislation is that developments and projects need to take account of potential effects on amphibians. In areas where suitable habitat exists, and in the absence of contemporary baseline data existing for the species, survey work is necessary to establish whether amphibians are likely to be present and to estimate the size of the local population.

This enables mitigation, relocation, habitat enhancement and creation of initiatives to be planned and incorporated into the design of the project concerned. It also ensures that there is no adverse effect on the conservation status of the species at a local level. Given the presence of suitable water bodies at the Site, records of amphibians within the Site and the lack of contemporary baseline survey data, survey work was undertaken.

2 METHODOLOGY

The methodologies used to establish the presence of amphibians on the Site are summarised below.

2.1 Desk-Based Studies

A desk-based review of information sources was completed, which included the following:

- The National Biodiversity Data Centre ('NBDC') website was consulted with regard to species distributions [2];
- The Environmental Protection Agency ('EPA') Catchments website was also consulted to obtain details about watercourses in the vicinity of the Site [3]; and,
- MOR (2025) Environmental Impact Assessment Report – Volume 2, Application for Continuation of the Murrens Quarry, Co. Meath [4].

2.2 Field Surveys

The initial field survey on 16th January identified the presence of 14 suitable waterbodies for amphibians along with suitable terrestrial habitat.

Amphibian surveys were undertaken on the 20th March, 31st March, 7th April and 24th April 2025. The surveys aimed to confirm the presence / absence of amphibians within the waterbodies on the Site.

2.2.1 Survey Constraints

Pond 9 was inaccessible during the survey on 20th March 2025 due to access restrictions. Similarly, Pond 3 was not accessible on 31st March 2025. However, both ponds were surveyed on the other three dates. In addition, poor visibility was noted at Ponds 3, 4, 10, and 11 during the first visit on 20th March 2025.

2.2.2 Habitat Suitability Index

A visit to the Site waterbody in daylight on 20th March 2025 allowed the calculation of a Habitat Suitability Index ('HSI').

The HSI establishes the suitability of a waterbody to support the great crested newt and was developed [5]. The HSI incorporates ten suitability indices, all of which are factors known to affect this species, such as pond location, size of pond, years when pond dries out, water quality, suitability of terrestrial habitat, connectivity to other ponds and presence of water fowl and fish [6].

The great crested newt HSI was used in this report, as no equivalent index currently exists for the smooth newt. However, both species have the same habitat requirements.

The HSI is a numerical index between 0 and 1. Values close to 0 indicate unsuitable habitat, and 1 represents optimal habitat. Refer to Table 2-1, Categorisation of HSI Score.

Table 2-1: Categorisation of HSI Score

HSI Score	**Pond Suitability**
< 0.50	Poor
0.50 - 0.59	Below average
0.60 - 0.69	Average
0.70 - 0.79	Good
> 0.80	Excellent

2.2.3 Presence / Absence Survey

Presence / absence surveys were undertaken at the 14 identified ponds, which were considered suitable for amphibians.

The following survey methodologies were utilised:

- Refugia Search:

A refugia search was carried out on the terrestrial area near the ponds being surveyed. This included searching amongst old debris, logs, under rocks and through vegetated areas.

- Egg Search:

A systematic search through submerged vegetation for egg wraps was undertaken. The inspection took place in daylight hours. If smooth newt egg wraps were found, the search was ended to avoid further disturbance.

- Netting:

The Surveyors, using a long-handled dip net, walked the perimeter of the waterbody (where accessible) and swept the margins for newts. If a newt was caught, netting was ceased immediately due to the disruptive nature of this activity.

- Torching:

Torching was used to determine the presence or absence of newts and to estimate the population. A high-powered torch (1 million candle power) was used around the margins of the waterbody to detect newt activity after dusk.

These methodologies are in line with the following guidance:

- National Road Authority (‘NRA’), now Transport Infrastructure Ireland (‘TII’), ‘*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*,’ [7];
- Joint Nature Conservation Committee (‘JNCC’), ‘*Common Standards Monitoring Guidance*,’ [8];
- JNCC ‘*Herpetofauna Worker’s Manual’* [9]; and,
- Froglife, ‘*Surveying for Amphibians*’ [10].

The location of the surveyed ponds is shown in Figure 2-1.

Figure 2-1: Pond Locations

3 RECEVING ENVIRONMENT

3.1 Desk Study Results

Table 3-1 provides a summary of amphibians recorded within 2km of the Site within the last 10 years [11]. The 'NBDC' records were checked on 20th January 2025. The following 'NBDC' 2km grids have been checked: N57B, N57C, N57D, N57G, N57H, N57I, N57L, N57M, N57N [11].

Only records within the past 10 years were included in Table 3-1. The parameter of 10 years was chosen on the basis of habitat and modification. It is considered that any records over 10 years old are not representative of the current distribution of amphibian species populations.

Table 3-1: NBDC Records of Amphibians within 2km of the Site (Grid Codes: N57B, N57C, N57D, N57G, N57H, N57I, N57L, N57M, N57N).

Common Name	***Scientific Name***	**Date of last record**	**Designation**
Amphibians			
Common frog	*Rana temporaria*	08/07/2019	Wildlife Acts 1976 / 2000 Habitats Directive Annex V
Smooth Newt	*Lissotriton vulgaris*	29/11/2018	Wildlife Acts 1976 / 2000

3.2 Field Survey Results

3.2.1 HSI Results

HSI establishes the suitability of a waterbody to support smooth newt, based on a set of criteria as detailed in Section 2.2.2. Table 3-2 below presents the results of the HSI of 14 ponds surveyed.

Table 3-2: Habitat Suitability Index

Pond Name		**P1**	**P2**	**P3**	**P4**	**P5**	**P6**	**P7**	**P8**	**P9**	**P10**	**P11**	**P12**	**P13**	**P14**
SI No	SI Description	SI Value	SI Value	SI Value	SI Value	SI Value	SI Value	SI Value	SI Value	SI Value	SI Value	SI Value	SI Value	SI Value	SI Value
1	Geographic location	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
2	Pond area	0.85	0.5	1.0	0.88	1.0	0.955	0.955	0.3	0.955	0.55	0.55	0.895	0.75	0.5
3	Pond permanence	0.5	0.5	0.5	0.9	0.5	0.5	1.0	0.5	0.5	0.9	0.9	0.9	0.5	0.5
4	Water quality	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33	0.33
5	Shade	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
6	Waterfowl effect	1.0	1.0	1.0	0.67	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
7	Fish presence	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
8	Pond Count	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
9	Terrestrial habitat	0.33	0.33	0.33	0.33	0.33	0.67	0.33	0.67	0.67	0.33	0.33	0.67	0.67	0.33
10	Macrophyte cover	0.4	0.4	0.4	0.4	0.4	0.6	0.4	0.75	0.65	0.4	0.4	0.4	0.75	0.4
Pond suitability		**0.671**	**0.636**	**0.682**	**0.686**	**0.682**	**0.758**	**0.727**	**0.691**	**0.764**	**0.681**	**0.681**	**0.767**	**0.757**	**0.636**
		Average	**Average**	**Average**	**Average**	**Average**	**Good**	**Good**	**Average**	**Good**	**Average**	**Average**	**Good**	**Good**	**Average**

3.2.2 Amphibian Survey Results

There are 14 waterbodies located on the Site. Refer to Table 3-3 for descriptions of the ponds onsite and Figure 3-1 for the locations of the recorded amphibians.

Table 3-3: Ponds Descriptions

Ponds No.	Description
1	Pond 1 is a temporary surface water feature situated in the northeast corner of the site. It is relatively shallow, with a sloped eastern bank lined with large rocks. The pond is bordered by undisturbed stockpiles. The vegetation around the pond was sparse, with some areas devoid of vegetation.
2	Pond 2 is a temporary surface water feature is located east of Pond 1. It is relatively shallow and clear, with a silty and sandy base. Large rocks border the pond, and the vegetation was sparse, with some areas devoid of vegetation.
3	Pond 3 is a settlement canal located within the north-central portion of the Site. The pond is bordered by undisturbed stockpiles to the east, and Pond 4 borders the pond to the west. The vegetation around the pond was sparse, with some areas being devoid of vegetation.
4	Pond 4 is a settlement canal located in the north-central portion of the Site. It is bordered by scrub to the west and Pond 3 to the east. The western banks of the pond are densely vegetated, while an access track on the eastern bank, which separates this pond from Pond 3, is devoid of vegetation.
5	Pond 5 is a temporary surface water feature located in the east-central portion of the Site. It is relatively shallow and clear, with a silty and sandy base. Large rocks border the pond, and the vegetation was sparse, with some areas devoid of vegetation.
6	Pond 6 is a temporary surface water feature located in the east-central part of the Site. It is shallow and clear, with a silt and clay bedrock base. Large rocks border the pond, and the vegetation was sparse, with some areas devoid of vegetation.
7	Pond 7 is a temporary surface water feature located in the southeast section of the Site. The pond is deep and clear, with a gravel island in the middle and a gravel and cobble base. It is bordered to the south by quarry ledges. The vegetation around the pond was sparse, with some areas being devoid of vegetation.
8	Pond 8 is a temporary surface water feature located southeast of the Site. It is shallow and clear and has a sand and gravel base. Large rocks border the pond, and the vegetation was sparse, with some areas devoid of vegetation.
9	Pond 9 is a temporary surface water feature located in the southern corner of the Site. Large rocks border the pond, and the vegetation was sparse, with some areas devoid of vegetation.
10	Pond 10 is one of the settlement ponds located in the north-central area of the Site. This pond is deep and turbid, with moderate vegetation cover.
11	Pond 11 is a settlement pond similar to Pond 10 described above. The pond is deep and turbid and has moderate vegetation cover.
12	Pond 12 is a settlement pond similar to Pond 10 described above. It is deep and turbid, with moderate vegetation cover.
13	Pond 13 is a temporary surface water feature located in the northwest corner of the Site. It is shallow and clear and has a sand and gravel base. The pond is located west of the settlement ponds and has moderate vegetation cover.
14	Pond 14 is a temporary surface water feature located west of the access track from the settlement streams. It is relatively shallow and clear, with a silty and sandy base. Large rocks border the pond, and the vegetation was sparse, with some areas devoid of vegetation

Figure 3-1: Results of Amphibians Presence within the Ponds

Please see Section 3.3 below for further details on survey results.

3.3 Presence / Absence Survey Results

Table 3-4 below outlines the results of amphibian surveys undertaken at 14 ponds between March and April 2025, recording the presence or absence of common frogs and smooth newts using a combination of egg searches, torching, netting, and visual observation.

Table 3-4: The Egg Search, Torch Lighting and Netting Results

Pond No.	Date	Air Temp (°C)	Common Frog		Smooth Newt	
			Egg Search	Torching and Netting	Egg Search	Visual, Torching and Netting
1	20/03/2025	11°C	None	None	None	8
	31/03/2025	8°C	None	None	None	3
	07/04/2025	11°C	None	None	None	9
	24/04/2025	12°C	None	None	None	6
2	20/03/2025	11°C	None	None	None	3

Pond No.	Date	Air Temp (°C)	Common Frog		Smooth Newt	
			Egg Search	Torching and Netting	Egg Search	Visual, Torching and Netting
	31/03/2025	8°C	None	None	None	None
	07/04/2025	11°C	None	None	None	None
	24/04/2025	12°C	None	None	None	None
3	20/03/2025	11°C	None	None	None	Poor Visibility
	31/03/2025	8°C	Not Accessible			
	07/04/2025	11°C	None	None	None	Pond has reduced by 40%
	24/04/2025	12°C	None	None	None	None
4	20/03/2025	11°C	None	None	None	Poor Visibility
	31/03/2025	8°C	None	None	None	1
	07/04/2025	11°C	None	None	None	None
	24/04/2025	12°C	None	None	None	3
5	20/03/2025	11°C	None	None	None	2
	31/03/2025	8°C	None	None	None	None
	07/04/2025	11°C	None	None	None	2
	24/04/2025	12°C	None	None	None	7
6	20/03/2025	11°C	None	None	None	9
	31/03/2025	8°C	None	Tadpoles	None	15
	07/04/2025	11°C	None	None	None	5
	24/04/2025	12°C	None	None	None	15
7	20/03/2025	11°C	None	None	None	25+
	31/03/2025	8°C	None	None	None	55
	07/04/2025	11°C	None	None	None	47
	24/04/2025	12°C	None	None	None	68
8	20/03/2025	11°C	None	None	None	2
	31/03/2025	8°C	None	Tadpoles	None	1
	07/04/2025	11°C	None	None	None	None

Pond No.	Date	Air Temp (°C)	Common Frog		Smooth Newt	
			Egg Search	Torching and Netting	Egg Search	Visual, Torching and Netting
	24/04/2025	12°C	None	Tadpoles	None	6
9	20/03/2025	11°C	Not Accessible			
	31/03/2025	8°C	None	None	None	159
	07/04/2025	11°C	None	5 1 Female 1 Juvenile	None	77
	24/04/2025	12°C	None	None	None	56
10	20/03/2025	11°C	None	None	None	Poor Visibility
	31/03/2025	8°C	None	None	None	5
	07/04/2025	11°C	None	None	None	4
	24/04/2025	12°C	None	None	None	13
11	20/03/2025	11°C	None	None	None	Poor Visibility
	31/03/2025	8°C	None	None	None	1
	07/04/2025	11°C	None	None	None	None
	24/04/2025	12°C	None	None	None	2
12	20/03/2025	11°C	None	None	None	None
	31/03/2025	8°C	None	None	None	1
	07/04/2025	11°C	None	None	None	None
	24/04/2025	12°C	None	None	None	1
13	20/03/2025	11°C	None	None	None	None
	31/03/2025	8°C	None	None	None	7
	07/04/2025	11°C	None	None	None	None
	24/04/2025	12°C	None	1 Dead Frog	None	15
14	20/03/2025	11°C	None	None	None	None
	31/03/2025	8°C	None	None	None	None
	07/04/2025	11°C	None	None	None	None
	24/04/2025	12°C	None	None	None	None

3.4 Summary of Results

No frog spawn was recorded during any of the surveys; however, tadpoles were observed in Ponds 6 and 8, and one dead frog was noted in Pond 13. Smooth newts were recorded in 12 of the 14 ponds, with the highest numbers observed in Ponds 7 and 9, where adults and juveniles were present.

Smooth newts were recorded in Ponds 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12 and 13. No newts were recorded in Ponds 3 and 14. The common frog and tadpoles were recorded within Ponds 6, 8, 9 and 13.

Ponds 3, 4, 10, and 11 were limited by poor visibility or access constraints, and Pond 3 was recorded as having a 40% reduction in water level during the 7th April visit.

Table 3-5 presents a summary of the results and a population size class distribution estimate for smooth newts. The population size class is defined as follows:

- Small population: 1-10 individuals;
- Medium population: 11-100 individuals; and,
- High population: 100+ individuals.

The size class is based on the highest survey count over the survey period.

Table 3-5: Summary of Survey Results and Population Estimation.

Pond No.	Common Frog	Smooth Newt population estimation.
1	0	Small
2	0	Small
3	0	0
4	0	Small
5	0	Medium
6	Present	Medium
7	0	High
8	Present	Small
9	0	High
10	0	Medium
11	0	Small
12	0	Small
13	0	Medium
14	0	0

Given the presence and distribution of amphibians across the Site, it is considered that the site is of high local value for amphibians.

4 AMPHIBIAN MANAGEMENT PLAN

Given the confirmed presence of smooth newts and common frogs and the presence of suitable breeding, foraging and sheltering habitats for amphibians, the following remediation/mitigation measures will be implemented to ensure the phased works do not adversely affect amphibians.

The NPWS will be consulted with regard to the proposed plan, and confirmation will be sought with regard to the requirement for a derogation licence.

4.1 Mitigation and Recommendations

- The Ecological Clerk of Works ('ECoW') will supervise the construction and planting of the new ponds to ensure that they are constructed in line with the recommendations below;
- The infilling of the ponds will be scheduled to take place outside of the amphibian breeding season (February - August). The ECoW will inspect and net the ponds prior to infilling and supervise the works to ensure that no amphibians are present;
- The ponds will be constructed at the initial stage of the project and in advance of any known breeding ponds being disturbed / removed;
- Any amphibians that are found during the removal of the five ponds will be relocated to the newly created pond in the western part of the Site; and,
- Should amphibians be encountered during any other activities associated with the Proposed Development, the ECoW will be consulted for advice.

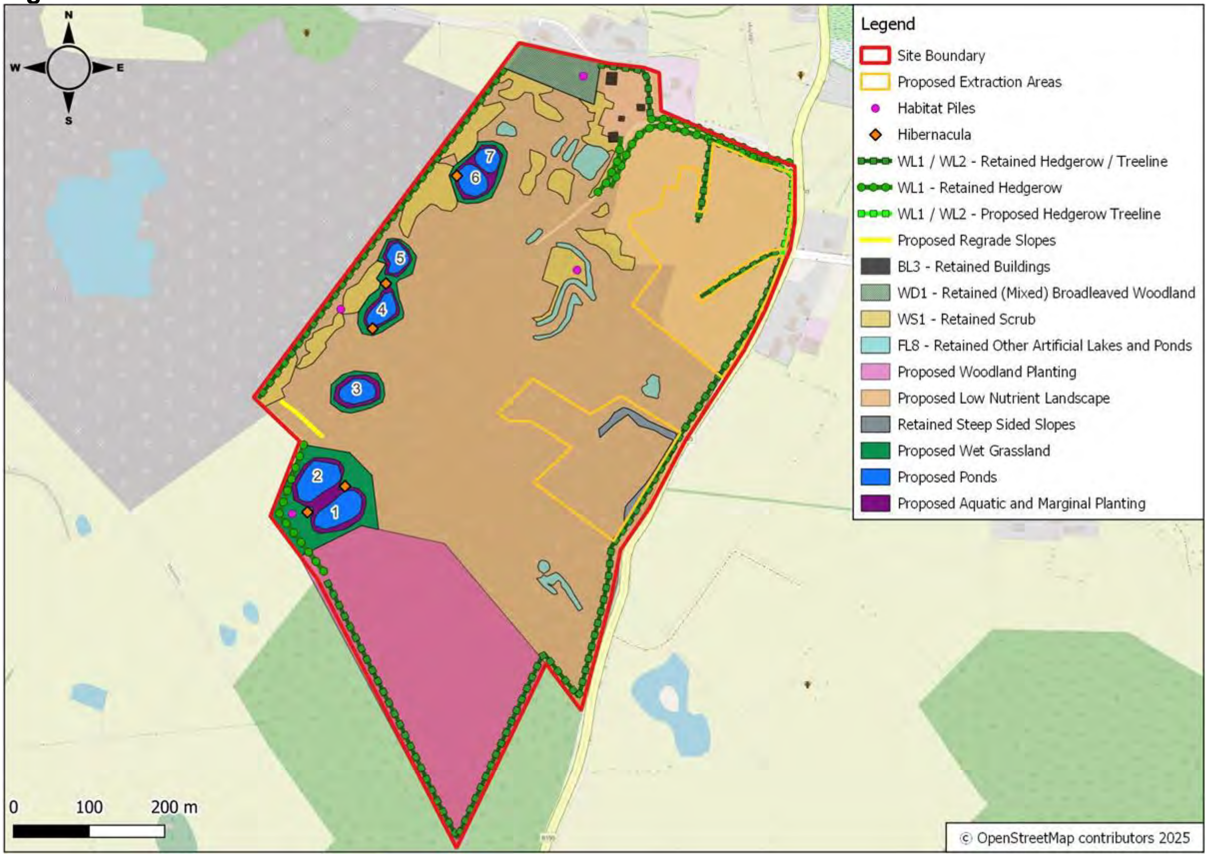
4.2 Habitat Creation

4.2.1 Proposed Ponds / Wetland

As part of the Restoration Plan, it is proposed to construct seven purpose-built ponds to enhance the availability of suitable breeding and foraging habitats for native amphibian species, particularly the common frog and smooth newt. These new ponds will also remediate the five ponds that will be lost as part of the Proposed Development.

Each pond has been specifically designed to support amphibian. This includes a combination of deeper open water zones and gradual sloping margins, which will facilitate safe access for amphibians and support a mosaic of aquatic microhabitats. Refer to Figure 4-1 below for the restoration plan.

Figure 4-1: Restoration Plan



The measurements of the seven ponds will be as follows:

1. Pond 1: 72m L x 30m W;
2. Pond 2: 68m L x 37m W;
3. Pond 3: 50m L x 33m W;
4. Pond 4: 53m L x 26m W;
5. Pond 5: 42m L x 31m W;
6. Pond 6: 44m L x 36m W; and,
7. Pond 7: 32m L x 31m W.

Pond depths will range from approximately 1 to 2 metres to promote variation in temperature and oxygen levels, providing suitable conditions for both egg-laying and larval development.

To ensure year-round water retention, each pond will be constructed with a clay lining or geotextile membrane, depending on underlying soil permeability.

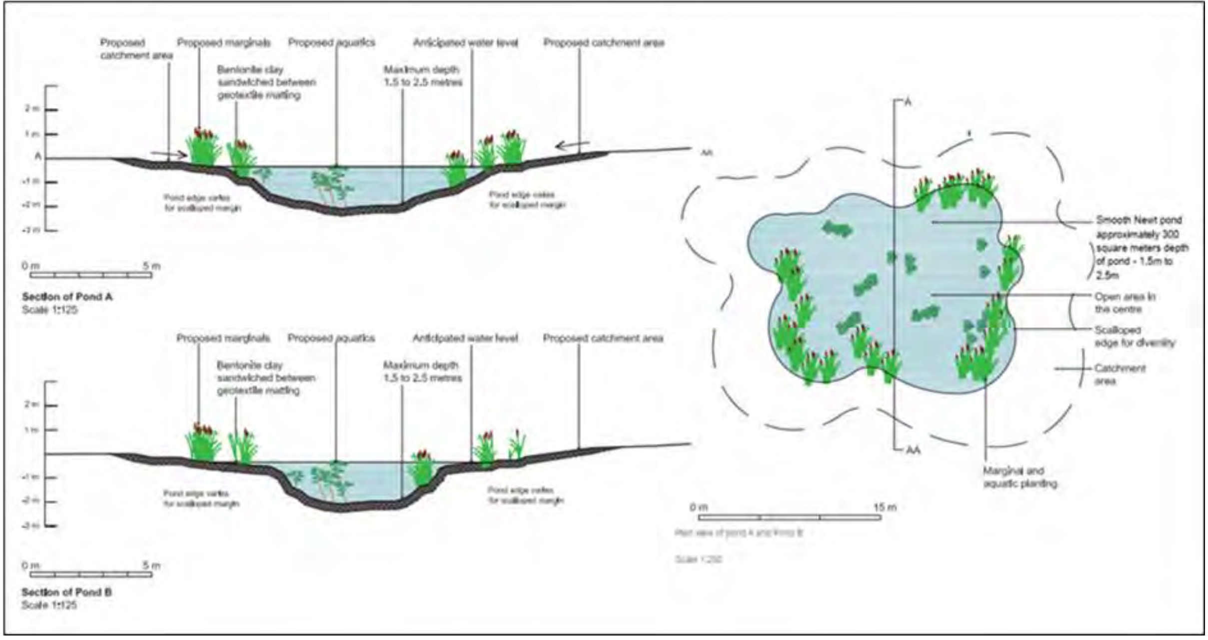
Native emergent and marginal wetland vegetation, as outlined in Table 4-1 below, will be planted around and within the ponds. These plant species are vital for amphibian breeding, offering cover, spawning surfaces and habitat for aquatic invertebrates, which serve as food sources.

In addition to the aquatic features, as part of the Restoration Plan, the areas of scrub, transitional vegetation, and recolonising bare ground across the site will be retained. These terrestrial habitats provide important shelter for amphibians during non-breeding periods, offering refuge from predators, excessive heat and desiccation.

Following cessation of quarry activities at the Site, the remaining ponds on the Site will be retained and allowed to naturalise and form part of the network of ponds / wetland across the Site.

Refer to Figure 4-2 below for a conceptual layout of the proposed amphibian-friendly pond design.

Figure 4-2: Proposed Pond Layout



4.2.2 Aquatic and Marginal Planting

As part of the restoration plan, targeted planting of aquatic and marginal wetland vegetation will be undertaken around and within the newly constructed ponds.

This planting will accelerate the plant establishment process, stabilising pond margins and encourage the early colonisation of native species such as aquatic invertebrates, amphibians and birds.

All new plant material will be sourced from reputable suppliers specialising in native Irish wetland species and local provenance stock.

Strict biosecurity measures will be implemented to prevent the unintentional introduction of non-native invasive species or aquatic fauna (e.g. fish). All plant material will be inspected prior to planting to ensure it is free of contaminants or unwanted biological material.

The planting strategy will vary according to the pond's design and liner type (clay or geotextile membrane), as follows:

Aquatic species will be planted either:

- In containerised baskets with aquatic soil, grouped in clusters of 5 to 8 individuals of the same species. The baskets will be submerged at a depth not exceeding 750 mm;
- Directly into pond substrate where suitable (e.g. in clay-lined areas), allowing for natural root establishment.
- Marginal vegetation will be plug-planted into shallow water zones and gently sloping pond edges. These will be: and,
- Planted in species-specific groups, with individual plugs spaced approximately 300 mm apart.

Positioned to create a graduated vegetative structure, offering a variety of microhabitats for different species and improving visual integration with the surrounding landscape. A recommended mix of native aquatic and marginal species will be used to reflect local wetland habitats and maximise biodiversity benefits as outlined in Table 4-1.

Table 4-1: Planting mix for Ponds and Marginal Mix for Banks

Common Name	Scientific Name
Acquatics	
Pond water crowfoot	*Ranunculus peltatus*
Pondweeds	*Potamogeton natans, or perfoliatus*
Common hornweed	*Ceratophyllum demersum*
Frog Bit	*Hydrocharis morus-rane*
Lesser Water Parsnip	*Berula eracta*
Water starwort	*Callitriche platycarpa*
Marginals	
Soft rush	*Juncus effusus*
Arrow-head	*Sagittaria sagittifolia*
Water mint	*Mentha aquatica*
Reed sweet-grass	*Glyceria maxima*
Branched bur-weed	*Sparganium erectum*
Meadowsweet	*Filipendula ulmaria*
Ragged robin	*Lychnis flos-cuculi*
Water forget-me-not	*Myosotis scorpioides*
Yellow flag-iris	*Iris psedudacorus*
Water plantain	*Alisma plantago-aquatica*
Marshmallow	*Althaea officinalis*

4.2.3 Proposed Wet Meadow

As part of the restoration plan, targeted planting will be undertaken around the outer margins of the newly constructed ponds, encompassing an area of ca. 2.6 ha (ca. 26421.05 m²). Refer to Table 4-2 for potential species mix.

The seed mix will be locally sourced. Seeding will take place in either spring or autumn and will simply comprise broadcasting the seeds in an appropriate quantity within the identified zone surrounding the ponds. Further soil spreading / penetration will occur as required. If site conditions are not immediately suitable, seeding will be postponed or adjusted to ensure successful establishment.

A qualified ecologist will assess site conditions and, based on this assessment, the most suitable native meadow / wetland edge seed mix will be confirmed and sown, ensuring compatibility with local conditions.

Table 4-2: Wet Meadow Mix

Common Name	**Scientific Name**
Grasses	
Marsh foxtail	*Alopecurus geniculatus*
Sweet vernal grass	*Anthoxanthum odoratum*
Tufted hair grass	*Deschampsia cespitosa*
Meadow fescue	*Festuca pratensis*
Red fescue	*Festuca rubra*
Rough meadow grass	*Poa trivialis*
Sedges	
Glaucous sedge	*Carex flacca*
Hairy sedge	*Carex hirta*
Sneezewort	*Achillea ptarmica*
Bugle	*Ajuga reptans*
Marsh marigold	*Caltha palustris*
Cuckooflower	*Cardamine pratensis*
Meadowsweet	*Flipendula ulmaria*
Square stalked St. John’s wort	*Hypericum tetrapterum*
Autumn hawkbit	*Leontodon autumnalis*
Greater bird’s foot trefoil	*Lotus pendunculatus*
Gypsywort	*Lycopus europaeus*
Ragged robin	*Lychnis flos-cuculi*
Common fleabane	*Pulicaria dysenterica*
Lesser spearwort	*Ranunculus flammula*
Creeping buttercup	*Ranunculus repens*
Great burnet	*Sanguisorba officinalis*
Marsh woundwort	*Stachys palustris*

4.2.4 Hibernacula and Habitat Piles

Hibernacula and habitat piles are a valuable habitat and support a range of biodiversity, including insects, amphibians and small mammals. These habitats act as refuges and hibernation sites for amphibians as well as a host of other species of inverts and small mammals. The objective is to create a diversity of habitats within the Site.

Hibernacula and habitat piles can be created through the placement of either piles of rocks or logs around the margins of hedgerows / treelines, near wetland habitats and adjacent to drainage ditches. It is proposed that these enhancement measures be created on-site. Refer to examples below, Plates 4-1 and 4-2

Plate 4-1:Typical Hibernaculum

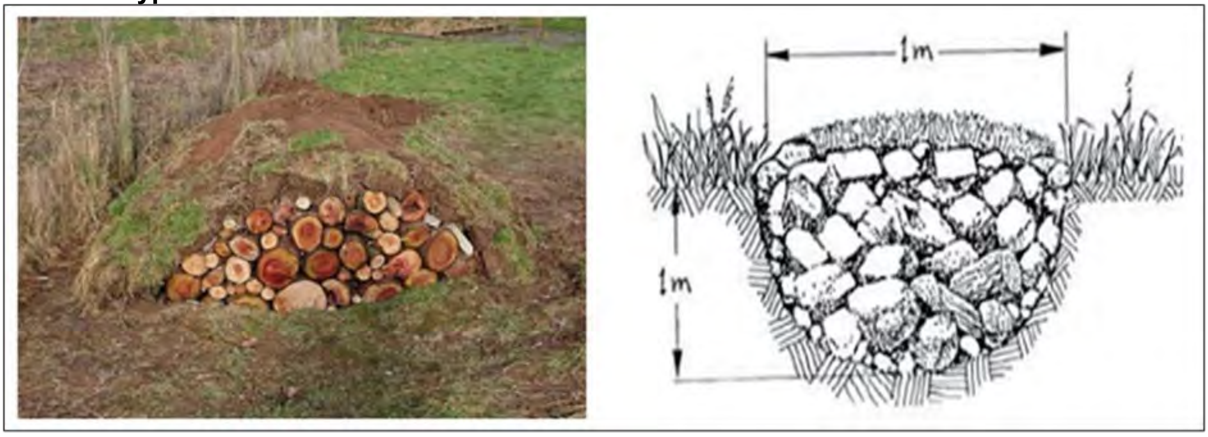


Plate 4-2: Habitat Piles

4.3 Monitoring

The ECoW will provide support throughout the life cycle of the newt mitigation works to ensure that they are completed in a manner that best achieves the plan's aims and ensures the protection of amphibians using the Site.

The new ponds will be subject to monitoring in years 1, 3 and 5, following the creation of the new ponds. The monitoring will confirm that the conditions on the ponds are suitable for breeding amphibians and assess the success of the planting and habitat creation works. The survey will also confirm if amphibians are using these newly created waterbodies.

Annual monitoring reports will be prepared and submitted to the Meath County Council detailing the progress of the plan.

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APPENDIX 7

APPENDIX 7-1

CAUSEWAY GEOTECH

25-0001

MURRENS QUARRY, OLDCASTLE GROUND INVESTIGATION REPORT

Client:
JJ FLOOD & SONS

Client's Representative:
MALONE O`REGAN ENVIRONMENTAL

Date:
MARCH 2025

Status:
FINAL

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LIST OF TABLES

APPENDICES

DOCUMENT CONTROL SHEET

REPORT NO:		**25-0001**			
PROJECT TITLE:		**MURRENS QUARRY, OLDCASTLE**			
CLIENT:		**JJ FLOOD & SONS**			
CLIENT'S REPRESENTATIVE:		**MALONE O`REGAN ENVIRONMENTAL**			
REVISION:	**A00**	**STATUS**	**FINAL**	**ISSUE DATE**	**17/02/2025**
REVISION:	**A01**	**STATUS**	**FINAL**	**ISSUE DATE**	**16//03/2025**
PREPARED BY:		**REVIEWED BY:**		**APPROVED BY:**	
Buhlebenkosi Angie Ndebele **BSC. GEOLOGY**		Celine Rooney Celine Rooney **BSC MSC PGEO (EURGEOL)**		Celine Rooney Celine Rooney **BSC MSC PGEO (EURGEOL)**	

This report presents a factual account of the ground investigation in accordance with the Specification and Related Documents for Ground Investigation in Ireland 2nd Edition, published by Engineers Ireland (2016).

METHODS OF DESCRIBING SOILS AND ROCKS

Soil and rock descriptions are based on the guidance in BS5930:2015+A1:2020, The Code of Practice for Ground Investigation.

Abbreviations used on exploratory hole logs	
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler).
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler).
P	Nominal 100mm diameter undisturbed piston sample.
B	Bulk disturbed sample.
LB	Large bulk disturbed sample.
SB	Sonic bulk disturbed sample.
D	Small disturbed sample.
C	Core sub-sample (displayed in the Field Records column on the logs).
L	Liner sample from dynamic sampled borehole.
W	Water sample.
ES / EW	Soil sample for environmental testing / Water sample for environmental testing.
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained).
SPT (c)	Standard penetration test using 60 degree solid cone.
(x,x/x,x,x,x)	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length.
(Y for Z/ Y for Z)	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given seating or test length 'Z' (mm).
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm).
HVP / HVR	Uncorrected in situ hand vane peak (HVP) and residual (HVR) result presented in kPa. Vane calibration factor has been applied, but no correction made for soil type.
V VR	Shear vane test (borehole). Shear strength stated in kPa. V: undisturbed vane shear strength VR: remoulded vane shear strength
Soil consistency description	In cohesive soils, where samples are disturbed and there are no suitable laboratory tests, N values may be used to indicate consistency on borehole logs – a median relationship of Nx5=Cu is used (as set out in Stroud & Butler 1975).
dd-mm-yyyy	Date at the end and start of shifts, shown at the relevant borehole depth. Corresponding casing and water depths shown in the adjacent columns.
▽	Water strike: initial depth of strike.
▼	Water strike: depth water rose to.
Abbreviations relating to rock core – reference Clause 36.4.4 of BS 5930: 2015+A1:2020	
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.
(xxx/xxx/xxx)	Spacing between discontinuities (minimum/average/maximum) measured in millimetres.

1 AUTHORITY

On the instructions of Malone O`Regan Environmental, (the “Client’s Representative”), acting on the behalf of JJ Flood & Sons (the “Client”), a ground investigation was undertaken at the site to provide data for groundwater assessment.

This report details the work carried out on site; it contains a description of the site and the works undertaken, and the exploratory hole logs.

All information given in this report is based upon the ground conditions encountered during the ground investigation works. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata, contaminant concentrations, and water conditions between or below exploratory holes. It should be noted that groundwater levels usually vary due to seasonal and/or other effects and may at times differ to those recorded during the investigation. No responsibility can be taken for conditions not encountered through the scope of work commissioned, for example between exploratory hole points, or beneath the termination depths achieved.

This report was prepared by Causeway Geotech Ltd for the use of the Client and the Client’s Representative in response to a particular set of instructions. Any other parties using the information contained in this report do so at their own risk and any duty of care to those parties is excluded.

2 PURPOSE, RATIONALE & SCOPE OF THE INVESTIGATION

The purpose of this investigation is to assess the ground conditions and to allow an evaluation of the groundwater issues with the current site and proposed development.

The rationale has been determined by the Client’s Representative, with the extent of the investigation including boreholes, trial pits, and the preparation of a factual account of the ground investigation findings.

3 DESCRIPTION OF SITE

The site is located within the grounds of an active quarry, situated in Murrens, Oldcastle Co. Meath. The site location is presented in Appendix A and a summary of the surrounding land uses is presented in Table 1.

Table 1: Summary of surrounding land uses

Location	Description
North	Agricultural fields, residential premises.
East	R195, residential premises, agricultural field beyond.
South	Forestry, agricultural fields.
West	Forestry, BD Flood

4 SITE OPERATIONS

4.1 SUMMARY OF SITE WORKS

Site operations, which were conducted between 14/01/2025 and 23/01/2025, comprised:

- Three rotary drilled boreholes
- Six machine-dug trial pits
- GPS survey of all completed locations

The exploratory holes were located as instructed by the Client’s Representative, and as shown on the exploratory hole location plan in Appendix A.

4.2 BOREHOLES

4.2.1 ROTARY DRILLED BOREHOLES

Three boreholes (BH01-03) were put to their completion by rotary drilling techniques only. The boreholes were completed using a Fraste CRS-XL Duo 140 tracked rotary drilling rig.

Symmetrix-cased full hole rotary percussive drilling techniques were employed to advance the boreholes to their completion depths.

Appendix B presents the borehole logs.

4.3 TRIAL PITS

Six trial pits (TP01-06) were excavated using an 13t tracked excavator fitted with a 600mm wide bucket, to depths of 4.50m.

Any water strikes encountered during excavation were recorded and the stability of the trial pit walls was noted on completion.

Appendix C presents the trial pit logs with photographs of the pits and arisings provided in Appendix D.

4.4 SURVEYING

The as-built exploratory hole positions were surveyed following completion of site operations by a Site Engineer from Causeway Geotech. Surveying was carried out using a Trimble R10 GPS system employing VRS and real time kinetic (RTK) techniques.

The plan coordinates (Irish Transverse Mercator) and ground elevation (mOD Malin) at each location are recorded on the individual exploratory hole logs. The exploratory hole location plan presented in Appendix A shows these as-built positions.

5 GROUND CONDITIONS

5.1 GENERAL GEOLOGY OF THE AREA

Published geological mapping from the online Geological Survey Ireland spatial resources database indicate the superficial deposits underlying the site comprise gravels derived from limestone. These deposits are shown to be underlain by cherty limes and minor shale of the Derravaragh Cherts unit.

5.2 GROUND TYPES ENCOUNTERED DURING INVESTIGATION OF THE SITE

A summary of the ground types encountered in the exploratory holes is listed below, in approximate stratigraphic order:

- **Paved surface:** trial pits TP01-05 encountered between 150-300mm of bitmac surfacing.
- **Topsoil:** encountered 150mm thick of topsoil in TP06.
- **Made Ground (fill):** gravelly sand with medium cobble and boulder content with plastic up to 1.70m (TP01). Concrete blocks, metal sheets, plastic, cables are noted in TP06 up to 1.00m. Reworked sandy gravelly clay with medium cobble content is noted to 1.50m in TP04.
- **Fluvioglacial deposits:** typically sands and gravels with occasional to high cobble content.
- **Bedrock (Limestone):** Rockhead was encountered from ground level (BH02) and between 3.00m and 8.00m in BH03 and BH01 respectively.

Further details of these ground types, including their specific depths and descriptions, can be found on the individual exploratory hole logs accompanying this report.

5.3 GROUNDWATER

Details of the individual groundwater strikes, along with any relative changes in levels as works proceeded, are presented on the exploratory hole logs for each location and in Table 2 below.

Table 2: Groundwater strike details

Exploratory Hole	Depth of groundwater strike (m bgl)	Comments
BH01	3.50m	Rose to 3.00m in 20 mins
BH03	7.50m	Rose to 7.30m in 20 mins

No other groundwater strikes were noted in the remaining exploratory hole locations. However, it should be noted that the casing used in supporting the borehole walls during drilling may have sealed out any groundwater strikes and the possibility of encountering groundwater during excavation works should not be ruled out.

Seasonal variation in groundwater levels should also be factored into design considerations.

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APPENDIX A – SITE AND EXPLORATORY HOLE LOCATION PLANS

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Legend Key

Project No.	25-0001
Client	JJ Flood & Sons
Client's Rep	Malone O'Regan Environmental

Site Location Plan

Murrens Quarry, Oldcastle

CAUSEWAY GEOTECH

Last Revision	16/02/2025
Scale	1:20000

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Legend Key

○ Locations By Type - RO

Project No.	25-0001
Client	JJ Flood & Sons
Client's Rep	Malone O'Regan Environmental
Exploratory Hole Location Plan	
Murrens Quarry, Oldcastle	
CAUSEWAY GEOTECH	
Last Revision	16/03/2025
Scale	1:2750

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Legend Key

🟥 Locations By Type - TP

Project No.	25-0001
Client	JJ Flood & Sons
Client's Rep	Malone O'Regan Environmental

Exploratory Hole Location Plan

Murrens Quarry, Oldcastle

CAUSEWAY GEOTECH

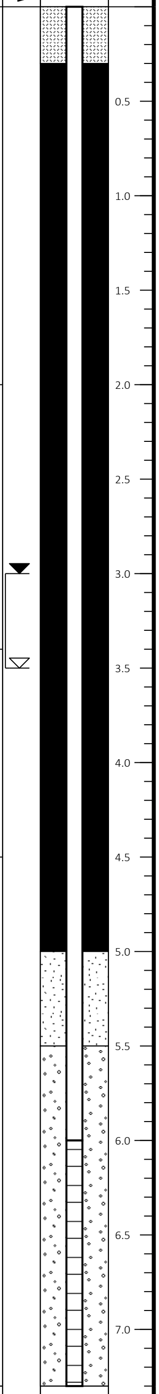
Last Revision	16/03/2025
Scale	1:500

APPENDIX B – BOREHOLE LOGS

CAUSEWAY GEOTECH	**Project No.**	**Project Name:** Murrens Quarry, Oldcastle	**Borehole ID**
	25-0001	**Client:** JJ Flood & Sons	**BH01**
		Client's Rep: Malone O’Regan Environmental	

Method	**Plant Used**	**Top (m)**	**Base (m)**	**Coordinates**				
Rotary Percussion	Fraste CRS-XL Duo 140	0.00	12.00	652767.20 E 774919.70 N	**Final Depth:** 12.00 m	**Start Date:** 14/01/2025	**Driller:** CT	Sheet 1 of 2 Scale: 1:40
					Elevation: 120.36 mOD	**End Date:** 14/01/2025	**Logger:** CR	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00		14-01-2025	0.00	Dry				Orangish brown fine SAND and GRAVEL. (Driller`s description)		
					118.36	2.00		Orangish brown silty SAND. (Driller`s description)		
					116.96	3.40		Orangish brown fine to coarse SAND and GRAVEL. (Driller`s description)		
					115.86	4.50		Dark grey fine to coarse SAND and GRAVEL with cobble and boulder content. (Driller`s description)		



Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.50	3.50	20	3.00

Remarks

Casing Details

To (m)	Diam (mm)
12.00	100

Water Added

From (m)	To (m)

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated on Engineer's instruction.	16/03/2025

AGS

CAUSEWAY GEOTECH

Project No.			Borehole ID
25-0001	**Project Name:**	Murrens Quarry, Oldcastle	BH01
	Client:	JJ Flood & Sons	
	Client's Rep:	Malone O'Regan Environmental	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Rotary Percussion	Fraste CRS-XL Duo 140	0.00	12.00	652767.20 E 774919.70 N

Final Depth:	12.00 m	**Start Date:**	14/01/2025	**Driller:**	CT	Sheet 2 of 2 Scale: 1:40
Elevation:	120.36 mOD	**End Date:**	14/01/2025	**Logger:**	CR	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
					112.36	8.00		LIMESTONE. (Driller`s description)		
12.00		14-01-2025	0.00	Dry	108.36	12.00		End of Borehole at 12.00m		

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
3.50	3.50	20	3.00

Casing Details		Water Added	
To (m)	Diam (mm)	From (m)	To (m)
12.00	100		

Remarks

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated on Engineer's instruction.	16/03/2025

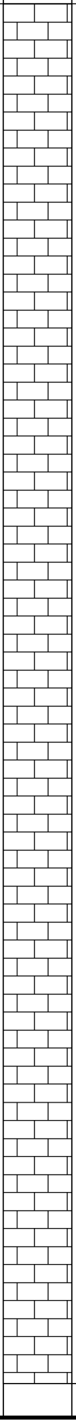
AGS

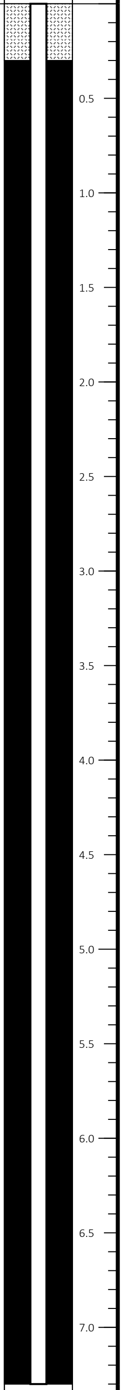
	Project No.	Project Name: Murrens Quarry, Oldcastle	Borehole ID
CAUSEWAY GEOTECH	25-0001	Client: JJ Flood & Sons Client's Rep: Malone O’Regan Environmental	BH02

Method	Plant Used	Top (m)	Base (m)	Coordinates
Rotary Percussion	Fraste CRS-XL Duo 140	0.00	20.00	652221.50 E 774730.80 N

Final Depth:	20.00 m	**Start Date:**	15/01/2025	**Driller:**	CT	Sheet 1 of 3 Scale: 1:40
Elevation:	128.65 mOD	**End Date:**	15/01/2025	**Logger:**	CR	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
0.00		15-01-2025	0.00	Dry				LIMESTONE. (Driller`s description)		





Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

No groundwater encountered.

Casing Details		Water Added	
To (m)	Diam (mm)	From (m)	To (m)
20.00	100		

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated on Engineer's instruction.	16/03/2025

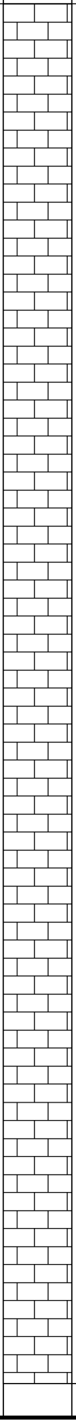
AGS

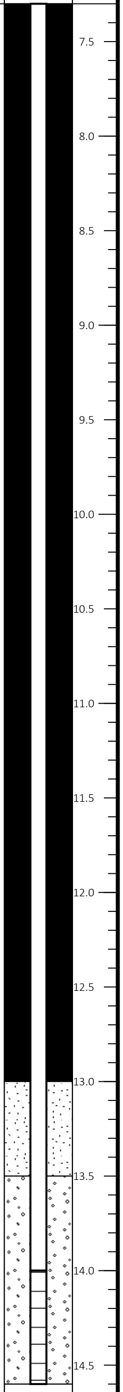
CAUSEWAY GEOTECH	**Project No.** **25-0001**	**Project Name:** Murrens Quarry, Oldcastle **Client:** JJ Flood & Sons **Client's Rep:** Malone O'Regan Environmental	**Borehole ID** **BH02**

Method	**Plant Used**	**Top (m)**	**Base (m)**	**Coordinates**
Rotary Percussion	Fraste CRS-XL Duo 140	0.00	20.00	652221.50 E 774730.80 N

Final Depth: 20.00 m	**Start Date:** 15/01/2025	**Driller:** CT	Sheet 2 of 3 Scale: 1:40
Elevation: 128.65 mOD	**End Date:** 15/01/2025	**Logger:** CR	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill





Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

No groundwater encountered.

Casing Details		**Water Added**	
To (m)	Diam (mm)	From (m)	To (m)
20.00	100		

Core Barrel	**Flush Type**	**Termination Reason**	**Last Updated**
	Air	Terminated on Engineer's instruction.	16/03/2025

AGS

CAUSEWAY GEOTECH	**Project No.**	**Project Name:** Murrens Quarry, Oldcastle	**Borehole ID**
	25-0001	**Client:** JJ Flood & Sons	**BH02**
		Client's Rep: Malone O'Regan Environmental	

Method	**Plant Used**	**Top (m)**	**Base (m)**	**Coordinates**				
Rotary Percussion	Fraste CRS-XL Duo 140	0.00	20.00	652221.50 E 774730.80 N	**Final Depth:** 20.00 m	**Start Date:** 15/01/2025	**Driller:** CT	Sheet 3 of 3 Scale: 1:40
					Elevation: 128.65 mOD	**End Date:** 15/01/2025	**Logger:** CR	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
20.00		15-01-2025	0.00	Dry	108.65	20.00		End of Borehole at 20.00m		

Depth scale: 15.0, 15.5, 16.0, 16.5, 17.0, 17.5, 18.0, 18.5, 19.0, 19.5, 20.0, 20.5, 21.0, 21.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)

Remarks

No groundwater encountered.

Casing Details		**Water Added**	
To (m)	Diam (mm)	From (m)	To (m)
20.00	100		

Core Barrel	**Flush Type**	**Termination Reason**	**Last Updated**
	Air	Terminated on Engineer's instruction.	16/03/2025

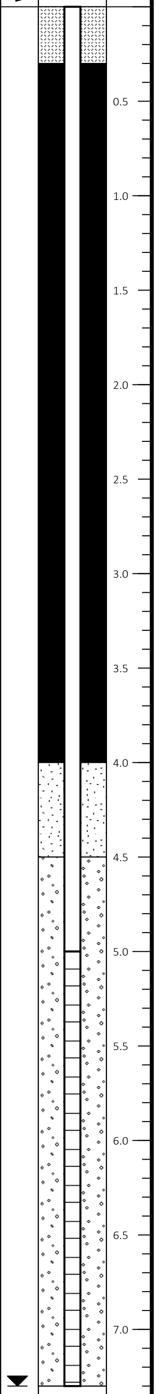
AGS

Project No. **25-0001**	**Project Name:** Murrens Quarry, Oldcastle **Client:** JJ Flood & Sons **Client's Rep:** Malone O'Regan Environmental		**Borehole ID** **BH03**

Method	**Plant Used**	**Top (m)**	**Base (m)**	**Coordinates**
Rotary Percussion	Fraste CRS-XL Duo 140	0.00	10.00	652585.10 E 774527.30 N

Final Depth: 10.00 m	**Start Date:** 14/01/2025	**Driller:** CT	Sheet 1 of 2 Scale: 1:40
Elevation: 118.58 mOD	**End Date:** 14/01/2025	**Logger:** CR	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Description
0.00		14-01-2025	0.00	0.00			Greyish brown slightly clayey fine to coarse SAND and GRAVEL with cobble and boulder content. (Driller`s description)
					115.58	3.00	LIMESTONE. (Driller`s description)



Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
7.50	7.50	20	7.30

Casing Details		**Water Added**	
To (m)	Diam (mm)	From (m)	To (m)
10.00	100		

Remarks

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated at scheduled depth.	16/03/2025

Project No.	Project Name: Murrens Quarry, Oldcastle	Borehole ID
25-0001	Client: JJ Flood & Sons	BH03
	Client's Rep: Malone O'Regan Environmental	

Method	Plant Used	Top (m)	Base (m)	Coordinates
Rotary Percussion	Fraste CRS-XL Duo 140	0.00	10.00	652585.10 E 774527.30 N

Final Depth: 10.00 m	**Start Date:** 14/01/2025	**Driller:** CT	Sheet 2 of 2 Scale: 1:40
Elevation: 118.58 mOD	**End Date:** 14/01/2025	**Logger:** CR	FINAL

Depth (m)	Sample / Tests	Field Records	Casing Depth (m)	Water Depth (m)	Level mOD	Depth (m)	Legend	Description	Water	Backfill
10.00		14-01-2025	0.00	Dry	108.58	10.00		End of Borehole at 10.00m		

7.5
8.0
8.5
9.0
9.5
10.0
10.5
11.0
11.5
12.0
12.5
13.0
13.5
14.0
14.5

Water Strikes

Struck at (m)	Casing to (m)	Time (min)	Rose to (m)
7.50	7.50	20	7.30

Casing Details		Water Added	
To (m)	Diam (mm)	From (m)	To (m)
10.00	100		

Remarks

Core Barrel	Flush Type	Termination Reason	Last Updated
	Air	Terminated at scheduled depth.	16/03/2025

AGS

APPENDIX C – TRIAL PIT LOGS

	Project No. 25-0001	**Project Name:** Murrens Quarry, Oldcastle	**Trial Pit ID** **TP01**
	Coordinates 652643.10 E 775151.50 N	**Client:** JJ Flood & Sons	
Method: Trial Pitting		**Client's Representative:** Malone O'Regan Environmental	Sheet 1 of 1 Scale: 1:25
Plant: 13t Tracked Excavator	**Elevation** 128.20 mOD	**Date:** 23/01/2025 **Logger:** SK	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			128.05	0.15		BITMAC	
			126.50	1.70		MADE GROUND: Brown slightly gravelly fine to coarse SAND with low cobble content and occasional rootlets and plastic throughout. Gravel is subangular fine to coarse. Cobbles are subrounded of limestone.	
			124.40	3.80		Light brown slightly sandy slightly clayey angular fine to coarse GRAVEL with medium cobble content. Sand is fine to coarse. Cobbles are subrounded of limestone.	
			123.70	4.50		Grey slightly sandy slightly clayey angular fine to coarse GRAVEL with medium cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subrounded of limestone up to 360mm in diameter.	
						End of trial pit at 4.50m	

0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5

Water Strikes			
Struck at (m)	Remarks		

Depth: 4.50
Width: 0.70
Length: 3.90

Remarks:
No groundwater encountered.

Stability:
Moderately stable

Termination Reason
Terminated at scheduled depth.

Last Updated
16/03/2025

Project No. 25-0001	**Project Name:** Murrens Quarry, Oldcastle		**Trial Pit ID** **TP02**
Coordinates 652652.20 E 775168.70 N	**Client:** JJ Flood & Sons		
Method: Trial Pitting	**Client's Representative:** Malone O’Regan Environmental		Sheet 1 of 1 Scale: 1:25
Plant: 13t Tracked Excavator	**Date:** 23/01/2025	**Logger:** SK	FINAL
Elevation 128.49 mOD			

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
			128.19	0.30	▩	BITMAC	
			128.09	0.40	⁖	Light orangish brown gravelly slightly clayey fine to coarse SAND. Gravel is subangular fine to coarse.	
			125.99	2.50	⁖	Dark brownish grey gravelly medium to coarse SAND with high cobble content and medium boulder content. Gravel is subrounded fine to coarse. Cobbles and boulders are rounded of limestone up to 400mm in diameter.	
						End of trial pit at 2.50m	

Water Strikes	
Struck at (m)	Remarks

Depth: 2.50
Width: 3.90
Length: 1.30

Remarks:
No groundwater encountered

Stability:
Unstable below 0.4m.

Termination Reason
Terminated on Engineer's instruction.

Last Updated
16/03/2025

CAUSEWAY GEOTECH	**Project No.** 25-0001	**Project Name:** Murrens Quarry, Oldcastle	**Trial Pit ID** **TP03**
	Coordinates 652648.50 E 775132.60 N	**Client:** JJ Flood & Sons	
Method: Trial Pitting		**Client's Representative:** Malone O'Regan Environmental	Sheet 1 of 1 Scale: 1:25
Plant: 13t Tracked Excavator	**Elevation** 127.80 mOD	**Date:** 23/01/2025 **Logger:** SK	FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
						BITMAC	
			127.60	0.20		Light orangish brown gravelly slightly clayey fine to coarse SAND. Gravel is subangular fine to coarse.	
			127.20	0.60		Dark brownish grey gravelly medium to coarse SAND with high cobble content and medium boulder content. Gravel is subrounded fine to coarse. Cobbles and boulders are rounded of limestone up to 390mm in diameter.	
			125.10	2.70		End of trial pit at 2.70m	

Water Strikes	
Struck at (m)	Remarks

Depth: 2.70

Width: 4.20

Length: 1.70

Stability:
Unstable below 0.4m.

Remarks:
No groundwater encountered

Termination Reason
Terminated on Engineer's instruction.

Last Updated
16/03/2025

AGS

Project No. 25-0001	**Project Name:** Murrens Quarry, Oldcastle		**Trial Pit ID** **TP04**
Coordinates 652658.30 E 775136.60 N	**Client:** JJ Flood & Sons		
	Client's Representative: Malone O'Regan Environmental		Sheet 1 of 1 Scale: 1:25
Elevation 128.12 mOD	**Date:** 23/01/2025	**Logger:** SK	FINAL

Method:
Trial Pitting

Plant:
13t Tracked Excavator

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
					▩	BITMAC	
			127.92	0.20	▨	MADE GROUND: Firm brown slightly sandy slightly gravelly CLAY with medium cobble content and occasional rootlets throughout. Sand is fine to medium. Gravel is subrounded fine to coarse. Cobbles are subrounded of limestone.	
			126.62	1.50	∘	Dark brownish grey gravelly medium to coarse SAND with medium cobble and boulder content. Gravel is subrounded fine to coarse. Cobbles and boulders are rounded of limestone up to 490mm in diameter.	
			124.42	3.70	⁘	Dark grey gravelly medium to coarse SAND with low cobble content. Gravel is subrounded fine to coarse. Cobbles are rounded of limestone.	
			123.62	4.50		End of trial pit at 4.50m	

Water Strikes

Struck at (m)	Remarks

Depth: 4.50
Width: 1.30
Length: 2.80

Remarks:
No groundwater encountered

Stability:
Moderately stable

Termination Reason
Terminated at scheduled depth.

Last Updated
16/03/2025

CAUSEWAY GEOTECH

Project No. 25-0001	**Project Name:** Murrens Quarry, Oldcastle		**Trial Pit ID** **TP05**
Coordinates 652627.30 E 775106.40 N	**Client:** JJ Flood & Sons		
	Client's Representative: Malone O'Regan Environmental		Sheet 1 of 1 Scale: 1:25
Elevation 126.62 mOD	**Date:** 23/01/2025	**Logger:** SK	FINAL

Method:
Trial Pitting

Plant:
13t Tracked Excavator

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
						BITMAC	
			126.42	0.20		MADE GROUND: Dark brown gravelly slightly clayey fine to coarse SAND with low cobble content and with occasional rootlets and plastic throughout. Gravel is subangular fine to coarse. Cobbles are subrounded of limestone.	
			126.12	0.50		MADE GROUND: Yellowish brown slightly gravelly fine to medium SAND with low cobble content and occasional rootlets throughout. Gravel is subrounded fine to coarse. Cobbles are subrounded of limestone.	
			125.82	0.80		Grey slightly silty clayey fine to medium SAND.	
			124.72	1.90		Brownish grey slightly clayey fine to medium SAND with low cobble content. Cobbles are subangular of limestone.	
			122.82	3.80		Brownish grey slightly clayey fine to medium SAND with low cobble and boulder content. Cobbles are subangular of limestone. Boulders are subrounded of limestone up to 520mm in diameter.	
			122.12	4.50		End of trial pit at 4.50m	

Water Strikes	
Struck at (m)	Remarks

Depth: 4.50
Width: 3.40
Length: 0.90

Remarks:
No groundwater encountered

Stability:
Stable

Termination Reason
Terminated at scheduled depth.

Last Updated
16/03/2025

AGS

CAUSEWAY GEOTECH

Project No. 25-0001	**Project Name:** Murrens Quarry, Oldcastle		**Trial Pit ID** **TP06**
Coordinates 652633.20 E 775142.70 N	**Client:** JJ Flood & Sons		
Method: Trial Pitting	**Client's Representative:** Malone O'Regan Environmental		Sheet 1 of 1 Scale: 1:25
Plant: 13t Tracked Excavator	**Elevation** 128.23 mOD	**Date:** 23/01/2025	**Logger:** SK
			FINAL

Depth (m)	Sample / Tests	Field Records	Level (mOD)	Depth (m)	Legend	Description	Water
					▧	TOPSOIL	
			128.08	0.15	▩	MADE GROUND: Dark grey very gravelly medium to coarse SAND with medium cobble and boulder content and abundant concrete blocks, cables, metal sheets, plastic and rootlets throughout. Gravel is subangular fine to coarse. Cobbles are subangular of mixed lithologies predominantly limestone. Boulders are subrounded of limestone up to 410mm in diameter.	
			127.23	1.00	⁘	Brown slightly gravelly fine to coarse SAND with medium cobble content with occasional rootlets throughout. Gravel is subangular fine to coarse. Cobbles and boulders are subrounded of limestone up to 360mm in diameter.	
			125.73	2.50		End of trial pit at 2.50m	

Water Strikes			
Struck at (m)	Remarks	**Depth:** 2.50 **Width:** 2.20 **Length:** 3.10	**Remarks:** No groundwater encountered
		Stability: Unstable	**Termination Reason** Terminated on Engineer's instruction.

Last Updated
16/03/2025

AGS

APPENDIX D – TRIAL PIT PHOTOGRAPHS


CAUSEWAY
GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
Date
23/01/25
EH Number
TP01
(m)
0.1
0.2
0.3
0.4
0.5

TP01

TP01

TP01

TP01

TP01

TP01

TP01


CAUSEWAY
GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
TP Number
TP01
Date
28/01/25
TP01
(m)
0.1
0.2
0.3
0.4
0.5

TP01


CAUSEWAY GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
Date
23/01/25
EH Number
TP02
(m) 0.1 0.2 0.3 0.4 0.5

TP02

TP02

TP02

TP02

TP02

TP02


CAUSEWAY GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
Date
23/01/25
TP Number
TP02
(m) 0.1 0.2 0.3 0.4 0.5

TP02


CAUSEWAY GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
TP Number
TP02
Date
23/01/25
0.1
0.2
0.3
0.4
0.5
(m)

TP02


CAUSEWAY GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
Date
23/01/25
EH Number
TP03
(m) 0.1 0.2 0.3 0.4 0.5

TP03

TP03

TP03

TP03

TP03

TP03


CAUSEWAY GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
EH Number
TP03
Date
25/01/25
(m)
0.1
0.2
0.3
0.4
0.5

TP03


CAUSEWAY GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
Date
23/01/25
EH Number
TP04
(m) 0.1 0.2 0.3 0.4 0.5

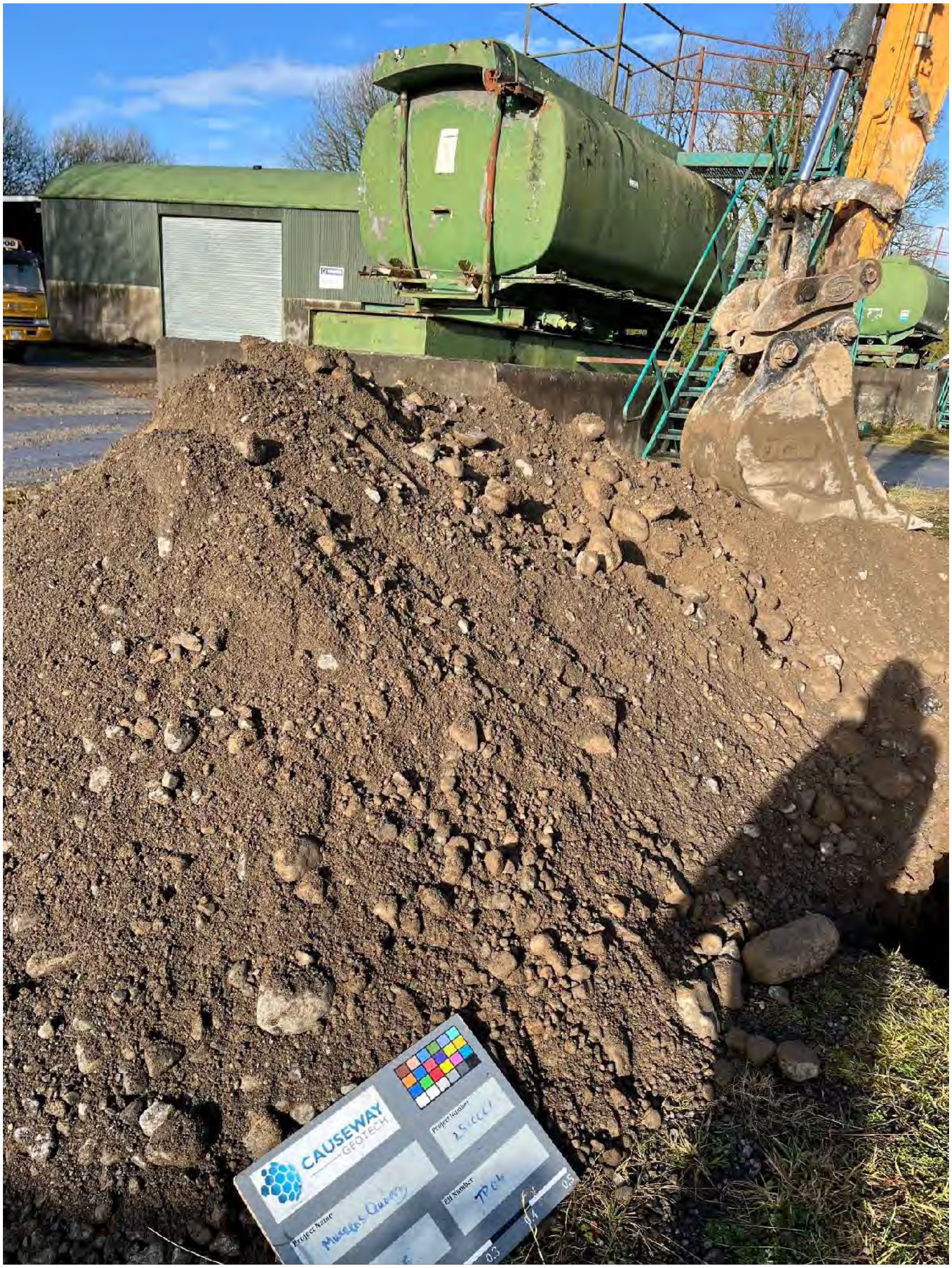
TP04

TP04

TP04

TP04

TP04


CAUSEWAY GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
TP Number
TP04
0.3
0.4
0.5

TP04


CAUSEWAY GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
BH Number
TP04
Date
23/01/25
0.2
0.3
0.4
0.5

TP04


CAUSEWAY
GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
Date
23/01/25
EH Number
TP05
(m) 0.1 0.2 0.3 0.4 0.5

TP05

TP05

TP05

TP05

TP05


CAUSEWAY GEOTECH
Project Name Murrens Quarry
Project Number 25-0001
Date 23/01/25
SI Number TP05
(m) 0.1 0.2 0.3 0.4 0.5

TP05


CAUSEWAY GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
Date
23/01/25
EH Number
TP05
(m) 0.1 0.2 0.3 0.4 0.5

TP05


CAUSEWAY GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
Date
23/01/25
EH Number
TP06
(m)
0.1
0.2
0.3
0.4
0.5

TP06

TP06

TP06

TP06

TP06


CAUSEWAY GEOTECH
Project Name
Murrens Quarry
Project Number
25-0001
Date
23/01/25
Pit Number
TP06
(m) 0.1 0.2 0.3 0.4 0.5

TP06

CAUSEWAY
GEOTECH

Causeway Geotech Limited has made its commitment to health and safety of people, the environment and the quality of its services an integral part of our strategy.

Whether it be ensuring people's safety or meeting the challenges of operating in an ecologically diverse environment, we aim to act in a sustainable and responsible manner at all times.

CERTIFICATIONS

Constructionline
Gold Member

SCS
INTEGRATED CERTIFICATION
ISO 9001, 14001 & 45001

UKAS
MANAGEMENT SYSTEMS
9235

MEMBERSHIP

AGS

BRITISH
DRILLING
ASSOCIATION

BGA
THE BRITISH
GEOTECHNICAL
ASSOCIATION

INTERNATIONAL JACK-UP BARGE OPERATORS ASSOCIATION

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info@causewaygeotech.com

APPENDIX 7-2

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W: www.element.com

Malone O'Regan
Ground Floor - Unit 3
Bracken Business Park
Bracken Road
Sandyford
Dublin 18
Ireland
D18 V4K6

4225

Attention :	Enrique Garcia
Date :	11th February, 2025
Your reference :	E2343
Our reference :	Test Report 25/1058 Batch 1
Location :	Muriens Quarry
Date samples received :	24th January, 2025
Status :	Final Report
Issue :	202502111658

Twenty three samples were received for analysis on 24th January, 2025 of which twelve were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 87.749 kg of CO2

Scope 1&2&3 emissions - 207.373 kg of CO2

Authorised By:

Bruce Leslie
Project Manager

Client Name: Malone O'Regan
Reference: E2343
Location: Muriens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1058

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	16-18	28-30	31-33	37-39	40-42	43-45	46-48	52-54	LOD/LOR	Units	Method No.
Sample ID	TP04	TP04	TP05	TP06	TP06	TP01	TP01	TP01	TP01	TP02			
Depth	0.00-0.50	0.50-1.50	0.00-0.50	0.00-0.50	0.50-1.50	0.00-0.50	0.50-1.50	1.50-2.50	2.50-3.50	0.00-0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025			
Antimony	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Arsenic #	3.2	4.0	2.7	3.8	3.3	3.8	3.4	3.1	2.0	1.4	<0.5	mg/kg	TM30/PM15
Barium #	18	24	39	25	16	22	20	9	14	9	<1	mg/kg	TM30/PM15
Cadmium #	0.4	0.7	0.4	0.5	0.5	0.4	0.5	0.3	0.4	0.3	<0.1	mg/kg	TM30/PM15
Chromium #	24.7	28.8	35.7	20.6	19.8	61.3	26.0	17.0	15.0	8.4	<0.5	mg/kg	TM30/PM15
Copper #	6	11	10	57	10	8	6	5	6	4	<1	mg/kg	TM30/PM15
Lead #	6	5	6	30	11	8	8	<5	<5	<5	<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum #	1.3	1.3	2.0	1.4	1.2	3.8	1.6	1.3	0.8	0.2	<0.1	mg/kg	TM30/PM15
Nickel #	13.6	27.1	16.3	29.8	14.9	19.8	12.1	9.4	8.5	6.5	<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	411	273	219	492	408	381	466	193	232	231	<50	mg/kg	TM50/PM29
Water Soluble Boron #	1.0	0.7	0.5	0.8	0.6	0.8	0.8	0.4	0.4	0.3	<0.1	mg/kg	TM74/PM32
Zinc #	40	52	54	168	78	62	44	20	24	21	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	0.09	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	0.08	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	89	90	92	108	92	88	85	91	105	88	<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30	922	138	<30	<30	<30	<30	38	<30	mg/kg	TM5/PM8/PM16

Element Materials Technology

Client Name:	Malone O'Regan	**Report :**	**Solid**
Reference:	E2343		
Location:	Muriens Quarry	**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Enrique Garcia		
EMT Job No:	25/1058		

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	16-18	28-30	31-33	37-39	40-42	43-45	46-48	52-54			
Sample ID	TP04	TP04	TP05	TP06	TP06	TP01	TP01	TP01	TP01	TP02			
Depth	0.00-0.50	0.50-1.50	0.00-0.50	0.00-0.50	0.50-1.50	0.00-0.50	0.50-1.50	1.50-2.50	2.50-3.50	0.00-0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025			
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)$^{\#}$	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL)$^{\#}$	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL)$^{\#}$	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL)$^{\#}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)$^{\#}$	<7	<7	<7	12	<7	<7	<7	<7	<7	27	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)$^{\#}$	<7	<7	<7	829	124	<7	<7	<7	<7	11	<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_CU_1D_AL)	<7	<7	<7	81	14	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH_CU+HS_1D_AL)	<26	<26	<26	922	138	<26	<26	<26	<26	38	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_CU_1D_AL)	<10	<10	<10	139	17	<10	<10	<10	<10	39	<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_CU_1D_AL)	<10	<10	<10	702	107	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR)$^{\#}$	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR)$^{\#}$	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR)$^{\#}$	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)$^{\#}$	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR)$^{\#}$	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR)$^{\#}$	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR)$^{\#}$	<7	<7	<7	312	43	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_CU_1D_AR)	<7	<7	<7	59	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH_CU+HS_1D_AR)	<26	<26	<26	371	43	<26	<26	<26	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH_CU+HS_1D_Total)	<52	<52	<52	1293	181	<52	<52	<52	<52	<52	<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR)$^{\#}$	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_CU_1D_AR)	<10	<10	<10	56	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_CU_1D_AR)	<10	<10	<10	262	35	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
MTBE$^{\#}$	<5	<5	<5	<5^{SV}	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
Benzene$^{\#}$	<5	<5	<5	<5^{SV}	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
Toluene$^{\#}$	<5	<5	<5	<5^{SV}	7	<5	<5	<5	6	<5	<5	ug/kg	TM36/PM12
Ethylbenzene$^{\#}$	<5	<5	<5	<5^{SV}	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
m/p-Xylene$^{\#}$	<5	<5	<5	<5^{SV}	5	<5	<5	<5	8	<5	<5	ug/kg	TM36/PM12
o-Xylene$^{\#}$	<5	<5	<5	<5^{SV}	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM36/PM12
PCB 28$^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 52$^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 101$^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 118$^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 138$^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 153$^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 180$^{\#}$	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs$^{\#}$	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	ug/kg	TM17/PM8

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Malone O'Regan
Reference: E2343
Location: Muriens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1058

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	16-18	28-30	31-33	37-39	40-42	43-45	46-48	52-54			
Sample ID	TP04	TP04	TP05	TP06	TP06	TP01	TP01	TP01	TP01	TP02			
Depth	0.00-0.50	0.50-1.50	0.00-0.50	0.00-0.50	0.50-1.50	0.00-0.50	0.50-1.50	1.50-2.50	2.50-3.50	0.00-0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025			
Phenol #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM26/PM21B
Natural Moisture Content	16.7	8.8	8.5	8.4	6.4	11.9	12.1	4.8	7.5	4.3	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	14.3	8.1	7.8	7.8	6.0	10.6	10.8	4.5	6.9	4.1	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	24.7	28.8	35.7	20.6	19.8	61.3	26.0	17.0	15.0	8.4	<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	0.83	0.32	0.22	0.70	0.39	0.69	0.81	0.29	0.23	0.17	<0.02	%	TM21/PM24
Sulphide	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	mg/kg	TM107/PM45
Elemental Sulphur	3	3	3	8	5	2	3	3	4	2	<1	mg/kg	TM108/PM114
pH #	8.35	8.61	8.59	8.49	8.56	7.90	7.73	8.23	8.37	9.04	<0.01	pH units	TM73/PM11

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E2343
Location: Muriens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1058

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	58-60	61-63									LOD/LOR	Units	Method No.
Sample ID	TP02	TP03											
Depth	1.50-2.50	0.00-0.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	23/01/2025	23/01/2025											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	24/01/2025	24/01/2025											
Antimony	<1	<1									<1	mg/kg	TM30/PM15
Arsenic #	1.7	2.7									<0.5	mg/kg	TM30/PM15
Barium #	13	12									<1	mg/kg	TM30/PM15
Cadmium #	0.5	0.5									<0.1	mg/kg	TM30/PM15
Chromium #	17.8	24.5									<0.5	mg/kg	TM30/PM15
Copper #	4	6									<1	mg/kg	TM30/PM15
Lead #	<5	<5									<5	mg/kg	TM30/PM15
Mercury #	<0.1	0.1									<0.1	mg/kg	TM30/PM15
Molybdenum #	0.2	1.3									<0.1	mg/kg	TM30/PM15
Nickel #	8.3	11.5									<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1									<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	224	239									<50	mg/kg	TM50/PM29
Water Soluble Boron #	0.3	0.4									<0.1	mg/kg	TM74/PM32
Zinc #	28	36									<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05									<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03									<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06									<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02									<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07									<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04									<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	<0.22									<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64									<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05									<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02									<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1									<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	45^{SV}	88									<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	87	<30									<30	mg/kg	TM5/PM8/PM16

Client Name:	Malone O'Regan	**Report :**	**Solid**
Reference:	E2343		
Location:	Muriens Quarry	**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Enrique Garcia		
EMT Job No:	25/1058		

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	58-60	61-63											
Sample ID	TP02	TP03											
Depth	1.50-2.50	0.00-0.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	23/01/2025	23/01/2025											
Sample Type	Soil	Soil											
Batch Number	1	1									LOD/LOR	Units	Method No.
Date of Receipt	24/01/2025	24/01/2025											
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)#	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL)#	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL)#	<0.2	<0.2									<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL)#	14	<4									<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)#	56	<7									<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)#	17	<7									<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_CU_1D_AL)	<7	<7									<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH_CU+HS_1D_AL)	87	<26									<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_CU_1D_AL)	87	<10									<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_CU_1D_AL)	<10	<10									<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR)#	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<0.2	<0.2									<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR)#	<4	<4									<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR)#	<7	<7									<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR)#	<7	<7									<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_CU_1D_AR)	<7	<7									<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH_CU+HS_1D_AR)	<26	<26									<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH_CU+HS_1D_Total)	87	<52									<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR)#	<0.1	<0.1									<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_CU_1D_AR)	<10	<10									<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_CU_1D_AR)	<10	<10									<10	mg/kg	TM5/PM8/PM16
MTBE#	<5	<5									<5	ug/kg	TM36/PM12
Benzene#	<5	<5									<5	ug/kg	TM36/PM12
Toluene#	<5	6									<5	ug/kg	TM36/PM12
Ethylbenzene#	<5	<5									<5	ug/kg	TM36/PM12
m/p-Xylene#	<5	<5									<5	ug/kg	TM36/PM12
o-Xylene#	<5	<5									<5	ug/kg	TM36/PM12
PCB 28#	<5	<5									<5	ug/kg	TM17/PM8
PCB 52#	<5	<5									<5	ug/kg	TM17/PM8
PCB 101#	<5	<5									<5	ug/kg	TM17/PM8
PCB 118#	<5	<5									<5	ug/kg	TM17/PM8
PCB 138#	<5	<5									<5	ug/kg	TM17/PM8
PCB 153#	<5	<5									<5	ug/kg	TM17/PM8
PCB 180#	<5	<5									<5	ug/kg	TM17/PM8
Total 7 PCBs#	<35	<35									<35	ug/kg	TM17/PM8

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Malone O'Regan
Reference: E2343
Location: Muriens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1058

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	58-60	61-63											
Sample ID	TP02	TP03											
Depth	1.50-2.50	0.00-0.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	23/01/2025	23/01/2025											
Sample Type	Soil	Soil											
Batch Number	1	1									LOD/LOR	Units	Method No.
Date of Receipt	24/01/2025	24/01/2025											
Phenol #	<0.01	<0.01									<0.01	mg/kg	TM26/PM21B
Natural Moisture Content	4.3	4.0									<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	4.1	3.9									<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3									<0.3	mg/kg	TM38/PM20
Chromium III	17.8	24.5									<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5									<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	0.16	0.18									<0.02	%	TM21/PM24
Sulphide	<10	<10									<10	mg/kg	TM107/PM45
Elemental Sulphur	2	4									<1	mg/kg	TM108/PM114
pH #	9.49	9.03									<0.01	pH units	TM73/PM11

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Malone O'Regan
Reference: E2343
Location: Muriens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1058

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	16-18	28-30	31-33	37-39	40-42	43-45	46-48	52-54			
Sample ID	TP04	TP04	TP05	TP06	TP06	TP01	TP01	TP01	TP01	TP02			
Depth	0.00-0.50	0.50-1.50	0.00-0.50	0.00-0.50	0.50-1.50	0.00-0.50	0.50-1.50	1.50-2.50	2.50-3.50	0.00-0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025			
Dissolved Antimony #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025	<0.0025	0.0029	<0.0025	0.0026	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025	0.029	<0.025	0.026	<0.025	<0.025	<0.025	<0.025	<0.025	mg/kg	TM30/PM17
Dissolved Barium #	<0.003	<0.003	0.016	0.004	<0.003	<0.003	0.003	<0.003	<0.003	0.004	<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	<0.03	0.16	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	0.04	<0.03	mg/kg	TM30/PM17
Dissolved Boron #	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	<0.012	mg/l	TM30/PM17
Dissolved Boron (A10) #	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	<0.12	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.003	<0.002	<0.002	<0.002	0.002	<0.002	0.003	<0.002	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	0.003	<0.003	0.005	0.040	<0.003	0.003	0.004	0.003	<0.003	0.003	<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	0.03	<0.03	0.05	0.40	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM26/PM0
Fluoride	0.6	0.4	<0.3	0.4	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/l	TM173/PM0
Fluoride	6	4	<3	4	<3	<3	<3	<3	<3	<3	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<0.5	<0.5	3.6	5.2	3.5	18.9	19.0	2.0	4.2	<0.5	<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	<5	<5	36	52	35	189	190	20	42	<5	<5	mg/kg	TM38/PM0
Mass of raw test portion	0.1145	0.1025	0.0983	0.1042	0.0951	0.1052	0.118	0.1017	0.1029	0.0953		kg	NONE/PM17
Chloride #	0.6	0.4	12.8	0.8	0.5	1.6	1.0	0.5	0.6	0.3	<0.3	mg/l	TM38/PM0
Chloride #	6	4	128	8	5	16	10	5	6	<3	<3	mg/kg	TM38/PM0
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09		kg	NONE/PM17
Ammoniacal Nitrogen as N #	<0.03	<0.03	<0.03	0.06	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/l	TM38/PM0

Client Name: Malone O'Regan
Reference: E2343
Location: Muriens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1058

Report : **CEN 10:1 1 Batch**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	16-18	28-30	31-33	37-39	40-42	43-45	46-48	52-54			
Sample ID	TP04	TP04	TP05	TP06	TP06	TP01	TP01	TP01	TP01	TP02			
Depth	0.00-0.50	0.50-1.50	0.00-0.50	0.00-0.50	0.50-1.50	0.00-0.50	0.50-1.50	1.50-2.50	2.50-3.50	0.00-0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025	24/01/2025			
Ammoniacal Nitrogen as N #	<0.3	<0.3	<0.3	0.6	0.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	<2	<2	3	<2	3	5	<2	<2	<2	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20	<20	30	<20	30	50	<20	<20	<20	<20	mg/kg	TM60/PM0
Total Dissolved Solids #	72	46	60	65	43	207	317	97	91	<35	<35	mg/l	TM20/PM0
Total Dissolved Solids #	720	460	600	650	430	2070	3170	970	910	<350	<350	mg/kg	TM20/PM0

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Client Name:	Malone O'Regan
Reference:	E2343
Location:	Muriens Quarry
Contact:	Enrique Garcia
EMT Job No:	25/1058

Report : **CEN 10:1 1 Batch**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	58-60	61-63											
Sample ID	TP02	TP03											
Depth	1.50-2.50	0.00-0.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	23/01/2025	23/01/2025											
Sample Type	Soil	Soil											
Batch Number	1	1									LOD/LOR	Units	Method No.
Date of Receipt	24/01/2025	24/01/2025											
Dissolved Antimony #	<0.002	<0.002									<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025									<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025									<0.025	mg/kg	TM30/PM17
Dissolved Barium #	<0.003	<0.003									<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Dissolved Boron #	<0.012	<0.012									<0.012	mg/l	TM30/PM17
Dissolved Boron (A10) #	<0.12	<0.12									<0.12	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005									<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005									<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015									<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015									<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007									<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07									<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005									<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05									<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	<0.002	<0.002									<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002									<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003									<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003									<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001									<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001									<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01									<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1									<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3									<0.3	mg/l	TM173/PM0
Fluoride	<3	<3									<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<0.5	<0.5									<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	<5	<5									<5	mg/kg	TM38/PM0
Mass of raw test portion	0.0958	0.0949										kg	NONE/PM17
Chloride #	0.5	0.3									<0.3	mg/l	TM38/PM0
Chloride #	5	3									<3	mg/kg	TM38/PM0
Mass of dried test portion	0.09	0.09										kg	NONE/PM17
Ammoniacal Nitrogen as N #	<0.03	<0.03									<0.03	mg/l	TM38/PM0

Client Name: Malone O'Regan
Reference: E2343
Location: Muriens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1058

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	58-60	61-63											
Sample ID	TP02	TP03											
Depth	1.50-2.50	0.00-0.50											
COC No / misc													
Containers	V J T	V J T											
Sample Date	23/01/2025	23/01/2025											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	24/01/2025	24/01/2025									LOD/LOR	Units	Method No.
Ammoniacal Nitrogen as N $^{\#}$	<0.3	<0.3									<0.3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	<2									<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20									<20	mg/kg	TM60/PM0
Total Dissolved Solids $^{\#}$	<35	<35									<35	mg/l	TM20/PM0
Total Dissolved Solids $^{\#}$	<350	<350									<350	mg/kg	TM20/PM0

Mass of sample taken (kg)	0.1145	Dry Matter Content Ratio (%) =	78.8
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.876
Particle Size <4mm =	>95%		

EMT Job No	**25/1058**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**3**			
Client Sample No	**TP04**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.00-0.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.83	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-
Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.03	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	0.03	4	50	200
Chloride	6	800	15000	25000
Fluoride	6	10	150	500
Sulphate as SO4	<5	1000	20000	50000
Total Dissolved Solids	720	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

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Mass of sample taken (kg)	0.1025	Dry Matter Content Ratio (%) =	87.5
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.887
Particle Size <4mm =	>95%		

EMT Job No	**25/1058**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**6**			
Client Sample No	**TP04**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.50-1.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.32	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-
Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	4	800	15000	25000
Fluoride	4	10	150	500
Sulphate as SO4	<5	1000	20000	50000
Total Dissolved Solids	460	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

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Mass of sample taken (kg)	0.0983	Dry Matter Content Ratio (%) =	91.4
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.892
Particle Size <4mm =	>95%		

EMT Job No	**25/1058**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**18**			
Client Sample No	**TP05**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.00-0.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.22	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	0.16	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	0.05	4	50	200
Chloride	128	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	36	1000	20000	50000
Total Dissolved Solids	600	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

Mass of sample taken (kg)	0.1042	Dry Matter Content Ratio (%) =	86.4
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.886
Particle Size <4mm =	>95%		

EMT Job No	**25/1058**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**30**			
Client Sample No	**TP06**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.00-0.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.70	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	922	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-
Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	0.029	0.5	2	25
Barium	0.04	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	0.40	4	50	200
Chloride	8	800	15000	25000
Fluoride	4	10	150	500
Sulphate as SO4	52	1000	20000	50000
Total Dissolved Solids	650	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	30	500	800	1000

Mass of sample taken (kg)	0.0951	Dry Matter Content Ratio (%) =	94.1
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.894
Particle Size <4mm =	>95%		

		Landfill Waste Acceptance Criteria Limits		
EMT Job No	**25/1058**			
Sample No	**33**			
Client Sample No	**TP06**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.50-1.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.39	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	138	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-
Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	5	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	35	1000	20000	50000
Total Dissolved Solids	430	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

Mass of sample taken (kg)	0.1052	Dry Matter Content Ratio (%) =	85.8
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.885
Particle Size <4mm =	>95%		

		Landfill Waste Acceptance Criteria Limits		
EMT Job No	**25/1058**			
Sample No	**39**			
Client Sample No	**TP01**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.00-0.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.69	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-
Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	0.026	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	16	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	189	1000	20000	50000
Total Dissolved Solids	2070	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	30	500	800	1000

Mass of sample taken (kg)	0.118	Dry Matter Content Ratio (%) =	76.3
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.872
Particle Size <4mm =	>95%		

EMT Job No	**25/1058**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**42**			
Client Sample No	**TP01**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.50-1.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.81	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.03	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	0.04	4	50	200
Chloride	10	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	190	1000	20000	50000
Total Dissolved Solids	3170	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	50	500	800	1000

Mass of sample taken (kg)	0.1017	Dry Matter Content Ratio (%) =	88.4
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.888
Particle Size <4mm =	>95%		

EMT Job No	**25/1058**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**45**			
Client Sample No	**TP01**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**1.50-2.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.29	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-
Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	5	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	20	1000	20000	50000
Total Dissolved Solids	970	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

Mass of sample taken (kg)	0.1029	Dry Matter Content Ratio (%) =	87.5
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.887
Particle Size <4mm =	>95%		

EMT Job No	**25/1058**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**48**			
Client Sample No	**TP01**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**2.50-3.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.23	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	6	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	42	1000	20000	50000
Total Dissolved Solids	910	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

Mass of sample taken (kg)	0.0953	Dry Matter Content Ratio (%) =	93.9
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.894
Particle Size <4mm =	>95%		

EMT Job No	**25/1058**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**54**			
Client Sample No	**TP02**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.00-0.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.17	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	38	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	0.04	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	<3	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	<5	1000	20000	50000
Total Dissolved Solids	<350	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

Mass of sample taken (kg)	0.0958	Dry Matter Content Ratio (%) =	93.5
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.894
Particle Size <4mm =	>95%		

		Landfill Waste Acceptance Criteria Limits		
EMT Job No	**25/1058**			
Sample No	**60**			
Client Sample No	**TP02**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**1.50-2.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.16	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	87	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	5	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	<5	1000	20000	50000
Total Dissolved Solids	<350	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

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Mass of sample taken (kg)	0.0949	Dry Matter Content Ratio (%) =	95.2
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.896
Particle Size <4mm =	>95%		

EMT Job No	**25/1058**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**63**			
Client Sample No	**TP03**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.00-0.50**			
Sample Date	**23/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	0.18	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	<30	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-

Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	<0.03	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	3	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	<5	1000	20000	50000
Total Dissolved Solids	<350	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	<20	500	800	1000

Client Name: Malone O'Regan
Reference: E2343
Location: Muriens Quarry
Contact: Enrique Garcia

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
25/1058	1	TP04	0.00-0.50	1-3	No interpretation possible
25/1058	1	TP04	0.50-1.50	4-6	No interpretation possible
25/1058	1	TP05	0.00-0.50	16-18	No interpretation possible
25/1058	1	TP06	0.00-0.50	28-30	Trace of lubricating oil
25/1058	1	TP06	0.50-1.50	31-33	Trace of possible lubricating oil
25/1058	1	TP01	0.00-0.50	37-39	No interpretation possible
25/1058	1	TP01	0.50-1.50	40-42	No interpretation possible
25/1058	1	TP01	1.50-2.50	43-45	No interpretation possible
25/1058	1	TP01	2.50-3.50	46-48	No interpretation possible
25/1058	1	TP02	0.00-0.50	52-54	No interpretation possible
25/1058	1	TP02	1.50-2.50	58-60	Trace of diesel
25/1058	1	TP03	0.00-0.50	61-63	No interpretation possible

Client Name:	Malone O'Regan
Reference:	E2343
Location:	Muriens Quarry
Contact:	Enrique Garcia

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
25/1058	1	TP04	0.00-0.50	2	Anthony Carman	07/02/2025	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	07/02/2025	**Asbestos Fibres**	NAD
					Anthony Carman	07/02/2025	**Asbestos ACM**	NAD
					Anthony Carman	07/02/2025	**Asbestos Type**	NAD
25/1058	1	TP04	0.50-1.50	5	Anthony Carman	07/02/2025	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	07/02/2025	**Asbestos Fibres**	NAD
					Anthony Carman	07/02/2025	**Asbestos ACM**	NAD
					Anthony Carman	07/02/2025	**Asbestos Type**	NAD
25/1058	1	TP05	0.00-0.50	17	Simon Postlewhite	11/02/2025	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	11/02/2025	**Asbestos Fibres**	NAD
					Simon Postlewhite	11/02/2025	**Asbestos ACM**	NAD
					Simon Postlewhite	11/02/2025	**Asbestos Type**	NAD
25/1058	1	TP06	0.00-0.50	29	Anthony Carman	07/02/2025	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	07/02/2025	**Asbestos Fibres**	Fibre Bundles
					Anthony Carman	07/02/2025	**Asbestos ACM**	NAD
					Anthony Carman	07/02/2025	**Asbestos Type**	Chrysotile
					Anthony Carman	07/02/2025	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					Anthony Carman	07/02/2025	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					Anthony Carman	07/02/2025	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					Remigiusz Blichowski	10/02/2025	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					Remigiusz Blichowski	10/02/2025	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
25/1058	1	TP06	0.50-1.50	32	Charlotte Taylor	11/02/2025	**General Description (Bulk Analysis)**	brown soil/stones
					Charlotte Taylor	11/02/2025	**Asbestos Fibres**	NAD
					Charlotte Taylor	11/02/2025	**Asbestos ACM**	NAD
					Charlotte Taylor	11/02/2025	**Asbestos Type**	NAD
25/1058	1	TP01	0.00-0.50	38	Anthony Carman	11/02/2025	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	11/02/2025	**Asbestos Fibres**	NAD
					Anthony Carman	11/02/2025	**Asbestos ACM**	NAD
					Anthony Carman	11/02/2025	**Asbestos Type**	NAD
25/1058	1	TP01	0.50-1.50	41	Catherine Coles	11/02/2025	**General Description (Bulk Analysis)**	brown soil,stone
					Catherine Coles	11/02/2025	**Asbestos Fibres**	NAD
					Catherine Coles	11/02/2025	**Asbestos ACM**	NAD
					Catherine Coles	11/02/2025	**Asbestos Type**	NAD

Client Name: Malone O'Regan
Reference: E2343
Location: Muriens Quarry
Contact: Enrique Garcia

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
25/1058	1	TP01	1.50-2.50	44	Charlotte Taylor	11/02/2025	**General Description (Bulk Analysis)**	brown soil/stones
					Charlotte Taylor	11/02/2025	**Asbestos Fibres**	NAD
					Charlotte Taylor	11/02/2025	**Asbestos ACM**	NAD
					Charlotte Taylor	11/02/2025	**Asbestos Type**	NAD
25/1058	1	TP01	2.50-3.50	47	Catherine Coles	11/02/2025	**General Description (Bulk Analysis)**	brown soil,stone
					Catherine Coles	11/02/2025	**Asbestos Fibres**	NAD
					Catherine Coles	11/02/2025	**Asbestos ACM**	NAD
					Catherine Coles	11/02/2025	**Asbestos Type**	NAD
25/1058	1	TP02	0.00-0.50	53	Simon Postlewhite	11/02/2025	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	11/02/2025	**Asbestos Fibres**	NAD
					Simon Postlewhite	11/02/2025	**Asbestos ACM**	NAD
					Simon Postlewhite	11/02/2025	**Asbestos Type**	NAD
25/1058	1	TP02	1.50-2.50	59	Anthony Carman	11/02/2025	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	11/02/2025	**Asbestos Fibres**	NAD
					Anthony Carman	11/02/2025	**Asbestos ACM**	NAD
					Anthony Carman	11/02/2025	**Asbestos Type**	NAD
25/1058	1	TP03	0.00-0.50	62	Simon Postlewhite	11/02/2025	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	11/02/2025	**Asbestos Fibres**	NAD
					Simon Postlewhite	11/02/2025	**Asbestos ACM**	NAD
					Simon Postlewhite	11/02/2025	**Asbestos Type**	NAD

Client Name: Malone O'Regan
Reference: E2343
Location: Muriens Quarry
Contact: Enrique Garcia

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 25/1058						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.
It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 25/1058

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35 degrees Celsius or 105 degrees Celsius. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.	Yes		AD	Yes

EMT Job No: 25/1058

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.	Yes		AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 degrees Celsius. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 degrees Celsius. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.	Yes		AD	Yes

EMT Job No: 25/1058

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Determination of Mercury by Cold Vapour Atomic Fluorescence - WATERS: Modified USEPA Method 245.7, Rev 2, Feb 2005. SOILS: Modified USEPA Method 7471B, Rev.2, Feb 2007	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM108	Determination of Elemental Sulphur by Reversed Phase High Performance Liquid Chromatography with Ultra Violet spectroscopy.	PM114	End over end extraction of dried and crushed soil samples for organic analysis. The solvent mix varies depending on analysis required			AD	Yes
TM131	Quantification of Asbestos Fibres and ACM based on HSG 248 Second edition:2021, HSG 264 Second edition:2012, HSE Contract Research Report No.83/1996, MDHS 87:1998, WM3 1st Edition v1.1:2018	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes

EMT Job No: 25/1058

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35 degrees Celsius or 105 degrees Celsius. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

APPENDIX 7-3

Sample ID		TP01	TP01	TP01	TP01	TP02	TP02	TP03	TP04	TP04	TP05	TP06	TP06
Sample Depth (mbgl)		0.00-0.50	0.50-1.50	1.50-2.50	2.50-3.50	0.00-0.50	1.50-2.50	0.00.0.50	0.00-0.50	0.50-1.50	0.00-0.50	0.00-0.50	0.50-1.50
Laboratory Report No.		25/1058	25/1058	25/1058	25/1058	25/1058	25/1058	25/1058	25/1058	25/1058	25/1058	25/1058	25/1058
Laboratory Sample No.		37-39	40-42	43-45	46-48	52-54	58-60	61-63	1-3	4-6	16-18	28-30	31-33
Total Organic Carbon	%	0.69	0.81	0.29	0.23	0.17	0.16	0.18	0.83	0.32	0.22	0.70	0.39
Calculated SOM	%	1.20	1.41	0.50	0.40	0.30	0.28	0.31	1.44	0.56	0.38	1.22	0.68

TOC to SOM conversion rate: %SOM = TOC(%)*1.74

Soil Organic Matter Results		
Max	Min	Average
1.44	0.28	0.72

E2343 - Murrens Quarry, Co. Meath
Table 1: Soils Analytical Results

			CL:AIRE Generic Assessment Criteria[1]	LQM/CIEH (Generic Assessment Criteria)[2] S4UL	Category 4 Screening Levels[3] C4SL												
Sample ID	**Units**	**LOD**	**Commercial 1%SOM**	**Commercial 1%SOM**	**Commercial 1%SOM**	TP01	TP01	TP01	TP01	TP02	TP02	TP03	TP04	TP04	TP05	TP06	TP06
Depth (mbgl)						0.00-0.50	0.50-1.50	1.50-2.50	2.50-3.50	0.00-0.50	1.50-2.50	0.00.0.50	0.00-0.50	0.50-1.50	0.00-0.50	0.00-0.50	0.50-1.50
Sample Date						23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025
Sample Type						Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Soil Characteristic Parameters																	
Natural Moisture Content	%	<0.1	-	-	-	11.9	12.1	4.8	7.5	4.3	4.3	4.0	16.7	8.8	8.5	8.4	6.4
Moisture Content (% Wet Weight)	%	<0.1	-	-	-	10.6	10.8	4.5	6.9	4.1	4.1	3.9	14.3	8.1	7.8	7.8	6.0
Indicators																	
Total Organic Carbon	%	<0.02	-	-	-	0.69	0.81	0.29	0.23	0.17	0.16	0.18	0.83	0.32	0.22	0.70	0.39
Soil Organic Matter (MOR calculation)	%	-	-	-	-	1.2	1.4	0.5	0.4	0.3	0.3	0.3	1.4	0.6	0.4	1.2	0.7
Total Cyanide	mg/kg	<0.5	-	-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Sulphide	mg/kg	<10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Elemental Sulphur	mg/kg	<1	-	-	-	2.0	3.0	3.0	4.0	2.0	2.0	4.0	3.0	3.0	3.0	8.0	5.0
pH	pH Units	<0.01				7.90	7.73	8.23	8.37	9.04	9.49	9.03	8.35	8.61	8.59	8.49	8.56
Phenol	mg/kg	<0.01	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Fluoride	mg/kg	<3	-	-	-	<3	<3	<3	<3	<3	<3	<3	6.0	4.0	<3	4.0	<3
Chloride	mg/kg	<3	-	-	-	16	10	5	6	<3	5.0	3.0	6	4	128	8	5
Ammoniacal Nitrogen as N	mg/kg	<0.3	-	-	-	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.6	0.5
Asbestos																	
General Description (Bulk Analysis)	None		-	-	-	Brown Soil/Stones	Brown Soil/Stones	Brown Soil/Stones	Brown soil/stones	Brown soil, stones	Brown Soil/Stones	Brown soil/stones	Brown Soil/Stones	Brown Soil/Stones	Brown Soil/Stones	Brown Soil/Stones	Brown Soil/Stones
Asbestos Fibres	None		-	-	-	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	Fibre bundles	NAD
Asbestos ACM	None		-	-	-	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD
Asbestos Type	None		-	-	-	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	Chrsotile	NAD
Total ACM Gravimetric Quantification (% Asb)						-	-	-	-	-	-	-	-	-	-	<0.001	-
Total Detailed Gravimetric Quantification (% Asb)						-	-	-	-	-	-	-	-	-	-	<0.001	-
Total Gravimetric Quantification (ACM + Detailed) (% Asb)						-	-	-	-	-	-	-	-	-	-	<0.001	-
Asbestos PCOM Quantification (Fibres)						-	-	-	-	-	-	-	-	-	-	<0.001	-
Asbestos Gravimetric & PCOM Total						-	-	-	-	-	-	-	-	-	-	<0.001	-
Mass of raw test portion	kg			-	-	0.1052	0.118	0.1017	0.1029	0.0953	0.0958	0.0949	0.1145	0.1025	0.0983	0.1042	0.0951
Mass of dried test portion	kg			-	-	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09
Metals																	
Antimony	mg/kg	<1	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Arsenic	mg/kg	<0.5	-	640	640	3.8	3.4	3.1	2.0	1.4	1.7	2.7	3.2	4.0	2.7	3.8	3.3
Barium	mg/kg	<1	22000	-	-	22	20	9	14	9	13	12	18	24	39	25	16
Cadmium	mg/kg	<0.1	-	190	410	0.4	0.5	0.3	0.4	0.3	0.5	0.5	0.4	0.7	0.4	0.5	0.5
Chromium III	mg/kg	<0.5	-	8600	-	61.3	26.0	17.0	15.0	8.4	17.8	24.5	24.7	28.8	35.7	20.6	19.8
Chromium VI (Hexavalent)	mg/kg	<0.5	-	33	49	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Chromium (Total)	mg/kg	<0.3	-	-	-	61.3	26.0	17.0	15.0	8.4	17.8	24.5	24.7	28.8	35.7	20.6	19.8
Copper	mg/kg	<1	-	68000	-	8	6	5	6	4	4	6	6	11	10	57	10
Lead	mg/kg	<5	-	-	2300	8	8	<5	<5	<5	<5	<5	6	5	6	30	11
Mercury	mg/kg	<0.1	-	1,100	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Molybdenum	mg/kg	<0.1	-	-	-	3.8	1.6	1.3	0.8	0.2	0.2	1.3	1.3	1.3	2.0	1.4	1.2
Nickel	mg/kg	<0.7	-	980	-	19.8	12.1	9.4	8.5	6.5	8.3	11.5	13.6	27.1	16.3	29.8	14.9
Selenium	mg/kg	<1	-	12000	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Total Sulphate as SO4	mg/kg	<50	-	-	-	381	466	193	232	231	224	239	411	273	219	492	408
Water Soluble Boron	mg/kg	<0.1	-	240000	-	0.8	0.8	0.4	0.4	0.3	0.3	0.4	1.0	0.7	0.5	0.8	0.6
Zinc	mg/kg	<5	-	730000	-	62	44	20	24	21	28	36	40	52	54	168	78
Mineral Oil																	
C8-C40 Mineral Oil (Calculation)	mg/kg	<30	-	-	-	<30	<30	<30	<30	38	87	<30	<30	<30	<30	922	138
TPH CWG																	
Aliphatics																	
>C5-C6	mg/kg	<0.1	-	3200	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1
>C6-C8	mg/kg	<0.1	-	7800	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1
>C8-C10	mg/kg	<0.1	-	2000	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1
>C10-C12	mg/kg	<0.2	-	9700	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>C12-C16	mg/kg	<4	-	59000	-	<4	<4	<4	<4	<4	14	<4	<4	<4	<4	<4	<4
>C16-C21	mg/kg	<7	-	1600000	-	<7	<7	<7	<7	27	56	<7	<7	<7	<7	12	<7
>C21-C35	mg/kg	<7	-	-	-	<7	<7	<7	<7	11	17	<7	<7	<7	<7	829	124
>C35-C40	mg/kg	<7	-	-	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	81	14
Total aliphatics C5-40	mg/kg	<26	-	-	-	<26	<26	<26	<26	38	87	<26	<26	<26	<26	922	138
>C6-C10 (HS_1D_AL)	mg/kg	<0.1	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{SV}	<0.1
>C10-C25 (EH_CU_1D_AL)	mg/kg	<10	-	-	-	<10	<10	<10	<10	39	87	<10	<10	<10	<10	139	17
>C25-C35 (EH_CU_1D_AL)	mg/kg	<10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	702	107

Completed by: EG
Checked by:

			CL:AIRE Generic Assessment Criteria[1]	LQM/CIEH (Generic Assessment Criteria)[2] S4UL	Category 4 Screening Levels[3] C4SL												
Sample ID	**Units**	**LOD**	**Commercial 1%SOM**	**Commercial 1%SOM**	**Commercial 1%SOM**	TP01	TP01	TP01	TP01	TP02	TP02	TP03	TP04	TP04	TP05	TP06	TP06
Depth (mbgl)						0.00-0.50	0.50-1.50	1.50-2.50	2.50-3.50	0.00-0.50	1.50-2.50	0.00.0.50	0.00-0.50	0.50-1.50	0.00-0.50	0.00-0.50	0.50-1.50
Sample Date						23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025	23/01/2025
Sample Type						Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Sample Type						Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
Aromatics																	
>EC5-EC7	mg/kg	<0.1	-	26000	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{sv}	<0.1
>EC7-EC8	mg/kg	<0.1	-	56000	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{sv}	<0.1
>EC8-EC10	mg/kg	<0.1	-	3500	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{sv}	<0.1
>EC10-EC12	mg/kg	<0.2	-	16000	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
>EC12-EC16	mg/kg	<4	-	36000	-	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4
>EC16-EC21	mg/kg	<7	-	28000	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7
>EC21-EC35	mg/kg	<7	-	28000	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	312	43
>EC35-EC40	mg/kg	<7	-	-	-	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	59	<7
Total aromatics C5-40	mg/kg	<26	-	-	-	<26	<26	<26	<26	<26	<26	<26	<26	<26	<26	371	43
Total aliphatics and aromatics(C5-40)	mg/kg	<52	-	-	-	<52	<52	<52	<52	<52	87	<52	<52	<52	<52	1293	181
>EC6-EC10 (HS_1D_AR)#	mg/kg	<0.1	-	-	-	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1^{sv}	<0.1
>EC10-EC25 (EH_CU_1D_AR)	mg/kg	<10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	56	<10
>EC25-EC35 (EH_CU_1D_AR)	mg/kg	<10	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	262	35
PETROLEUM HYDROCARBONS																	
BTEX/MTBE																	
Methyl Tertiary Butyl Ether (MTBE)	mg/kg	<0.005	7900	-	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5^{sv}	<5
Benzene	mg/kg	<0.005	-	27	27	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5^{sv}	<5
Toluene	mg/kg	<0.005	-	56000	-	<5	<5	<5	6	<5	<5	6	<5	<5	<5	<5^{sv}	7
Ethylbenzene	mg/kg	<0.005	-	5700	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5^{sv}	<5
m/p-Xylene	mg/kg	<0.005	-	6200 / 5900	-	<5	<5	<5	8	<5	<5	<5	<5	<5	<5	<5^{sv}	5
o-Xylene	mg/kg	<0.005	-	6600	-	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5^{sv}	<5
EPH Interpretation						No interpretation possible	No interpretation possible	No interpretation possible	No interpretation possible	No interpretation possible	Trace of diesel	No interpretation possible	No interpretation possible	No interpretation possible	No interpretation possible	Trace of lubricating oil	Trace of possible lubricating oil
EU Indicator Polychlorinated Biphenyls (PCBs)																	
PCB 28	mg/kg	<0.005	10[4]			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCB 52	mg/kg	<0.005	10[4]			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCB 101	mg/kg	<0.005	10[4]			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCB 118	mg/kg	<0.005	10[4]			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCB 138	mg/kg	<0.005	10[4]			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCB 153	mg/kg	<0.005	10[4]			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
PCB 180	mg/kg	<0.005	10[4]			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Total 7 PCBs	mg/kg	<0.035	50[4]			<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035
Polycyclic Aromatic Hydrocarbons (PAHs)																	
Naphthalene	mg/kg	<0.04	-	190	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Acenaphthylene	mg/kg	<0.03	-	83000	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Acenaphthene	mg/kg	<0.05	-	84000	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	mg/kg	<0.04	-	63000	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Phenanthrene	mg/kg	<0.03	-	22000	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03
Anthracene	mg/kg	<0.04	-	520000	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Fluoranthene	mg/kg	<0.03	-	23000	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.09	<0.03
Pyrene	mg/kg	<0.03	-	54000	-	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.08	<0.03
Benzo(a)anthracene	mg/kg	<0.06	-	170	-	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06
Chrysene	mg/kg	<0.02	-	350	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02
Benzo(bk)fluoranthene	mg/kg	<0.07	-	-	-	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07
Benzo(a)pyrene	mg/kg	<0.04	-	35	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Indeno(123cd)pyrene	mg/kg	<0.04	-	500	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Dibenzo(ah)anthracene	mg/kg	<0.04	-	3.5	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Benzo(ghi)perylene	mg/kg	<0.04	-	3900	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
Coronene	mg/kg	<0.04	-	-	-	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04
PAH 6 Total	mg/kg	<0.22				<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22
PAH 17 Total	mg/kg	<0.64	-	-	-	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64
Benzo(b)fluoranthene	mg/kg	<0.05	-	44	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(k)fluoranthene	mg/kg	<0.02	-	1200	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Benzo(j)fluoranthene	mg/kg	<0	-	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
PAH Surrogate % Recovery	%	<1	-	-	-	88	85	91	105	88	45^{sv}	88	89	90	92	108	92

Notes:

NAD-No Asbestos Detected

1 - Contaminated Land: Applications in Real Environments (CL:AIRE), December 2009: The Soil Generic Assessment Criteria for Human Health Risk Assessment.

2 - LQM/CIEH , December 2015: S4ULs for Human Health Risk Assessment) "Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3548. All rights reserved."

3 - DEFRA, 2014: Development of Category 4 Screening Levels (C4SL) for Assessment of Land Affected by Contamination - Policy Companion Document.

4 - EPA, 2017: Local Authority PCB Contaminated Land Guidance, Section 6.2

Completed by: EG
Checked by:

APPENDIX 8

APPENDIX 8-1

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781

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Malone O'Regan
Ground Floor - Unit 3
Bracken Business Park
Bracken Road
Sandyford
Dublin 18
Ireland
D18 V4K6

4225

Attention : Enrique Garcia

Date : 18th February, 2025

Your reference : E2343

Our reference : Test Report 25/1344 Batch 1

Location : Murrens Quarry

Date samples received : 30th January, 2025

Status : Final Report

Issue : 202502181001

Four samples were received for analysis on 30th January, 2025 of which four were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

The greenhouse gas emissions generated (in Carbon – Co2e) to obtain the results in this report are estimated as:

Scope 1&2 emissions - 16.58 kg of CO2

Scope 1&2&3 emissions - 39.182 kg of CO2

Authorised By:

Bruce Leslie
Project Manager

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1344

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	19-21												
Sample ID	ST01												
Depth	0.00-0.20												
COC No / misc													
Containers	V J T												
Sample Date	27/01/2025												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	30/01/2025										LOD/LOR	Units	Method No.
Antimony	171$_{AC}$										<1	mg/kg	TM30/PM15
Arsenic$^{\#}$	0.8										<0.5	mg/kg	TM30/PM15
Barium$^{\#}$	11										<1	mg/kg	TM30/PM15
Cadmium$^{\#}$	5.4										<0.1	mg/kg	TM30/PM15
Chromium$^{\#}$	8.5										<0.5	mg/kg	TM30/PM15
Copper$^{\#}$	21920$_{AE}$										<1	mg/kg	TM30/PM15
Lead$^{\#}$	240										<5	mg/kg	TM30/PM15
Mercury$^{\#}$	<0.1										<0.1	mg/kg	TM30/PM15
Molybdenum$^{\#}$	0.7										<0.1	mg/kg	TM30/PM15
Nickel$^{\#}$	2.7										<0.7	mg/kg	TM30/PM15
Selenium$^{\#}$	3										<1	mg/kg	TM30/PM15
Total Sulphate as SO4$^{\#}$	163										<50	mg/kg	TM50/PM29
Water Soluble Boron$^{\#}$	0.3										<0.1	mg/kg	TM74/PM32
Zinc$^{\#}$	1407										<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene$^{\#}$	<0.08$_{AA}$										<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.06$_{AA}$										<0.03	mg/kg	TM4/PM8
Acenaphthene$^{\#}$	0.16$_{AA}$										<0.05	mg/kg	TM4/PM8
Fluorene$^{\#}$	0.21$_{AA}$										<0.04	mg/kg	TM4/PM8
Phenanthrene$^{\#}$	0.83$_{AA}$										<0.03	mg/kg	TM4/PM8
Anthracene$^{\#}$	0.11$_{AA}$										<0.04	mg/kg	TM4/PM8
Fluoranthene$^{\#}$	1.41$_{AA}$										<0.03	mg/kg	TM4/PM8
Pyrene$^{\#}$	0.91$_{AA}$										<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene$^{\#}$	0.16$_{AA}$										<0.06	mg/kg	TM4/PM8
Chrysene$^{\#}$	0.21$_{AA}$										<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene$^{\#}$	<0.14$_{AA}$										<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene$^{\#}$	<0.08$_{AA}$										<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene$^{\#}$	<0.08$_{AA}$										<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene$^{\#}$	<0.08$_{AA}$										<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene$^{\#}$	<0.08$_{AA}$										<0.04	mg/kg	TM4/PM8
Coronene	<0.08$_{AA}$										<0.04	mg/kg	TM4/PM8
PAH 6 Total$^{\#}$	1.41$_{AA}$										<0.22	mg/kg	TM4/PM8
PAH 17 Total	4.00$_{AA}$										<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.10$_{AA}$										<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.04$_{AA}$										<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<2$_{AA}$										<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	44$^{SV}_{AA}$										<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	6622										<30	mg/kg	TM5/PM8/PM16

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	Malone O'Regan	**Report :**	**Solid**
Reference:	E2343		
Location:	Murrens Quarry	**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Enrique Garcia		
EMT Job No:	25/1344		

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	19-21												
Sample ID	ST01												
Depth	0.00-0.20												
COC No / misc													
Containers	V J T												
Sample Date	27/01/2025												
Sample Type	Soil												
Batch Number	1											LOD/LOR	Units	Method No.
Date of Receipt	30/01/2025													
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)#	<0.2$^{SV}_{AA}$										<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL)#	<0.2$^{SV}_{AA}$										<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.2$^{SV}_{AA}$										<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL)#	<0.2										<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL)#	8										<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)#	117										<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)#	4315										<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_CU_1D_AL)	2182										<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH_CU+HS_1D_AL)	6622										<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.2$^{SV}_{AA}$										<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_CU_1D_AL)	534										<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_CU_1D_AL)	3906										<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR)#	<0.2$^{SV}_{AA}$										<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<0.2$^{SV}_{AA}$										<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<0.2$^{SV}_{AA}$										<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	7.1										<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR)#	25										<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR)#	66										<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR)#	24745										<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_CU_1D_AR)	1539										<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH_CU+HS_1D_AR)	26382										<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH_CU+HS_1D_Total)	33004										<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR)#	<0.2$^{SV}_{AA}$										<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_CU_1D_AR)	1083										<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_CU_1D_AR)	23760										<10	mg/kg	TM5/PM8/PM16
MTBE#	<10$^{SV}_{AA}$										<5	ug/kg	TM36/PM12
Benzene#	<10$^{SV}_{AA}$										<5	ug/kg	TM36/PM12
Toluene#	<10$^{SV}_{AA}$										<5	ug/kg	TM36/PM12
Ethylbenzene#	<10$^{SV}_{AA}$										<5	ug/kg	TM36/PM12
m/p-Xylene#	<10$^{SV}_{AA}$										<5	ug/kg	TM36/PM12
o-Xylene#	<10$^{SV}_{AA}$										<5	ug/kg	TM36/PM12
PCB 28#	<50$^{SV}_{AC}$										<5	ug/kg	TM17/PM8
PCB 52#	<50$^{SV}_{AC}$										<5	ug/kg	TM17/PM8
PCB 101#	<50$^{SV}_{AC}$										<5	ug/kg	TM17/PM8
PCB 118#	<50$^{SV}_{AC}$										<5	ug/kg	TM17/PM8
PCB 138#	<50$^{SV}_{AC}$										<5	ug/kg	TM17/PM8
PCB 153#	<50$^{SV}_{AC}$										<5	ug/kg	TM17/PM8
PCB 180#	<50$^{SV}_{AC}$										<5	ug/kg	TM17/PM8
Total 7 PCBs#	<350$^{SV}_{AC}$										<35	ug/kg	TM17/PM8

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1344

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	19-21												
Sample ID	ST01												
Depth	0.00-0.20												
COC No / misc													
Containers	V J T												
Sample Date	27/01/2025												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	30/01/2025										LOD/LOR	Units	Method No.
Phenol #	<0.01										<0.01	mg/kg	TM26/PM21B
Natural Moisture Content	20.9										<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	17.3										<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3										<0.3	mg/kg	TM38/PM20
Chromium III	8.5										<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5										<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	8.52										<0.02	%	TM21/PM24
Sulphide	<10										<10	mg/kg	TM107/PM45
Elemental Sulphur	NDP										<1	mg/kg	TM108/PM114
pH #	8.68										<0.01	pH units	TM73/PM11

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1344

Report : **Liquid**

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-6	7-12	13-18			
Sample ID	BH01	BH02	BH03			
Depth						
COC No / misc						
Containers	V H P G	V H P G	V H P G			
Sample Date	27/01/2025	27/01/2025	27/01/2025			
Sample Type	Ground Water	Ground Water	Ground Water			
Batch Number	1	1	1			
Date of Receipt	30/01/2025	30/01/2025	30/01/2025	LOD/LOR	Units	Method No.
Dissolved Aluminium #	<20	<20	<20	<20	ug/l	TM30/PM14
Dissolved Arsenic #	<2.5	4.4	2.8	<2.5	ug/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	ug/l	TM30/PM14
Dissolved Zinc #	4	4	<3	<3	ug/l	TM30/PM14
PAH MS						
Naphthalene #	<0.1	<0.1	<0.1	<0.1	ug/l	TM4/PM30
Acenaphthylene #	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Acenaphthene #	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Fluorene #	<0.005	<0.005	0.006	<0.005	ug/l	TM4/PM30
Phenanthrene #	<0.005	<0.005	0.010	<0.005	ug/l	TM4/PM30
Anthracene #	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Fluoranthene #	<0.005	<0.005	0.005	<0.005	ug/l	TM4/PM30
Pyrene #	<0.005	<0.005	0.006	<0.005	ug/l	TM4/PM30
Benzo(a)anthracene #	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Chrysene #	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Benzo(bk)fluoranthene #	<0.008	<0.008	<0.008	<0.008	ug/l	TM4/PM30
Benzo(a)pyrene #	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Indeno(123cd)pyrene #	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Dibenzo(ah)anthracene #	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
Benzo(ghi)perylene #	<0.005	<0.005	<0.005	<0.005	ug/l	TM4/PM30
PAH 16 Total #	<0.173	<0.173	<0.173	<0.173	ug/l	TM4/PM30
Benzo(b)fluoranthene	<0.008	<0.008	<0.008	<0.008	ug/l	TM4/PM30
Benzo(k)fluoranthene	<0.008	<0.008	<0.008	<0.008	ug/l	TM4/PM30
PAH Surrogate % Recovery	89	87	87	<0	%	TM4/PM30

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1344

Report : **Liquid**

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-6	7-12	13-18										
Sample ID	BH01	BH02	BH03										
Depth													
COC No / misc													
Containers	V H P G	V H P G	V H P G										
Sample Date	27/01/2025	27/01/2025	27/01/2025										
Sample Type	Ground Water	Ground Water	Ground Water										
Batch Number	1	1	1								LOD/LOR	Units	Method No.
Date of Receipt	30/01/2025	30/01/2025	30/01/2025										
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Dieldrin	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan I	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan II	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Endrin	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.30$_{AD}$	<0.10$_{AC}$	<0.10$_{AC}$								<0.01	ug/l	TM149/PM30
Heptachlor	<0.30$_{AD}$	<0.05$_{AB}$	<0.05$_{AB}$								<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.30$_{AD}$	<0.05$_{AB}$	<0.05$_{AB}$								<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.30$_{AD}$	<0.10$_{AC}$	<0.10$_{AC}$								<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.30$_{AD}$	<0.05$_{AB}$	<0.05$_{AB}$								<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.30$_{AD}$	<0.05$_{AB}$	<0.05$_{AB}$								<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Organophosphorus Pesticides													
Azinphos methyl	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Diazinon	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Dichlorvos	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Disulfoton	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Ethion	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Fenitrothion	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Malathion	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
Mevinphos	<0.30$_{AD}$	<0.01	<0.01								<0.01	ug/l	TM149/PM30
EPH (C8-C40) (EH_1D_Total)$^{\#}$	<10	<10	<10								<10	ug/l	TM5/PM30
Alcohols/Acetates													
Tetrahydrofuran	<10	<10	<10								<10	ug/l	TM83/PM10
Sulphate as SO4$^{\#}$	29.9	49.3	45.7								<0.5	mg/l	TM38/PM0
Chloride$^{\#}$	32.4	12.1	4.6								<0.3	mg/l	TM38/PM0
Nitrate as NO3$^{\#}$	0.4	<0.2	4.7								<0.2	mg/l	TM38/PM0
Nitrite as NO2$^{\#}$	<0.02	<0.02	<0.02								<0.02	mg/l	TM38/PM0
MRP Ortho Phosphate as P	<0.03	<0.03	<0.03								<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as NH4$^{\#}$	0.07	0.78	0.05								<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<0.006	<0.006	<0.006								<0.006	mg/l	TM38/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1344

Report : **Liquid**

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-6	7-12	13-18										
Sample ID	BH01	BH02	BH03										
Depth													
COC No / misc													
Containers	V H P G	V H P G	V H P G										
Sample Date	27/01/2025	27/01/2025	27/01/2025										
Sample Type	Ground Water	Ground Water	Ground Water										
Batch Number	1	1	1										
Date of Receipt	30/01/2025	30/01/2025	30/01/2025								LOD/LOR	Units	Method No.
Total Alkalinity as CaCO3 #	500	746	176								<1	mg/l	TM75/PM0
Electrical Conductivity @25C #	771	700	386								<2	uS/cm	TM76/PM0
pH #	7.53	7.71	8.05								<0.01	pH units	TM73/PM0

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1344

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	19-21												
Sample ID	ST01												
Depth	0.00-0.20												
COC No / misc													
Containers	V J T												
Sample Date	27/01/2025												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	30/01/2025										LOD/LOR	Units	Method No.
Dissolved Antimony#	0.003										<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10)#	0.03										<0.02	mg/kg	TM30/PM17
Dissolved Arsenic#	<0.0025										<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10)#	<0.025										<0.025	mg/kg	TM30/PM17
Dissolved Barium#	0.027										<0.003	mg/l	TM30/PM17
Dissolved Barium (A10)#	0.27										<0.03	mg/kg	TM30/PM17
Dissolved Boron#	<0.012										<0.012	mg/l	TM30/PM17
Dissolved Boron (A10)#	<0.12										<0.12	mg/kg	TM30/PM17
Dissolved Cadmium#	<0.0005										<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10)#	<0.005										<0.005	mg/kg	TM30/PM17
Dissolved Chromium#	<0.0015										<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10)#	<0.015										<0.015	mg/kg	TM30/PM17
Dissolved Copper#	0.039										<0.007	mg/l	TM30/PM17
Dissolved Copper (A10)#	0.39										<0.07	mg/kg	TM30/PM17
Dissolved Lead#	<0.005										<0.005	mg/l	TM30/PM17
Dissolved Lead (A10)#	<0.05										<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum#	<0.002										<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10)#	<0.02										<0.02	mg/kg	TM30/PM17
Dissolved Nickel#	<0.002										<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10)#	<0.02										<0.02	mg/kg	TM30/PM17
Dissolved Selenium#	<0.003										<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10)#	<0.03										<0.03	mg/kg	TM30/PM17
Dissolved Zinc#	0.008										<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10)#	0.08										<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF#	<0.00001										<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF#	<0.0001										<0.0001	mg/kg	TM61/PM0
Phenol	<0.01										<0.01	mg/l	TM26/PM0
Phenol	<0.1										<0.1	mg/kg	TM26/PM0
Fluoride	<0.3										<0.3	mg/l	TM173/PM0
Fluoride	<3										<3	mg/kg	TM173/PM0
Sulphate as SO4#	1.4										<0.5	mg/l	TM38/PM0
Sulphate as SO4#	14										<5	mg/kg	TM38/PM0
Mass of raw test portion	0.1071											kg	NONE/PM17
Chloride#	1.6										<0.3	mg/l	TM38/PM0
Chloride#	16										<3	mg/kg	TM38/PM0
Mass of dried test portion	0.09											kg	NONE/PM17
Ammoniacal Nitrogen as N#	<0.03										<0.03	mg/l	TM38/PM0

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1344

Report : **CEN 10:1 1 Batch**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	19-21												
Sample ID	ST01												
Depth	0.00-0.20												
COC No / misc													
Containers	V J T												
Sample Date	27/01/2025												
Sample Type	Soil												
Batch Number	1												
Date of Receipt	30/01/2025										LOD/LOR	Units	Method No.
Ammoniacal Nitrogen as N #	<0.3										<0.3	mg/kg	TM38/PM0
Dissolved Organic Carbon	3										<2	mg/l	TM60/PM0
Dissolved Organic Carbon	30										<20	mg/kg	TM60/PM0
Total Dissolved Solids #	<35										<35	mg/l	TM20/PM0
Total Dissolved Solids #	<350										<350	mg/kg	TM20/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1344

SVOC Report : **Liquid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-6	7-12	13-18								LOD/LOR	Units	Method No.
Sample ID	BH01	BH02	BH03										
Depth													
COC No / misc													
Containers	V H P G	V H P G	V H P G										
Sample Date	27/01/2025	27/01/2025	27/01/2025										
Sample Type	Ground Water	Ground Water	Ground Water										
Batch Number	1	1	1										
Date of Receipt	30/01/2025	30/01/2025	30/01/2025										
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1								<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1								<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1								<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1								<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10								<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1								<1	ug/l	TM16/PM30
Phenol	<1	<1	<1								<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1								<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1								<1	ug/l	TM16/PM30
Naphthalene #	<1	<1	<1								<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1	<1								<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1	<1								<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1								<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1								<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5	<0.5								<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5								<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1								<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5								<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1								<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1								<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1								<1	ug/l	TM16/PM30

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1344

SVOC Report : **Liquid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-6	7-12	13-18							LOD/LOR	Units	Method No.
Sample ID	BH01	BH02	BH03									
Depth												
COC No / misc												
Containers	V H P G	V H P G	V H P G									
Sample Date	27/01/2025	27/01/2025	27/01/2025									
Sample Type	Ground Water	Ground Water	Ground Water									
Batch Number	1	1	1									
Date of Receipt	30/01/2025	30/01/2025	30/01/2025									
SVOC MS												
Other SVOCs												
1,2-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1							<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1							<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1							<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1							<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1							<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1							<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5							<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1							<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	116	107	114							<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	115	109	114							<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia
EMT Job No: 25/1344

VOC Report : **Liquid**

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-6	7-12	13-18										
Sample ID	BH01	BH02	BH03										
Depth													
COC No / misc													
Containers	V H P G	V H P G	V H P G										
Sample Date	27/01/2025	27/01/2025	27/01/2025										
Sample Type	Ground Water	Ground Water	Ground Water										
Batch Number	1	1	1										
Date of Receipt	30/01/2025	30/01/2025	30/01/2025								LOD/LOR	Units	Method No.
VOC MS													
Dichlorodifluoromethane	<2	<2	<2								<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1								<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3								<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1								<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1								<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3								<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3								<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3								<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<3	<3	<3								<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3								<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3								<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1								<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2								<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2								<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2								<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3								<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2								<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2								<2	ug/l	TM15/PM10
Benzene #	<0.5	3.4	<0.5								<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3								<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2								<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3								<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2								<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2								<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5								<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2								<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2								<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3								<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2								<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2								<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2								<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2								<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2								<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1								<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2								<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1								<1	ug/l	TM15/PM10
Styrene	<2	<2	<2								<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2								<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4								<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2								<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3								<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3								<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3								<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2								<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3								<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3								<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2								<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3								<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	96	96	102								<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	96	63	100								<0	%	TM15/PM10

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All solid results are expressed on a dry weight basis unless stated otherwise.

Mass of sample taken (kg)	0.1071	Dry Matter Content Ratio (%) =	84.0
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	0.883
Particle Size <4mm =	>95%		

EMT Job No	**25/1344**	**Landfill Waste Acceptance Criteria Limits**		
Sample No	**21**			
Client Sample No	**ST01**	**Inert**	**Stable Non-reactive**	**Hazardous**
Depth/Other	**0.00-0.20**			
Sample Date	**27/01/2025**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	8.52	3	5	6
Sum of BTEX (mg/kg)	<0.050	6	-	-
Sum of 7 PCBs (mg/kg)	<0.350	1	-	-
Mineral Oil (mg/kg) (EH_CU_1D_AL)	6622	500	-	-
PAH Sum of 6 (mg/kg)	1.41	-	-	-
PAH Sum of 17 (mg/kg)	4.00	100	-	-
Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	0.27	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	0.39	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	0.03	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	0.08	4	50	200
Chloride	16	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	14	1000	20000	50000
Total Dissolved Solids	<350	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	30	500	800	1000

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
25/1344	1	ST01	0.00-0.20	19-21	Lubricating oil

Client Name:	Malone O'Regan
Reference:	E2343
Location:	Murrens Quarry
Contact:	Enrique Garcia

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Asbestos sub-samples are retained for not less than 6 months from the date of analysis unless specifically requested.

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
25/1344	1	ST01	0.00-0.20	21	Simon Postlewhite	12/02/2025	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	12/02/2025	**Asbestos Fibres**	NAD
					Simon Postlewhite	12/02/2025	**Asbestos ACM**	NAD
					Simon Postlewhite	12/02/2025	**Asbestos Type**	NAD

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Method No.	NDP Reason
25/1344	1	ST01	0.00-0.20	19-21	TM108/PM114	Samples unsuitable for extraction

Client Name: Malone O'Regan
Reference: E2343
Location: Murrens Quarry
Contact: Enrique Garcia

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 25/1344						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

It is a requirement under ISO 17025 that we inform clients if samples are deviating i.e. outside what is expected. A deviating sample indicates that the sample 'may' be compromised but not necessarily will be compromised. The result is still accredited and our analytical reports will still show accreditation on the relevant analytes.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 25/1344

SOILS and ASH

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary. Asbestos samples are retained for 6 months.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C. Ash samples are dried at 35°C ±5°C.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil is quoted, this refers to Total Aliphatics C10-C40.

STACK EMISSIONS

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a requirement of our Accreditation Body for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.
Laboratory records are kept for a period of no less than 6 years.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

Customer Provided Information

Sample ID and depth is information provided by the customer.

Age of Diesel

The age of release estimation is based on the nC17/pristane ratio only as prescribed by Christensen and Larsen (1993) and Kaplan, Galperin, Alimi et al., (1996).
Age estimation should be treated with caution as it can be influenced by site specific factors of which the laboratory are not aware.

Tentatively Identified Compounds (TICs)

Where Tentatively Identified Compounds (TICs) are reported, up to 10 Tentatively Identified Compounds will be listed where there is found to be a greater than 80% match with the NIST library. The reported concentration is determined semi-quantitively, with a matrix specific limit of detection. Note, other compounds may be present but are not reported.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above quantitative calibration range. The result should be considered the minimum value and is indicative only. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x2 Dilution
AB	x5 Dilution
AC	x10 Dilution
AD	x30 Dilution
AE	x100 Dilution

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 25/1344

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35 degrees Celsius or 105 degrees Celsius. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes

EMT Job No: 25/1344

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260B v2:1996. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270D v5:2014. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil.	PM24	Preparation of Soil and Marine Sediment Samples for Total Organic Carbon.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21B	As Received samples are extracted in Methanol: Water (60:40) by reciprocal shaker.	Yes		AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM14	Preparation of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for Dissolved metals, and remain unfiltered for Total metals then acidified	Yes			

EMT Job No: 25/1344

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 degrees Celsius. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 degrees Celsius. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma-Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) - All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.	Yes		AD	Yes

EMT Job No: 25/1344

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Determination of Mercury by Cold Vapour Atomic Fluorescence - WATERS: Modified USEPA Method 245.7, Rev 2, Feb 2005. SOILS: Modified USEPA Method 7471B, Rev.2, Feb 2007	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM75	Modified US EPA method 310.1 (1978). Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM76	Modified US EPA method 120.1 (1982). Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM83	Modified USEPA method 8260B v2:1996. Determination of Alcohols, Acetates, Acetone, Fuel Oxygenates, THF and Cyclohexane by Headspace GC-MS	PM10	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.				
TM89	Modified USEPA method OIA-1667 (1999). Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes		AR	Yes

EMT Job No: 25/1344

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.			AR	Yes
TM108	Determination of Elemental Sulphur by Reversed Phase High Performance Liquid Chromatography with Ultra Violet spectroscopy.	PM114	End over end extraction of dried and crushed soil samples for organic analysis. The solvent mix varies depending on analysis required			AD	Yes
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270D v5:2014	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35 degrees Celsius or 105 degrees Celsius. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

APPENDIX 8-2

May 2025

Water Framework Directive Assessment Report

Application for Continuation of the Murrens Quarry

On behalf of

JJ Flood & Sons Manufacturing Limited

Murrens Quarry, Oldcastle, Co. Meath

MALONE O'REGAN ENVIRONMENTAL

QUALITY
I.S. EN ISO 9001:2015
NSAI Certified

MALONE O'REGAN

Form ES - 04

MALONE O'REGAN
ENVIRONMENTAL

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Title: Water Framework Directive Assessment Report, Application for Continuation of the Murrens Quarry, JJ Flood & Sons Manufacturing Limited, Murrens Quarry, Oldcastle, Co. Meath

Job Number: E2343

Prepared By: Alex Allen **Signed:**

Checked By: Damien Teague **Signed:** Damien Teague

Approved By: Laura McGrath **Signed:**

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	12/05/2025	Report	Final	AA	DT	LMG

Copyright and Third-Party Disclaimer

Malone O'Regan Environmental ('MOR Environmental') has prepared this report for the sole use of our client (as named on the front of the report) in accordance with the Client's instructions using all reasonable skill and competence and generally accepted consultancy principles. The report was prepared in accordance with the budget and terms of reference agreed with the Client and does not in any way constitute advice to any third party who is able to access it by any means. MOR Environmental excludes to the fullest extent lawfully permitted all liability whatsoever for any costs, liabilities or losses arising as a result of or reliance upon the contents of this report by any person or legal entity (other than the Client in accordance with the terms of reference). MOR Environmental has not verified any documents or information supplied by third parties and referred to herein in compiling this document, and no warranty is provided as part of this document. No part of this report may be copied or reproduced without express written confirmation from MOR Environmental. Any methodology contained in this report is provided to the Client in confidence and must not be disclosed or copied to third parties without the prior written agreement of MOR Environmental. Disclosure of such information may constitute an actionable breach of confidence or may otherwise prejudice our commercial interests. Third parties who obtain access to this report by any means, including disclosure by the Client, will be subject to the Copyright and Third-Party Disclaimer contained herein.

Water Framework Directive Assessment Report
Application for Continuation of the Murrens Quarry
JJ Flood & Sons Manufacturing Limited
Murrens Quarry, Oldcastle, Co. Meath

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APPENDICES

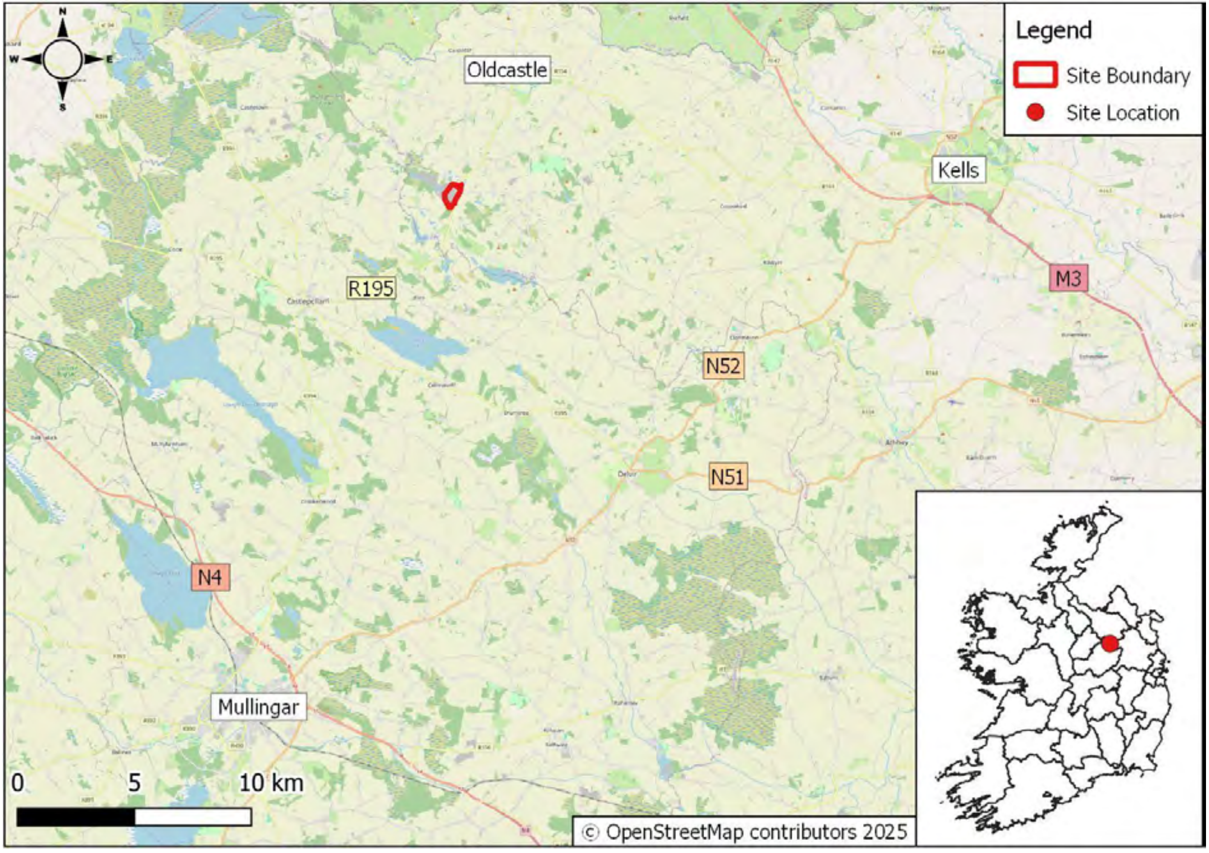
1 INTRODUCTION

1.1 Background

Malone O'Regan Environmental ('MOR Environmental') has been commissioned by JJ Flood & Sons Manufacturing Limited ('the Applicant') to undertake a Water Framework Directive ('WFD') Assessment in support of a planning application for proposed continuation of the Murrens Quarry (ITM 652523 774771) ('the Site'). This project ('the Proposed Development') will enable the Applicant to continue aggregate extraction within existing extraction areas of the quarry as well as a smaller greenfield area. The planning application will be submitted to Meath County Council ('MCC').

The location of the Proposed Development ('the Site') will be in several an areas entirely within the Applicant's existing quarry, which occupies an overall area of ca. 40.12ha., located ca. 5.5km south of the town centre of Oldcastle and ca. 7.3km northeast of the town centre of Castlepollard in County Meath, which are connected by the regional road R195 which passes along the eastern boundary of the Site. Figure 1-1 below shows the location of the Site.

Figure 1-1: Site Location



The aim of this WFD Assessment is to ascertain whether the Proposed Development will have the potential to have any effects on waterbodies in such a way as to result in a deterioration in the quality status of the waterbody under the Water Framework Directive [1]. If such effects are found to be possible, then mitigation must be put in place.

1.2 Site Context and Description

The Site lies in the townland of Murrens, Oldcastle, Co Meath (ITM 652523 774771) and covers an area of ca. 40.12ha. The Site is bounded to the west by a quarry operated by BD Flood Ltd. and to the east by the R195 road. The Site is bounded to the north and south by agricultural and forested land. The Site is situated ca. 5.5km south of the town centre of

Oldcastle and ca. 7.3km northeast of the town centre of Castlepollard, which are connected by the regional road R195 which passes along the eastern boundary of the Site.

The Site covers the majority of the land holding. The Site is primarily comprised of exposed sand and gravel deposits and exposed bedrock, with the main processing area located centrally. The water usage within the Site consists of a series of settlement ponds located in the north of the Site and a settlement canal located adjacent to the main processing area. No water is discharged off site.

Figure 1-2: Site Context

1.3 Regulatory Context Overview

1.3.1 EU Legislation - Water Framework Directive

The WFD (2000/60/EC) [1], as amended by Directives 2008/105/EC and 2013/39/EU, requires EU Member States to protect and improve water quality. It applies to all surface waters (defined as inland waters, both standing and flowing and includes rivers, lakes, reservoirs, streams and canals), groundwater, transitional (estuarine) and coastal waters. This includes both natural and "artificial and heavily modified bodies of water" ('artificial' is defined in Article 2(8) as 'a body of surface water created by human activity' and 'heavily modified' is defined in Article 2(9) as 'a body of surface water which as a result of physical alternations by human activity is substantially changed in character').

The long-term aim of the WFD is for all ground and surface waters within the EU to achieve 'good' status. The WFD was given legal status in Ireland via the European Communities (Water Policy) Regulations 2003 (S.I. 722/2003), as amended [2].

Article 1 of the WFD sets out that the purpose of the directive is to establish a framework which *"prevents further deterioration and protects and enhances the status of aquatic ecosystems"*, *"promotes sustainable water use"* and *"aims at enhanced protection and improvement of the aquatic environment* inter alia *through specific measures for the progressive reduction of discharges, emissions and losses of priority substances and the cessation or phasing-out of discharges, emissions and losses of priority hazardous substances"*.

Article 4 of the WFD sets out environmental objectives. In relation to surface water, Article 4(1)(a) states that:

> *"(i) Member States shall implement the necessary measures to prevent the deterioration of the status of all bodies of surface water…*
>
> *(ii) Member States shall protect, enhance and restore all bodies of surface water, subject to the application of subparagraph (iii) for artificial and heavily modified bodies of water, with the aim of achieving good surface water status at the latest 15 years after the date of entry into force of this Directive…*
>
> *(iii) Member States shall protect, enhance and restore all artificial and heavily modified bodies of water with the aim of achieving good ecological potential and good surface water chemical status at the latest 15 years after the date of entry into force of this Directive…"*

Article 4(1)(b) places the same obligation to prevent deterioration in relation to groundwater and in addition places an obligation to:

> *"protect, enhance and restore all bodies of groundwater, ensure a balance between abstraction and recharge of groundwater, with the aim of achieving good groundwater status at the latest 15 years after the date of entry into force of this Directive…"*

Article 4(7) states that Member States will not be in breach of the WFD when failure to achieve good groundwater or ecological status or ecological potential is the result of new modifications to the physical characteristics of a surface water body / alterations to the level of a groundwater body, or failure to prevent deterioration from 'high' to 'good' status is the result of new sustainable human development activities and:

- All practicable steps are taken to mitigate the adverse impact;
- The reasons for the modifications / alterations are set out in the river basin management plan;

- The reasons for the modifications / alternations are of over-riding public interest / the benefits of achieving good status are outweighed by the benefits of the modifications / alterations; and,
- The benefits of the medications / alternations cannot for reasons of technical feasibility or disproportionate cost be achieved by other means which are a significantly better environmental option.

Article 7(1) requires Member States to identify within each river basin:

> *"all bodies of water used for the abstraction of water intended for human consumption providing more than 10m^3 a day as an average or serving more than 50 persons and those bodies of water intended for such future use.*
>
> *Member States shall monitor, in accordance with Annex V, those bodies of water which according to Annex V provide more than 100m^3 a day as an average."*

Annex IV lists the relevant protected areas as:

- *"Areas designated for the abstraction of water intended for human consumption under Article 7;*
- *areas designated for the protection of economically significant aquatic species;*
- *bodies of water designated as recreational waters, including areas designated as bathing waters under Directive 76/160/EEC*[1]*;*
- *nutrient-sensitive areas, including areas designated as vulnerable zones under Directive 91/676/EEC*[2] *and areas designated as sensitive areas under Directive 91/271/EEC*[3] *and*
- *areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection, including relevant Natura 2000 sites designated under Directive 92/43/EEC*[4] *and Directive 79/409/EEC*[5]*."*

Article 11 requires each Member State to establish a "programme of measures" to achieve the objectives set out in Article 4.

1.3.2 National Policy

Since 2010, the Government of Ireland has created River Basin Management Plans ('RBMPs') which operate on a renewing six-year cycle. The purpose of these RBMPs is to set targets to address water quality issues, including the protection, improvement and sustainable management of the water environment, in line with the WFD. The first WFD cycle ran from 2009-2015, and the second cycle operated from 2016-2021. The current (third) cycle runs from 2022-2027, and the associated RBMP was named "Water Action Plan 2024" and published in September 2024, following public consultation [2].

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[1] The Bathing Water Directive
[2] The Nitrates Directive
[3] The Urban Wastewater Treatment Directive
[4] The Habitats Directive
[5] The Birds Directive

1.4 Assessment Criteria

For the following assessments, the EPA Interim Guideline Values ('IGVs') were used to assess chemical status in the absence of suitable legislative environmental quality standard limits set out within the appropriate regulations.

1.4.1 Surface Water Quality Assessment

Under the WFD [1], surface water bodies are defined as either:

- Rivers;
- Lakes;
- Transitional waters;
- Coastal waters;
- Artificial surface water bodies; and,
- Heavily modified surface water bodies.

The water quality status for surface waterbodies is classified into five quality classes, i.e. 'high', 'good', 'moderate', 'poor' and 'bad'. These classes are assessed on different attributes of the water body, i.e. the biological quality of the water body, the physio-chemical quality of the water body and the hydromorphological quality of the water body. The biological quality of the water body is dependent on the variety of flora and fauna (e.g. invertebrates, aquatic plants, algae and fish) and corresponds with a biotic index or "Q Value". These values are as follows:

- Q5, Q4-5 – High WFD Status;
- Q4 – Good WFD Status;
- Q3 – Q4 – Moderate WFD Status;
- Q3, Q2-3 – Poor WFD Status; and,
- Q2, Q1-2, Q1 – Bad WFD Status.

The physio-chemical status of the water body is representative of several physical parameters including temperature and pH, and several chemical parameters, including dissolved oxygen, nutrients and specific chemical pollutants.

The hydromorphology of a waterbody describes its physical characteristics in terms of the movement of water flows and levels ('hydro'), and the structure and form of the bed, banks and riparian zones and how they function within the surrounding landscape ('morphology'). Good hydromorphological conditions are required to create and maintain diverse aquatic habitat for invertebrates, fish and plants, which in turn support healthy aquatic ecosystems and good ecological status. If a waterbody is modified by anthropogenic activity e.g. channelisation and straightening of rivers, installation of weirs or other instream barriers, culverting or otherwise installing hard engineering works, and removal of natural features such as sand and gravel banks and riparian vegetation, the waterbody may experience hydromorphology pressures and a decrease in overall quality.

Each natural surface water body is assessed on its ecological status and its chemical status. Ecological status is assessed based on the following categories, with each category receiving a rating of "High," "Good," "Moderate," "Poor", or "Bad":

- Biological quality (aquatic flora and fauna);
- Physiochemical quality (temperature, oxygenation, nutrient conditions); and,

- Hydromorphological quality (waterflow, sediment composition and movement, riverbank structure etc).

The overall ecological status is based on the lowest of the three individual categories.

In the case of artificial and heavily modified waters, ecological potential status is assessed similarly to the ecological status above but is rated as “Maximum,” “Good,” “Moderate,” “Poor”, or “Bad” ecological potential instead. In general terms, ‘maximum ecological potential’ means that the water body is as close as possible to a comparable surface water body, with the only differences being those directly attributed to the artificial or modified nature of the water body.

Chemical status is given one of two ratings: ‘Good’ or ‘Failing to Achieve Good.’ For an assessment of ‘Good,’ no substance listed in the S.I. No. 272/2009 - European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended) [3] may be found in concentrations above the relevant environmental quality standard limits set out in the regulations.

The overall chemical status of a waterbody is determined by the lowest status found to apply.

1.4.2 Groundwater Quality Assessment

Groundwater is awarded either “Good” or “Poor” status. Groundwater is assessed based on its chemical and quantitative status.

Water quality for groundwater is classified into two quality classes, i.e. ‘good’ and ‘poor’, based on the status of its chemical and quantitative attributes. Similar to surface water, the chemical status of a groundwater body is dependent on its physio-chemical parameters, whereas the quantitative status is based on the availability and sustainability of the groundwater resource.

The overall quality status of any waterbody is based on the quality score of the lowest scoring attribute.

Good chemical status of a groundwater body requires the entry of hazardous substances and saline intrusion into the groundwater to be prevented and the presence of other pollutants to be below the limits within S.I. No. 9/2010 - European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended) [4]. Concentrations of pollutants must also not be of such a concentration as to affect the ecological or chemical status of associated surface waters or to damage linked terrestrial ecosystems.

Quantitative status is assessed based on whether or not the available groundwater resource is being reduced by the long-term rate of annual abstraction and is rated as “Good” or “Poor.”

2 METHODOLOGY, SCOPE AND POLICY CONTEXT

In order to assist in the implementation of the WFD, EU member states, alongside Norway and the European Commission, developed a “Common Implementation Strategy” (‘CIS’) in May 2001. This CIS was designed to provide coherent and comprehensible guidelines aimed at achieving the aims of WFD.

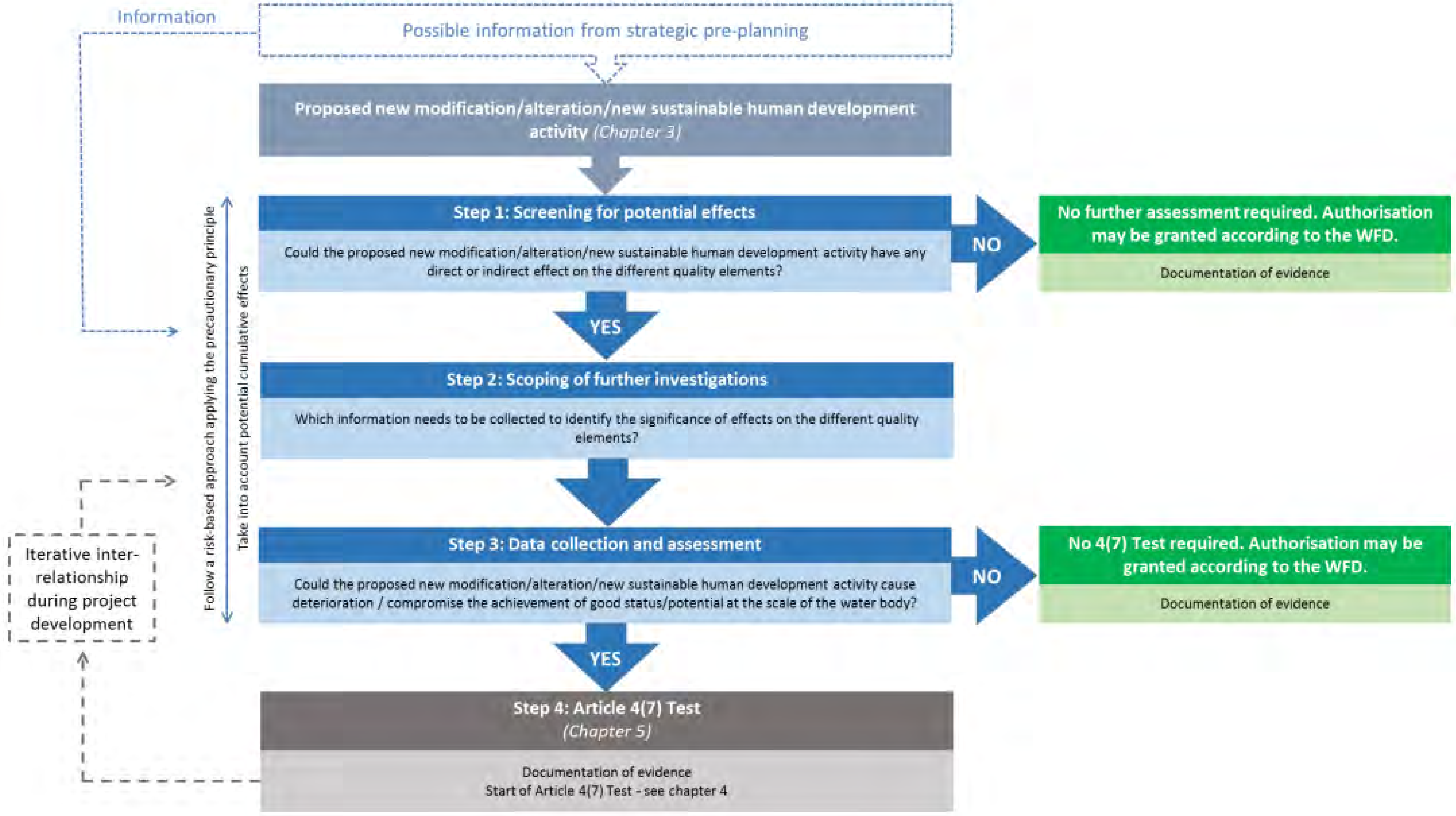
Figure 4 of the CIS Guidance Document 36 – “Exemptions to the Environmental Objectives according to Article 4(7)” [5] provides an outline of an approach to WFD Assessments. This figure, reproduced in Figure 2-1 below, breaks the assessment down into the following sequential steps:

- Screening for Potential Effects - Determine whether the Project could have any direct or indirect effect on the different quality elements relevant to the WFD;
- Scoping of Further Investigations - Outline the information required to determine the significance of any effect on the relevant quality elements; and,
- Data Collection and Assessment - Assess whether any effect could cause deterioration or compromise the status / potential status of a water body.

If the project is determined to compromise or deteriorate the status or potential status of a waterbody then a “Article 4(7) Test” is required. Assessment under Article 4(7) is summarised in CIS Guidance Document 36 [5].

If no effects are identified, then no Article 4(7) assessment is required, and the project may be authorised according to the WFD.

Figure 2-1: WFD Screening Assessment



3 EXISTING ENVIRONMENT

3.1 Existing Operations

The quarry at Murrens is a recognised pre-1963 development and is an aggregate extraction site. The quarry is bounded to the west by a quarry operated by BD Flood Ltd. and to the east by the R195 road. The Site is bounded to the north and south by agricultural and forested land. The quarry currently consists of the following infrastructure:

- Extraction area (ca. 37.5ha);
- Dry mobile screening plant;
- Wet semi-mobile screening plant;
- Semi-mobile crushing plant;
- Settlement canal system;
- Associated settlement ponds;
- Stockpiles of aggregate;
- Site access road;
- On-site haulage routes;
- Site office and toilets (ca. 77m^2);
- Wastewater treatment and percolation;
- Storage shed (ca. 375m^2);
- Maintenance Shed (ca. 164m^2);
- Two fuel tanks (ca. 153m^3);
- Vehicle parking;
- Weighbridge; and,
- Aggregate additives for making ‘arena footing’.

Work at the Site has been restricted until the application for substitute consent, case reference number ABP-322189-25, is determined and further authorised for prospective development, through the submission of an EIAR, with existing open areas of partial development being worked above the water table only, as well as substantial historical stockpiles.

The current active sand and gravel quarry is being processed, but at a reduced scale compared to historic production levels. Aggregates are being sourced from extensive onsite stockpiles until substitute consent is brought into compliance and the Site is further authorised for prospective development. See Figure 3-1 below for the current layout of the Facility and existing Site infrastructure.

Figure 3-1: Primary Site Infrastructure

3.1.1 Drainage

Surface water run-off from quarry processes, including the wheel wash and screening plant, is collected in the onsite canal settlement system and settlement ponds located in the centre and the northern section of the Site. Water is pumped from the settlement pond system at the north of the quarry to the screening plant in the centre of the Site, which is then collected at the settlement canal and pumped back to the northern settlement pond as part of a recycling system that is retained entirely within the Site. There are no discharges off-Site associated with the development. Water runoff from the screening plant is directed into the settlement canal which slowly flows by gravity in a winding manner to encourage the settlement of fines out of suspension. The water then flows by gravity to the settlement ponds via an underground pipe. These settlement ponds allow for more sediment to fall out of suspension and settle before the water is recycled and pumped back to the washing plant.

Pools of water are present in low elevation areas throughout the Site and are reflective of surface water ponding from runoff around the Site. These surface water ponds are biologically diverse (refer to Chapter 6 for more information) and gradually infiltrate to ground during dry periods.

3.1.2 Surface Water Monitoring

Surface water within the quarry boundaries is not discharged offsite and is contained within the existing water management system. Surface water monitoring has not occurred historically and is not planned to occur for future operations. No water monitoring is carried out at the Site, and the Proposed Development does not require any form of water discharge licence.

3.1.3 Groundwater Monitoring

3.1.3.1 Groundwater Levels and Flow Direction

Groundwater monitoring has not previously occurred at the Site prior to borehole installation in January 2025 (refer to Figure 3-2 for groundwater well locations). Historic data for groundwater quality and levels are unavailable.

Groundwater levels across the Site during the monitoring period January 2025 to March 2025, typically varied between approximately 118.21mAOD at BH01 and 122.83mAOD at BH02. Groundwater levels in each borehole were measured above the screened section of the borehole, which indicates confining conditions within the bedrock aquifer and groundwater under pressure. As such, the groundwater levels measured are reflective of the potentiometric surface of the bedrock aquifer underlying the Site.

The potentiometric surface in BH03 was measured at the top of the borehole casing above ground level in three out of the four monitoring events, hence BH03 is considered to be artesian. It is noted that BH03 is located within the existing limestone quarry area of the Site at an elevation of 118.58 mOD. The excavation depth for the Proposed Development is 119 mOD and hence artesian conditions are not expected to be encountered at any stage of the Proposed Development.

Figure 3-2: Groundwater Well Locations

Based on water levels collected during the 2025 monitoring events (presented in Table 3-1), it is concluded that groundwater flows in a general south to north direction across the Site (refer to Figure 3-3). The change in bedrock aquifer in the north of the Site, would act as a barrier to groundwater flow to surface water features located to the north of the Site. Therefore, it is concluded that groundwater underneath the Site is not contributing to baseflow in surface water features within the study area and that there is no hydrogeological connection between groundwater underneath the Site and surface water within the study area.

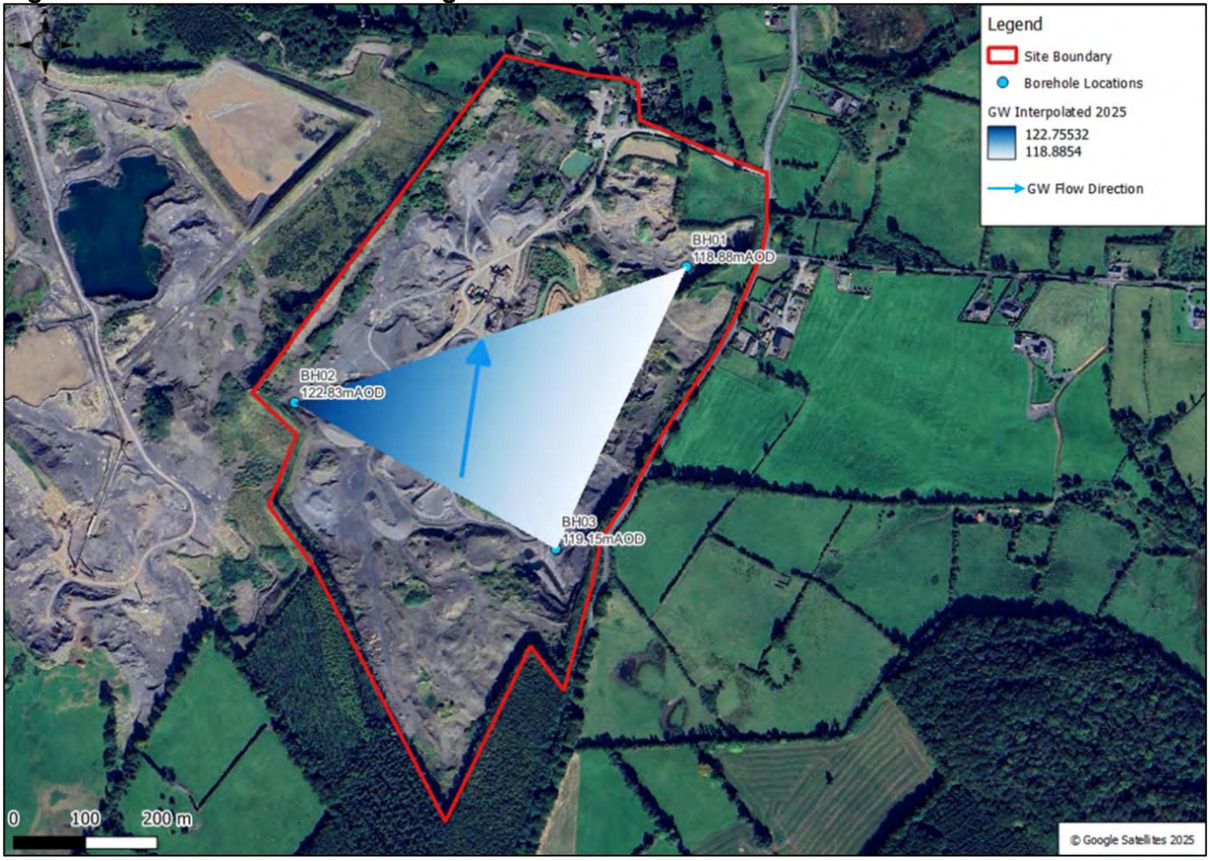
Table 3-1: Groundwater Levels 2025

Well ID	Elevation Reference*	Total Depth	27/01/2025		04/02/2025		04/03/2025		19/03/2025	
	mAOD	mbtoc	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD	mbtoc	mAOD
BH01	120.88	12.52	2.67	118.21	2.51	118.37	2.52	118.36	2.0	118.88
BH02	129.17	20.52	6.42	122.75	6.34	122.83	6.64	122.53	7.1	122.07
BH03	119.15	10.57	0.21	118.94	0*	119.15	0*	119.15	0*	119.15

Notes:
*Elevation reference is top of casing
0* denotes an artesian well i.e. groundwater piezometric surface level is above ground level.

mAOD: Meters above ordinance datum. mbtoc: Meters below top of casing.

Figure 3-3: Groundwater Monitoring Well Locations



3.1.3.2 Groundwater Quality

No historic groundwater monitoring data was available for the Site prior to borehole installation in January 2025. No water monitoring is carried out at the Site, and the Proposed Development does not require any form of water discharge licence.

Groundwater sampling for BH01, BH02 and BH03 was carried out on the 27th January 2025 by a MOR Environmental geologist. Samples collected were sent to Element Ltd, a UKAS and ISO 17025 accredited laboratory for analysis. The samples were kept cool and in darkness while in transit. In order to maintain sample integrity, a Chain of Custody ('CoC') document was completed to track sample possession from the time of sample collection to the time of analysis.

The data for the analysed parameters have been collected and assessed to monitor groundwater quality. Groundwater was analysed for the following parameters were analysed:

- Physical parameters such as electrical conductivity ('EC') and pH;
- Chemical parameters such as organics, inorganics and dissolved metals;
- Polyaromatic Hydrocarbons ('PAHs'); and,
- Pesticides.

Laboratory analytical results from groundwater samples were compared, where applicable, to the following groundwater Generic Assessment Criteria ('GAC'):

- Statutory Instrument S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended 2012 (S.I. No. 149 of 2012), as amended 2016 (S.I. No. 366 of 2016), as amended 2022 (S.I. No. 287 of 2022) [6].

In the absence of GAC for a specific parameter, the following criterion was used:

- The Interim Guideline Values ('IGVs') for Groundwater from the Environmental Protection Agency ('EPA') (2003), 'Towards setting guideline values for the protection of groundwater; Interim Report' [7].

Exceedance quantification refers to the process of identifying and measuring instances where a parameter (such as a chemical concentration, physical property, or other environmental indicator) exceeds a predefined limit or guideline value. This process involves not only detecting exceedances but also quantifying the extent or degree to which the parameter surpasses the threshold, typically expressed as the amount or percentage by which the value exceeds the standard (Refer to Table 3-2).

Table 3-2: GAC Exceedance Quantification

GAC Multiplier	Exceedances	Potential Risk
<1X GAC	None	Negligible
1x to 2x GAC	Marginal Exceedance	Low
2x to 10x GAC	Minor Exceedance	Low
10x to 100x GAC	Moderate Exceedance	Moderate
>100x GAC	Significant Exceedance	Significant

There are currently no groundwater GACs for COD and total ammonia, as these parameters are utilised as water quality indicators only. Concentrations of COD and total ammonia at the Site are generally only reported above the laboratory method detection limit ('MDL') intermittently at very low levels. The EPA Interim Guideline Values have set the chloride and nitrate as NO_3 concentrations threshold limit values of 200mg/l and 25mg/l, respectively. The Statutory Instruments ('S.I.') No. 287/2022 - European Communities Environmental Objectives (Groundwater) (Amendment) Regulations 2022 have set a lower threshold limit value of 24mg/l and an upper limit of 187.5mg/l for chloride and an overall value of 37.5mg/l for nitrate as NO_3. In 2024, all chloride and nitrate results were reported below the S.I. 287/2022 guideline values. There were no exceedances of groundwater and drinking water General Assessment Criteria ('GAC') from the samples taken at BH01, BH02 and BH03 during the January 2025 monitoring event.

3.1.4 Wastewater and Potable Water

Wastewater from onsite amenities (kitchen, toilets, sinks, etc.) is treated privately onsite. The wastewater is collected through a wastewater pipeline network and directed toward a septic tank and percolation area in the north of the Site. No changes are proposed to this system.

Potable water used for office facilities, including faucets and toilet facilities, is obtained from a small onsite well in the northern section of the Site. The water used for site processes is obtained from the recycled water settlement system onsite and is to remain unchanged with the Proposed Development prior to reinstatement.

4 PROPOSED DEVELOPMENT

A detailed description of the Proposed Development is presented in the Environmental Impact Assessment Report ('EIAR') submitted with this planning application. The works required for the Proposed Development will have three distinct stages:

- Stage 1 – Site Preparation;
- Stage 2 – Site Operation; and,
- Stage 3 – Restoration.

Unlike a greenfield development or extension, the majority of the site is already exposed and prepared for operational works. As such, soil stripping under Stage 1 Site preparation will only be relevant to the greenfield elements located on the northeastern boundary. Several ponds are present within the proposed works areas, and preparation works will also include the development of new ponds within the Site to enable the closure of these existing ponds.

Similarly, Stage 3 Restoration works will commence within areas of the Site where future reserves are not sought and will run in tandem with Stage 2 operational activities elsewhere on the site.

Stage 2 site operations will be subdivided into specific phases, covering the removal of existing stockpiles and the deepening of the quarry in two distinct areas within the site.

The Proposed Development will consist of the following works:

- Future extraction in designated areas as shown in Figure 1-2 above;
- Continued use of the current operational facilities on the Site, e.g., buildings, machinery, roadways, the settlement canal and the settlement ponds; and,
- Restoration works in the south and west of the existing Site.

4.1 Relevant Aspects of Proposed Development

A description of the Proposed Development in relation to the water environment are presented below. A full description of the Proposed Development is available within Chapter 3 of the EIAR which this WFD assessment report accompanies.

4.1.1 Stage 1 (Pond Construction)

Prior to commencement of aggregate extraction within areas where existing surface water ponds are located, replacement ponds will be constructed within the areas proposed for immediate reinstatement. Two such ponds are planned within the western area of the Site.

4.1.2 Stage 2

After the completion of Stage 1, extraction activities will continue at the Site within designated areas, as shown in Figure 1-2. Plant used as part of the works below will include the continued use of existing machinery onsite, such as the washing plant and associated water management system, the mobile screening and crushing plant, excavators with breakers and shovels and loading shovels.

4.1.2.1 Extension and Levelling of Quarry Floor in the North of the Site

The designated extraction area in the north of the quarry will include:

- Continued excavation of viable sand and gravel aggregate within the existing quarry footprint;
- Extension of the quarry into the field to the northwest of the Site;

- Levelling of the excavation area to a maximum depth of 119 metres Ordnance Datum ('mOD'); and,
- Storage of sand and gravel aggregate stockpiles within the designated working area of the quarry.

4.1.2.2 Deepening and Levelling of Quarry Floor in the East of the Site

The designated extraction area in the east of the quarry will include:

- Continued excavation of viable rock aggregate within the existing quarry footprint;
- Levelling of the excavation area to a maximum depth of 119mOD; and,
- Storage of rock aggregate stockpiles within the designated working area of the quarry.

4.1.3 Stage 3 (Reinstatement / Restoration)

Immediate restoration of sections of the existing Site footprint will be carried out as part of the Proposed Development. This will take place predominantly in the south and west of the existing quarry Site. Works will be carried out in designated reinstatement areas of the existing quarry footprint where stockpiles have been removed and no further activity (i.e. stockpile storage and excavation) will be taking place. Hence, any immediate restoration works will be carried out outside of the future extraction and operational activities areas and in line with the restoration plan presented in Chapter 6 of the EIAR.

There are currently a number of stockpiles of soil which have been stored on the Site for restoration purposes. During the immediate restoration works, these will be spread across the designated reinstatement areas to provide a thin soil layer over the existing ground. The importation of clean, uncontaminated soil will likely be required as part of this stage of the project. The volume of imported soil will not affect overall traffic numbers at the Site. It will occur when reduced deliveries of aggregate from the Site to the market are occurring. The imported soils will be inert by-product material only and are required to achieve the restoration goals outlined in the restoration plan.

Stage 3 restoration works to be carried out immediately and in tandem with the Stage 1 and Stage 2 works including the creation of various habitats and the restoration of the quarry habitat to a low-nutrient landscape. The habitats to be created include:

- Ponds and wetland areas in the southwest and west of the existing quarry Site;
- Wet meadows around the ponds;
- A woodland in the south of the existing quarry Site; and,
- A low nutrient habitat across the south and west of the existing quarry Site.

Restoration for the remainder of the Site will be undertaken following completion of the operations of the Proposed Development. This will take place predominantly in the centre, north and east of the Site and in line with the restoration plan.

All plant equipment will be removed from the Site. Buildings and associated utility infrastructure shall remain in place to accommodate potential future development opportunities.

Any future stockpiles of soil which will be stored on Site for restoration purposes will be spread across the Proposed Development area to provide a thin soil layer over the ground. The importation of clean, uncontaminated soil will likely be required as part of this phase of the restoration works. The Site will be restored to a low-nutrient habitat which is expected to develop into a species-rich, semi-natural grassland community.

4.1.4 Removal of Existing Drainage System for Reinstatement

During the overall restoration of the Site, the onsite washing plant and processing plant will be dismantled and removed. The pipe network for the drainage water system is proposed to be removed in concurrence with the dismantling and removal of the plant. Submersible pumps that feed the screening plant and the wheel wash in the centre of the Site will be shut off and removed as part of the plan for reinstatement.

Removal of the inflow and outflow mechanisms of water from the settlement pond and settlement canal will allow these water features to gradually transition to a natural state and promote aquatic flora and fauna to develop.

4.1.5 Drainage

There are no plans for drainage for the Proposed Development prior to reinstatement where the existing water management system will be dismantled.

4.1.5.1 Stormwater Drainage

Run off within the Site is part of the closed-loop drainage system detailed within Section 3.1.1. The system will remain unchanged during the Proposed Development prior to reinstatement.

5 STUDY AREA SCREENING

For the purposes of screening, information available on or through the EPA maps [8] was utilised throughout. Specific data on the quality status of waterbodies was gathered from datasets available on catchments.ie [9]. A study area of 2km was assessed in line with the Institute of Geologists of Ireland ('IGI') guidelines for the preparation of soils, geology and hydrogeology chapters of Environmental Impact Statements [10] and by using professional judgement. Protected sites within the 2km study area of the Site were assessed.

The aim of the WFD is for all waterbodies (surface water and groundwater) to achieve at least 'good' water quality status by 2027 and to ensure that water quality is maintained, i.e. no decline in water quality should be allowed to occur. If a decline in water quality is identified, then the associated water body must be restored where necessary to achieve the environmental objectives of the WFD.

Under the WFD, the EPA classifies the water quality status and the risk of not achieving the objectives of the WFD for all waterbodies in Ireland [8]. The most recent data for water body quality status and risk status, according to the WFD 2016 - 2021 monitoring events, was utilised at the time of writing this report.

5.1 Surface Water

According to the EPA Maps [8], much of the Site and the northern section of the study area is located within the Upper Shannon 26F WFD catchment, whereas the south of the Site and the southern section of the study area is located within the Boyne 07 WFD Catchment. The north of the Site and the majority of the northern section of the study area is located within the Inny (Shannon)_SC_010 WFD sub-catchment and the Inny_020 WFD river sub-basin. The south of the Site and the majority of the southern section of the study area is located within the Deel (Raharney)_SC_010 WFD sub-catchment and the Lough Lene-Adeel Stream_010 WFD river sub-basin. A portion of the western section of the study area is located within the Inny (Shannon)_SC_020 WFD sub-catchment and the WFD Glore (Westmeath)_010 river sub-basin.

There are several lake waterbodies located throughout the study area. The nearest lakes to the Site are a series of lakes ca. 440m to the northwest of the Site and known as Togher Lough, Goohertys Lough, Bane North (Lough) and Bane South (Lough).

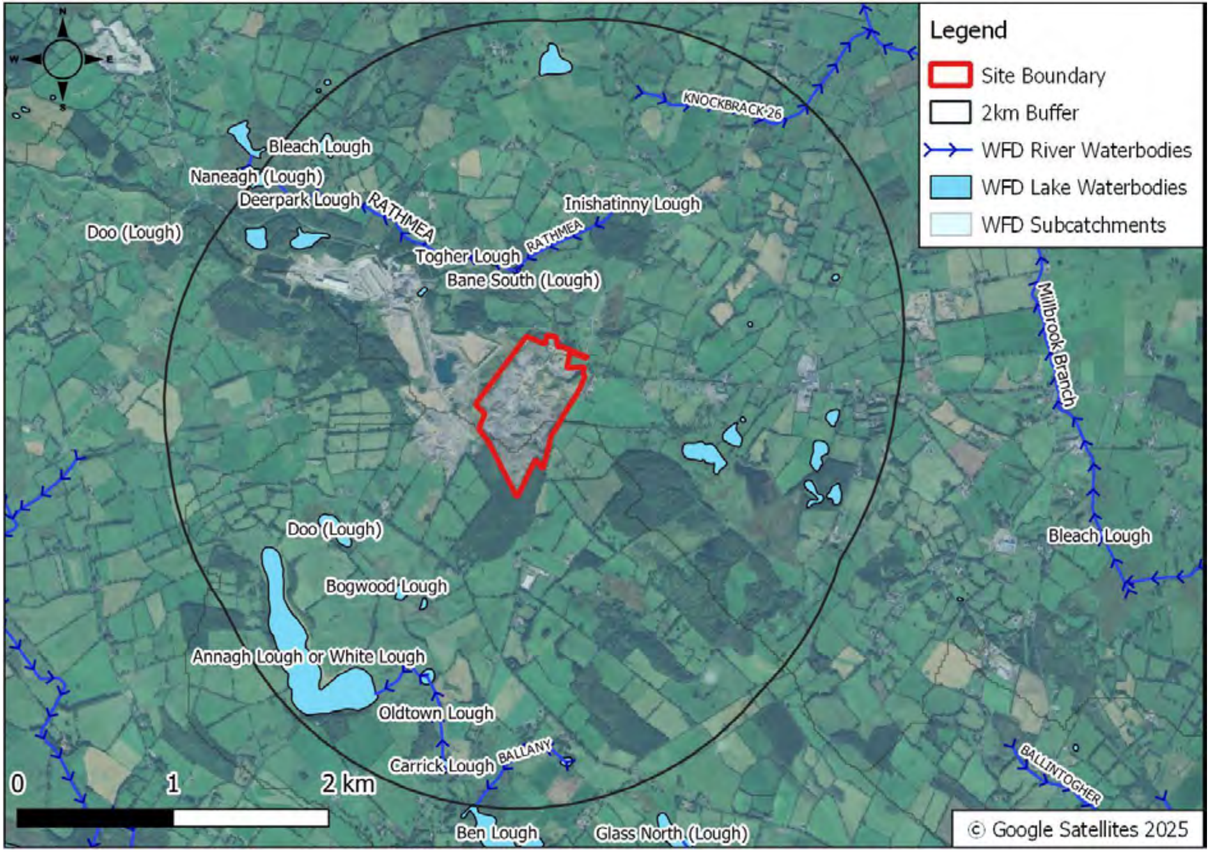
The lake waterbodies which are assessed under the WFD include all lake waterbodies with areal extents over 0.5km^2 or less than 0.5km^2 but located within a protected area. The lakes within the study area which are assessed under the WFD include Doo (Lough), Annagh-White Lough and Ben Lough. All other lakes within the study area are either too small to be included in the assessment or are not located within a protected area.

In the north of the study area, the Rathmea River is located ca. 430m north of the northern Site boundary and flows in a general east-to-west direction from Inishatinny Lough to Naneagh Lough. The Knockbrack 26 Stream is located ca. 1.7km north of the Site boundary and flows in a general west-to-east direction. Both rivers are part of the WFD Inny_020 river waterbody.

In the south of the study area, there are four unnamed streams located ca. 1.3km southwest of the Site boundary and flowing in a general southeast to northwest direction and connects Carrick Lough with Oldtown Lough, an unnamed lake, rusty Lough and the Annagh-White Lough. The Ballany Stream is located ca. 1.63 km south of the Site and flows in a general northeast to southwest direction and connects Ballany Lough with Ben Lough. These five streams are part of the Lough Lene-Adeel Stream_010 WFD river waterbody.

Figure 5-1 below shows the surface waterbodies identified within the study area. None of the above-mentioned surface water bodies are hydrologically connected to the Site. There are no potential effects identified on these waterbodies as a result of the Proposed Development in the absence of a connection between these waterbodies and the Site.

Figure 5-1: WFD Surface Waterbodies within the Study Area



5.2 Groundwater

5.2.1 Groundwater Bodies

According to the EPA Maps [8], the Site is within the groundwater bodies of Tynagh Gravels (IE_SH_G_238) and the Derravarragh (IE_SH_G_077). The Tynagh Gravels GWB corresponds to the gravel deposits within the study area and the Derravarragh GWB corresponds to the underlying bedrock units.

5.2.1.1 Tynagh Gravels

The Killkenny-Ballynakill Gravels groundwater body (EU Code: IE_SH_G_238) is assigned a "Good" status under the WFD 2016-2021 monitoring round [9]. The groundwater body risk is currently considered "at risk" of failing to meet the WFD objectives i.e. to achieve and maintain at least 'good' quality status by 2027. There is no GWB description available for this GWB from the GSI [11]. This groundwater body is considered to be hydrogeologically connected to the Site and hence will be considered for further assessment.

5.2.1.2 Derravarragh

The Derravarragh groundwater body (EU Code: IE_SH_G_077) is classified as having "Good" status under the WFD 2016-2021 monitoring round and considered "at risk" of failing to meet the WFD. The GWB description available from the GSI database [11] describes the groundwater flow in the bedrock to be confined to the top 30m of highly weathered layers several meters thick overlying a zone of interconnected fissures. Subsoil thickness is variable above the GWB ranging from no cover at exposed bedrock outcrops to 64m thickness. The GWB is recharged mainly through point recharge mechanisms through karstified features such as swallow holes, and through diffuse recharge mechanisms such as rainfall percolation. Discharge from the GWB is to surface water features such as small springs. Groundwater flow paths are of local scale with some areas having underground connections for flow rates up to 80 m/hr. Flow paths have been documented to cross catchment and river basin boundaries, demonstrating that flow does not always follow the surface water catchment. This groundwater body is considered to be hydrogeologically connected to the Site and hence will be considered for further assessment.

5.2.1.3 Inny, Ballymanus and Athboy

Within the study area, the Inny groundwater body (EU Code: IE_SH_G_110), the Ballymanus (EU Code: IE_SH_G_035) and the Athboy (EU Code: IE_SH_G_001) which comprise the Derravarragh Cherts (as part of the Upper Lucan Formation), the Lucan Formation, and the Visean Limestone Formation respectively. The Inny groundwater body and Athy groundwater body is classified as poorly productive bedrock of local importance while the Ballymanus groundwater body is classified as a Locally Important karstic Aquifer

The GSI groundwater body description for the Inny groundwater body [11] describes it as having generally low transmissivities of 2-20m^2/day, with transmissivity expected to be on the lower end of the scale. Diffuse recharge occurs through rainfall percolating through subsoils. Groundwater flow paths are focused in weathered and fractured zones of faulted bedrock and are in general between 30 and 300m. A majority of flow occurs in the upper tens of meters of bedrock, recharging and discharging in local zones. The low permeability rocks of this groundwater body will will not accept flow from the enclosed karstic Ballymanus groundwater body and the Derravarragh groundwater body.

The GSI groundwater body description for the Ballymanus groundwater body [11], describes it as having varying transmissivities and groundwater flow into highly fractured and permeable bedrock. Diffuse recharge to the groundwater body occurs through percolation of rainwater in subsoils with the recharge rate varying based on local subsoil thickness. Groundwater is generally unconfined within the groundwater body.

The GSI groundwater body description for the Athboy groundwater body [11], describes it as having an average transmissivity of 50m^2/day, though higher have been reported. Diffuse recharge is the dominant source of recharge for the groundwater body determined by subsoil thickness and topography. Some areas of the aquifer are disjointed and karstic – likely where point recharge occurs. Groundwater is generally unconfined within the groundwater body with flow taking place in the upper 3-5 meters of bedrock.

The Inny groundwater body, Ballymanus groundwater body and the Athboy groundwater body are classified as having ‘good’ water quality status and considered to be ‘not at risk’ of not meeting the WFD objectives.

Due to the poor productivity of these groundwater bodies and the local nature of the Derravarragh groundwater body groundwater it is not expected that the Proposed Development will affect these aquifers. Therefore, neither the Inny groundwater body, Ballymanus groundwater body or the Athboy groundwater body are considered to be hydrogeologically connected to the Site and hence neither will be considered for further assessment.

Figure 5-3 below shows all the groundwater bodies (‘GWB’) within 2km of the Site, with details of these groundwater bodies presented in Table 5-2 below.

Figure 5-2: Groundwater Bodies

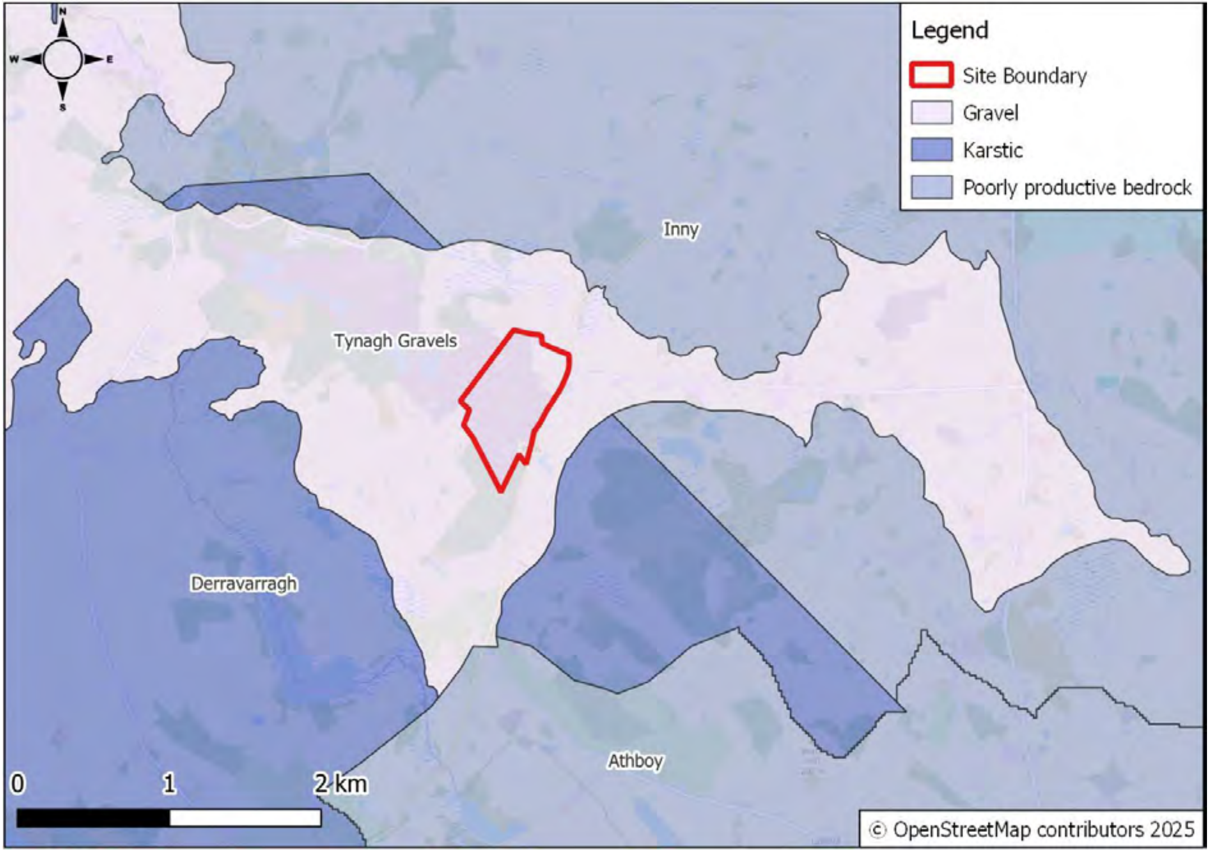


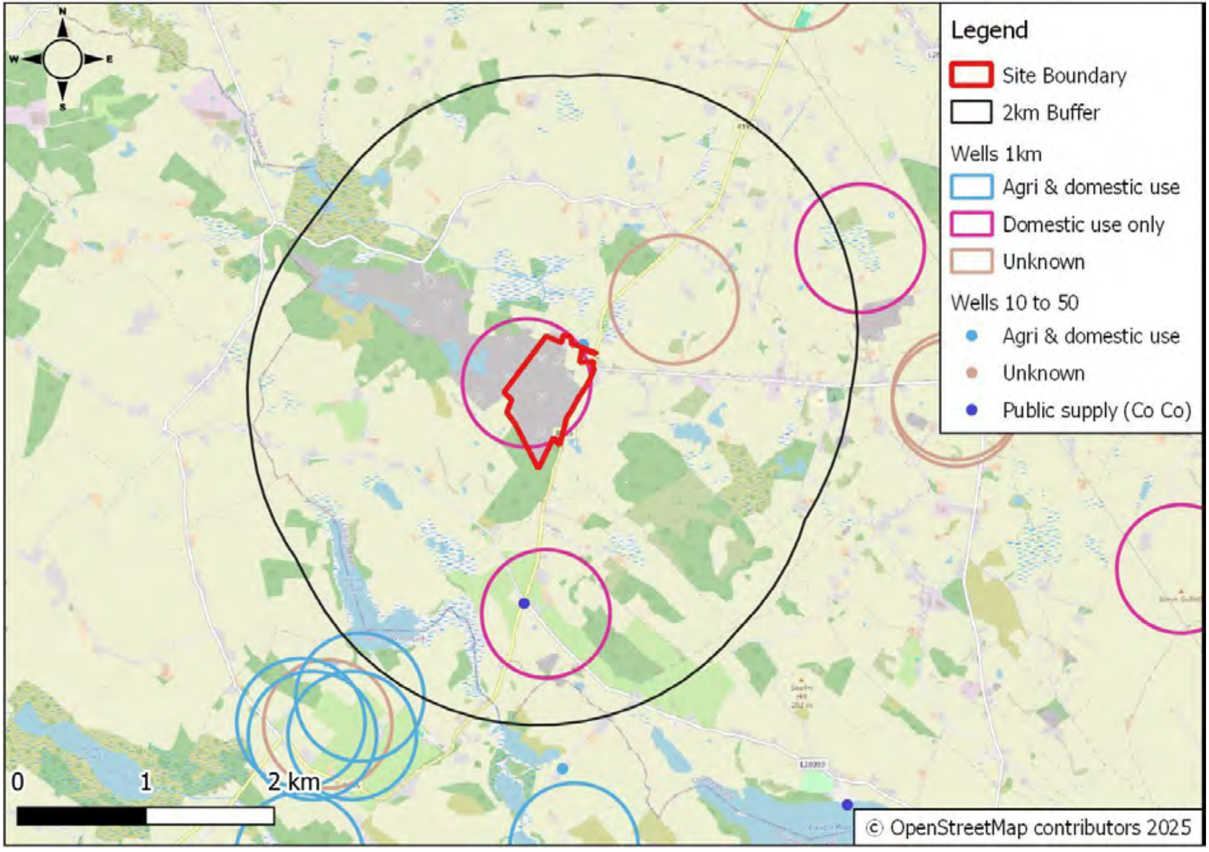
Table 5-1: Groundwater Bodies within 2km of the Site

Name	**EPA Code**	**Type**	**Status (2016 – 2021)**		**Overall Water Quality Status Rating**	**Risk**
			Quantitative	**Physio-Chemical**		
Tynagh Gravels	IE_SH_G_238	Sand and Gravel	Good	Good	Good	At Risk
Derravarragh	IE_SH_G_077	Karstic Bedrock	Good	Good	Good	At Risk
Inny	IE_SH_G_110	Poorly Productive Bedrock	Good	Good	Good	Not at Risk
Ballymanus	IE_SH_G_035	Karstic Bedrock	Good	Good	Good	Not at Risk
Athboy	IE_SH_G_001	Poorly Productive Bedrock	Good	Good	Good	Not at Risk

5.2.2 Groundwater Usage

A review of the GSI groundwater wells within GSI maps [12] identified a total of three wells within a 2km radius of the Site. These include one borehole and three dug wells which have reported yields ranging from 6.5m^3/d to 44m^3/d. The borehole is used for 'domestic' use only. Refer to Figure 5-3 below.

Figure 5-3: Groundwater Wells within 2km of the Site



The GSI database [12] also provides a framework for protecting groundwater source protection zones (e.g., areas contributing to water supply boreholes). The Site is not within a Zone of Contribution / Source Protection Zone for any public or private water supplies, and there are no mapped group water schemes mapped close to the area.

The nearest protected area is the Ballymachugh Public Water Supply Source Protection Area as part of the County Cavan Groundwater Protection Scheme which is located ca. 15km to the northwest of the Site.

5.3 Protected Sites

5.3.1 European Designated Sites

Any European site within the 2km study area and lacking a hydrological connection to the Proposed Development will be screened out, as in the absence of any direct impact pathway, the Proposed Development lacks the capacity to affect unconnected European sites.

There are two Special Area of Conservation ('SAC') within 2km of the Site. These are summarised in Table 5-3.

Table 5-2: European Designated Sites within 2km of the Site

Name	Type	Site Code	Distance and Direction from the Site	Further Assessment Required
White Lough, Ben Loughs and Lough Doo	SAC	001810	ca. 0.8km south of the Site	No – Not hydrologically connected to the Site. No surface water bodies connect the Site to these SACs.
Lough Bane and Lough Glass	SAC	002120	ca. 2km southeast of the Site	

Groundwater monitoring at the Site identified groundwater flow in the underlying bedrock to be in a general south-to-north direction away from these ecological sites. Therefore, there is no hydrogeological pathway or connection between the Site and these ecological sites, and they have been screened out for further assessment.

5.3.2 Economically Significant Shellfish Areas

There are no economically significant shellfish areas within the study area.

5.3.3 Nationally Designated Conservation Sites

The Salmonid Rivers, Nutrient Sensitive Areas, Natural Heritage Areas (‘NHAs’) and proposed Natural Heritage Areas (‘pNHAs’) within the 2km study area of the Site have been considered. Should there be any discharges to watercourses from a proposed development, potential effects on NHAs arising from such discharges will decrease with distance from the point of discharge. Any nationally designated conservation site lacking a hydrological connection to the Proposed Development will be screened out, as without a clear pathway, the Proposed Development cannot cause effects in such sites.

There are no Natural Heritage Areas or Nutrient Sensitive Areas within the study area.

There are two proposed Natural Heritage Areas (‘pNHAs’) identified within the study area. These are summarized in Table 5-4 below.

Figure 5-4: Proposed National Heritage Areas Within 2 km of the Site

Name	Type	Site Code	Distance and Direction from the Site	Further Assessment Required
Lough Naneagh pNHA	pHNA	001814	ca. 0.43km northwest of the Site	No – Not hydrologically connected to the Site. No surface water bodies connect the Site to these pHNAs.
Lough Bane and Lough Glass	pHNA	001810	ca. 0.82km south of the Site	

There are no hydrogeological connections between the Site and the Lough Naneagh and Lough Bane and Lough Glass pNHAs and they have been screened out for further assessment.

5.4 Water Pressures

The EPA has identified significant pressures for waterbodies that are “At Risk” of not meeting their water quality objectives under the WFD. Significant pressures are those pressures which need to be addressed in order to improve water quality. From the data presented on the EPA maps [8], there are water pressures identified for two groundwater bodies within 2km of the

Site, and which are hydrogeologically connected to the Site, as summarised in Table 5-3 below.

Table 5-3: EPA Water Pressures on Surface Waterbodies within 2km of the Site

Waterbody	**Associated Pressure Category**
Tynagh Gravels Groundwater Body	Agricultural
Derravarragh Groundwater Body	Agricultural

5.5 Cumulative Impacts from Other Facilities

Based on EPA maps [8], there are no facilities which hold an EPA-issued license or other types of permits within the 2km study area. The nearest facility which holds an EPA-issued license is the Ballinamoney Farms Unlimited Company ca. 4.1km northeast of the Site. The farm holds an Industrial Emissions Licensing facilities (‘IEL’) licence and an Integrated Pollution Prevention Control facility (‘IPCC’) licence.

Additionally, Snow’s Quarry, ca. 5.4km east, holds a Section 4 Discharge licence granted by the Meath County Council.

5.6 Screening

Given the pressures and hydrological connectivity of the waterbodies discussed above, waterbodies can be categorised into either requiring further assessment or not requiring further assessment; see Table 5-4 below.

No surface waterbodies within 2km of the Site were identified as having connectivity with the Proposed Development.

The Tynagh Gravels and the Derravarragh groundwater bodies have been screened in as both directly underlie the Site where bedrock is exposed.

No protected site i.e. European Designated Sites and Nationally Designated Conservation Sites within 2km of the Site were identified as having connectivity with the Proposed Development.

Table 5-4: Screening Table

Name	**Quality Status (Overall)**	**Risk**	**Further Assessment?**	**Justification**
Groundwater Body				
Tynagh Gravels	Good	At Risk	Yes	Hydrogeologically connected to the Site.
Derravarragh	Good	At Risk	Yes	

6 IMPACT ASSESSMENT

6.1 Construction Stage – Stage 1

6.1.1 Groundwater

During the Construction Phase, a range of ground-disturbing activities will be undertaken, including removal of vegetation, soils and subsoil for the construction of new ponds in the western area of the Site. These activities have the potential to increase groundwater vulnerability by exposing bedrock and creating pathways for infiltration of hydrocarbons into the groundwater system from spills and/or leaks.

6.2 Operational Stage – Stage 2

6.2.1 Groundwater

The Proposed Development will not involve any groundwater abstraction or direct discharge to groundwater during the Operational Phase.

During the operational stage, continued extraction activities have the potential to increase groundwater vulnerability by exposing bedrock and creating pathways for infiltration of hydrocarbons into the groundwater system from spills and/or leaks.

6.3 Restoration Stage – Stage 3

6.3.1 Groundwater

Groundwater is likely to be unaffected by the Restoration Phase as works are remedial.

Additional ponds may act as point recharge locations to the bedrock aquifer, where unlined by clay or geotextile membrane.

Stockpile material will be spread across the site to aid in building up the soil profile and to convert the land to a low nutrient landscape. This, in turn, will increase the thickness of overburden remaining on site post-extraction activities and will provide a cover over the exposed bedrock. It is unknown if this additional soil cover will decrease the groundwater vulnerability rating; however, it will aid in protecting the bedrock aquifer from infiltration of potential contaminants.

6.4 Surface Waterbodies

Mitigation measures were identified as not required for any surface waterbodies within the vicinity of the Site due to the absence of a connection between these waterbodies and the Site.

6.5 Groundwater Bodies

6.5.1 Tynagh Gravels

See Table 6-1 below for the Tynagh Gravels Impact Assessment.

Table 6-1: Tynagh Gravels Impact Assessment

Receptor	Potential Effect from Site	Potential Effect of Proposed Development	Mitigation Required?
Quantitative quality	No	Bulk dewatering will not be required during the Construction Stage and monitored groundwater levels will be below the proposed excavation depth. Additionally, the operational phase will not affect the groundwater levels and no additional groundwater abstraction will be required. Therefore, no quantitative impacts have been predicted to occur.	No
Chemical quality	Yes	The Proposed Development directly overlies the Tynagh Gravels. There will be the potential for a moderate, short-term effect on groundwater due to accidental spillages during the Construction Stage and Operational Stage which would require mitigation.	Yes

6.5.2 Derravarragh

Table 6-2: Derravarragh Impact Assessment

Receptor	Potential Effect from Site	Potential Effect of Proposed Development	Mitigation Required?
Quantitative quality	No	Bulk dewatering will not be required during the Construction Stage and monitored groundwater levels will be below the proposed excavation depth. Additionally, the operational phase will not affect the groundwater levels and no additional groundwater abstraction will be required. Therefore, no quantitative impacts have been predicted to occur.	Yes
Chemical quality	No	The Derravarragh groundwater body underlies the Tynagh Gravels groundwater body across the majority of the Site, and is exposed at surface in the east of the Site where the bedrock is exposed. Mitigation measures proposed for the Tynagh Gravels groundwater body will also be appropriate for the Derravarragh groundwater body.	

6.6 Mitigation Measures

6.6.1 Mitigation Measures Construction Phase

Specific aspects of the proposed construction mitigation measures are highlighted below.

The employment of good environmental management practices serves to minimise the risk of pollution from the extraction activities at the Quarry Site in line with the EPA (2006) Environmental Management Guidelines: Environmental Management in the Extractive Industry (Non-Scheduled Minerals) [13]. Mitigation measures for prevention of water contamination during all stages of the quarry are stated below. The following measures should be adhered to:

- All plant and HGVs will be refuelled within the designated equipment maintenance area;
- All plant and HGVs will be refuelled utilising adequately sized and positioned drip trays;
- Spill kits will be available adjacent to all refuelling and fuel storage operations;
- Fuel will be stored in tanks in the existing quarry and will be appropriately bunded and maintained;
- Fuels, lubricants and hydraulic fluids for screening equipment used on the Site will be carefully handled to avoid spillage, properly secured against unauthorised access or vandalism, and provided with spill containment according to best practice codes;
- Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the Site for disposal or recycling;
- Drip trays will be used under plant which has the potential for hydrocarbon or chemical leakage when located on permeable ground;
- Any spillage of fuels, lubricants, hydraulic oils or other chemicals will be immediately contained, and the contaminated soil removed from the Site and disposed of in accordance with relevant legislation;
- Water will continue to be collected in the existing water recycling system i.e. the settlement canal and settlement pond, before re-use to allow solids to settle out.

Additionally, the following mitigation measures will be implemented to provide a level of control over unplanned events at the Site and which could result in a risk to the water environment.

Collision / accident involving delivery truck arriving at / departing from the Site resulting in the release of substances:

- Speed limits and a traffic management system will be implemented onsite;
- All transit areas will be paved;
- Spills will be contained within the site drainage system which will contain an emergency shut off valve;
- Operational procedures as part of the facility’s Environmental Management System (‘EMS’) will be in place for incoming and outgoing materials; and,
- An adequate supply of suitably absorbent materials will be kept on site to deal with any spills.

Fire - resulting in the emission of fire water:

- The facility will have an adequate fire prevention plan.

Spillage of hydrocarbons or chemicals:

- All relevant external storage of chemicals or liquids within bund-protected zones / containers;
- Tanks and bunds will be impervious to the material they contain.

6.6.2 Mitigation Measures Operational Phase

During the Operational Phase, the primary mitigation measures will focus on long-term groundwater protection. These mitigation factors are in line with those proposed during the Construction Phase mentioned in Section 6.6.1.

By implementing these measures, the Operational Phase of the Proposed Development will effectively minimise its effect on the water environment, ensuring long-term environmental protection and regulatory compliance.

6.6.3 Mitigation Measures Remediation Phase

Mitigation measures during the Remediation Phase propose to ready the Site for reinstatement and are in line with those proposed in Section 6.6.1.

7 CONCLUSIONS

The Proposed Development has the potential to have an effect the following waterbodies:

- The Tynagh Gravels Groundwater Body (“good” WFD water quality status); and,
- The Derravarragh Groundwater Body (“good” WFD water quality status).

The Tynagh Gravels and Derravarragh groundwater bodies have a risk status of “at risk” of failing to meet the WFD objectives, i.e., to achieve and maintain at least “good” water quality status before 2027. The remaining waterbodies are ‘not at risk’ of failing to meet the WFD objectives.

Without mitigation, it was predicted that the Proposed Development could have a negative effect on the above waterbodies, particularly during the Construction Phase, should an unplanned spill or release of hydrocarbons or cement occur. Mitigation measures for the Proposed Development that will be implemented to manage the risk of such an event from occurring and to limit any effects arising from such an event. With mitigation, these effects will be imperceptible, localised and without an effect on the overall quality status of these waterbodies.

Upon completion of construction and the implementation of the mitigation measures presented in Section 6, it can be concluded that the Proposed Development will not have any likely or significant effects on the hydrological or hydrogeological environment in and around the Site. Moreover, it will adhere to all licence requirements at the Facility.

As such, it can be concluded that the Proposed Development will not:

- Jeopardise the achievement of:
    - good quality status;
    - good chemical status; or,
    - good ecological potential

  for any directly or indirectly connected groundwater or surface water body;
- Contribute to the risk of any directly or indirectly connected waterbody from failing to achieve “Good” status within the next cycle of the Water Framework Directive monitoring; and,
- Degrade the ecological quality of the protected sites associated with connected waterbodies, nor jeopardise the goals and/or targets set out for these protected sites.

Therefore, the Proposed Development will not compromise the objectives and requirements of the WFD within the local area and within the river basin district or the ability of any waters to meet the objectives of the WFD and transposing legislation.

8 REFERENCES

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APPENDIX 9

APPENDIX 9-1

APPENDIX 9

APPENDIX 9-1

Appendix 9-1
Mineral Dust Risk Assessment
JJ Flood & Sons Manufacturing Limited
Murrens Quarry, Oldcastle, Co. Meath

Contents

FIGURES

TABLES

1 DISAMENITY DUST RISK ASSESSMENT

The IAQM Guidance aims to provide advice on robust and consistent good practice approaches that can be used to assess the operational phase dust impacts from quarry activities [1]. The following sections extracted from Appendix 3 and Appendix 4 of the IAQM Guidance [1] provide a step by step guide on how the assessment presented in Chapter 9 Air Quality of the EIAR Volume II was undertaken.

1.1 Identification of Sensitive Receptors

For the sensitivity of people and their property to dust soiling, the IAQM recommends the use of professional judgement to identify where on the spectrum between high and low sensitivity a receptor lies. The following classification was used to define a receptor with High, Medium or Low sensitivity to dust soiling:

High Sensitive Receptor

- Users can reasonably expect enjoyment of a high level of amenity; and,
- The appearance, aesthetics or value of their property would be diminished by soiling; and,
- The people or property would reasonably be expected to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.

Indicative examples of a high-sensitivity receptor included dwellings, medium- and long-term carparks and car showrooms.

Medium Sensitive Receptor:

- Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home;
- The appearance, aesthetics or value of their property could be diminished by soiling; and,
- The people or property wouldn’t reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.

Indicative examples include parks, and places of work.

Low Sensitivity Receptor

- The enjoyment of amenity would not reasonably be expected;
- There is a property that would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; and,
- There is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.

Indicative examples include playing fields, farmland (unless commercially sensitive horticultural), footpaths, short-term car parks and roads.

1.2 Determining the Residual Source of Emissions

The following examples show the residual source emissions for a number of activities, illustrating the factors that may be considered when determining the potential impact.

Figure 1-1: Site Preparation / Restoration

LARGE	SMALL
Large working area	Small working area
High bunds	Low bunds
High volume of material movement	Low volume of material movement
High no. heavy plant	Low no. heavy plant
Minimal seeding/sealing of bund surface	Bunds seeded/sealed immediately
Material of high dust potential	Material of low dust potential

An example of a large potential dust magnitude from site preparation/restoration may include factors such as a working area >10ha, bunds >8 m in height, >100,000 m^3 material movement, >10 heavy plant simultaneously active, bunds un-seeded, fine grained and friable material. Conversely, a small potential dust magnitude may include a site with a working area <2.5ha, bunds <4m in height, <20,000 m^3 material movement, <5 heavy plant simultaneously active, all bunds seeded, material with a high moisture content.

Figure 1-2: Mineral Extraction

LARGE	SMALL
Large working area	Small working area
High energy extraction methods	Low energy extraction methods
Material of high dust potential	Material of low dust
Potential high extraction rate	Low extraction rate

An example of a large potential dust magnitude from mineral extraction may include a working area >100 ha, drilling and blasting frequently used, dusty mineral of small particle size and/or low moisture content, 1,000,000 tonnes per annum (tpa) extraction rate. A small potential magnitude may include working area <20 ha, hydraulic excavator, coarse material and/or high moisture content, <200,000 tpa extraction rate.

Figure 1-3: Materials Handling

LARGE	SMALL
High no. heavy plant	Low no. heavy plant
Unconsolidated/bare surface	Hard standing surface
Activities close to site boundary	Activities within quarry void
Material of high dust potential	Material of low dust potential

An example of a large potential dust magnitude from materials handling may include factors such as >10 loading plant within 50m of a site boundary, transferring material of a high dust potential and/or low moisture content on dry, poorly surfaced ground. Conversely, a small potential dust magnitude may include <5 plant, more than 100 m of a site boundary, within the quarry void or clean hardstanding, transferring material of low dust potential and/or high moisture content.

Figure 1-4: Onsite Transportation

LARGE	SMALL
Use of unconsolidated haul roads	Use of conveyors
Unpaved haul roads	Paved haul roads
Road surface of high dust potential	Road surface of low dust potential
High no. HDV movements	Low no. HDV movements
High total length of haul roads	Low total length of haul roads
Uncontrolled vehicle speed	Controlled (low) vehicle speed

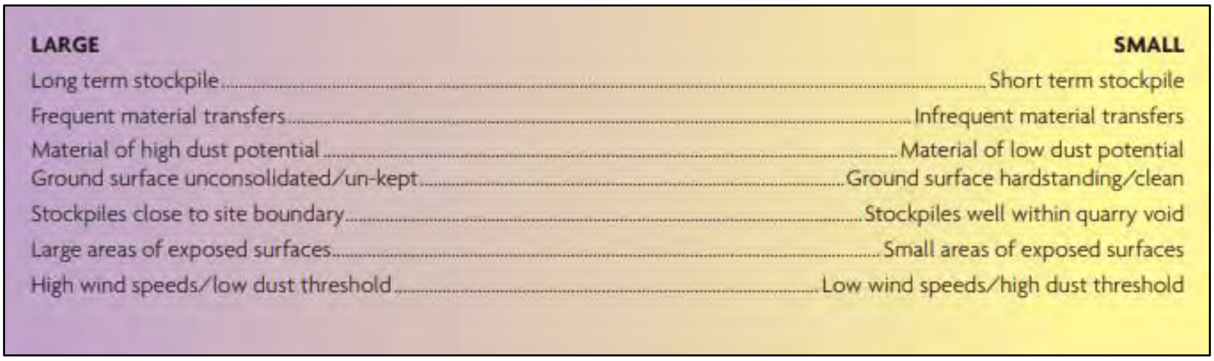
An example of a large potential dust magnitude from on-site transportation could include >250 movements in any one day on unpaved surfaces of potentially dusty material. A small potential magnitude may include the employment of covered conveyors used for the majority of the on-site transportation of material, <100 movements of vehicles per day, with surface materials of compacted aggregate, <500 m in length and a maximum speed of 15 mph.

Figure 1-5: Mineral Processing

LARGE	SMALL
Raw material of high dust potential	Raw material of low dust potential
End product of high dust potential	End product of low dust potential
Complex or combination of processes	Single process
High volume material processed	Low volume material processed

An example of a large potential dust magnitude from mineral processing may include factors such as a mobile crusher and screener with a concrete batching plant on-site, processing >1,000,000 tpa of material with a high dust potential and/or low moisture content e.g. hard rock. Conversely, a small potential dust magnitude may include a site with a fixed screening plant with effective design in dust control, processing <200,000 tpa of material with a low dust potential and/or high moisture content e.g. wet sand and gravel.

Figure 1-6: Stockpiles / Exposed Surfaces



LARGE	SMALL
Long term stockpile	Short term stockpile
Frequent material transfers	Infrequent material transfers
Material of high dust potential	Material of low dust potential
Ground surface unconsolidated/un-kept	Ground surface hardstanding/clean
Stockpiles close to site boundary	Stockpiles well within quarry void
Large areas of exposed surfaces	Small areas of exposed surfaces
High wind speeds/low dust threshold	Low wind speeds/high dust threshold

An example of a large potential dust magnitude from stockpiles and exposed surfaces could include a stockpile with a total exposed area >10 ha in an area exposed to high wind speeds located <50 m of the site boundary. Daily transfer of material with a high dust potential and/or low moisture content. Stockpile duration >12 months and quarry production >1,000,000 tpa. A small potential magnitude may include stockpile duration of <1 month with a total area <2.5 ha in an area of low wind speeds, located >100 m from the site boundary. Weekly transfers of material with a low dust potential and/or high moisture content. Quarry production <200,000 tpa.

Figure 1-7: Offsite Transportation

LARGE	SMALL
High No. HDV Movements	Low No. HDV Movements
Unconsolidated Access Road	Paved Access Road
Limited/No Vehicle Cleaning Facilities	Extensive Vehicle Cleaning Facilities
Small Length of Access Road	Large Length of Access Road

An example of a large potential dust magnitude from off-site transportation could include total HDV >200 movements in any one day on an unsurfaced site access road <20 m in length with no HDV cleaning facilities. No road sweeper is available. A small potential magnitude may include <25 HDV movements per day, a paved surfaced site access road >50 m in length, with effective HDV cleaning facilities and procedures, and the employment of an effective road sweeper.

1.3 Estimation of the Pathway Effectiveness

The site-specific factors considered to determine the effectiveness of the pathway for dust dispersion were the distance and orientation of receptors relative to prevailing wind directions. Receptors were identified within 400m of the dust emission source. Table 1-1 shows the categorisation of the frequency of potential dust winds based on the meteorological data from a nearby weather station.

Table 1-1: Categorisation of Frequency of Potentially Dusty Winds

Frequency Category	Criteria
Infrequent	Frequency of winds (>5 m/s) from the direction of the dust source on dry days are less than 5%
Moderately Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 5% and 12%
Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are between 12% and 20%
Very Frequent	The frequency of winds (>5 m/s) from the direction of the dust source on dry days are greater than 20%

Table 1-2 below shows the categorisation of receptors, based on their distance to the dust emission source.

Table 1-2: Categorisation of Receptor Distance from Source

Distance Category	Criteria
Distant	Receptor is between 200m and 400m from the dust source
Intermediate	Receptor is between 100m and 200m from the dust source
Close	Receptor is less than 100m from the dust source

Table 1-3 below shows the determination of the Pathway Effectiveness based on the frequency of potentially dusty winds and the distance of the receptor from the dust emission source.

Table 1-3: Classification of the Pathway Effectiveness

Receptor Distance Category	**Frequency of Potentially Dusty Winds**			
	Infrequent	**Moderately Frequent**	**Frequent**	**Very Frequent**
Close	Ineffective	Moderately Effective	Highly Effective	Highly Effective
Intermediate	Ineffective	Moderately Effective	Moderately Effective	Highly Effective
Distant	Ineffective	Ineffective	Moderately Effective	Moderately Effective

1.4 Estimation of the Dust Impact Risk and Effects

Table 1-4 shows the estimation of the Dust Impact Risk based on the Residual Source of Emission and Pathway Effectiveness classifications.

Table 1-4: Estimation of Dust Impact Risks

Pathway Effectiveness	**Residual Source Emission**		
	Small	**Medium**	**Large**
Highly Effective Pathway	Low Risk	Medium Risk	High Risk
Moderate Effective Pathway	Negligible Risk	Low Risk	Medium Risk
Ineffective Pathway	Negligible Risk	Negligible Risk	Low Risk

1.5 Estimation of the Effects of Dust Impact

Table 1-5 below shows the estimate of the likely magnitude of Disamenity Effects based on the receptor sensitivity and the risk of dust impacts.

Table 1-5: Descriptors for magnitude of Dust Effects

Receptor Distance Category	**Receptor Sensitivity**		
	Low	**Medium**	**High**
High Risk	Slight Adverse Effect	Moderate Adverse Effect	Substantial Adverse Effect
Medium Risk	Negligible effect	Slight Adverse Effect	Moderate Adverse Effect
Low Risk	Negligible effect	Negligible effect	Slight Adverse Effect
Negligible Risk	Negligible effect	Negligible effect	Negligible effect

REFERENCES

[1] IAQM, "Guidance on the Assessment of Mineral Dust Impacts for Planning," Institute of Air Quality Management, London, 2016.

APPENDIX 10

APPENDIX 10-1

1 CHARACTERISING CLIMATE HAZARDS

1.1 Frequency of Climate Hazards according to Annex B [1]

Table 1-1: Classifying the Frequency of Climate Hazards

Frequency	**Frequency Occurrence in a Year**	**Description**
Very Frequent	>100%	Occurs several times in a single year
Frequent	50 to 100%	Occurs once in a 1-to-2-year period
Common	10 to 50%	Occurs once in a 2-to-10-year period
Occasional	1 to 10%	Occurs once in a 10–100-year period
Rare	<1%	occurs once in over 100 years

1.2 Vulnerability Types

Table 1-2: Description of Different Vulnerability Types [1]

Vulnerability Type	**Frequency Occurrence in a Year**
Physical Vulnerability	Properties of an asset related to the structure or facilities can exacerbate/reduce the impacts before, during, or after a hazard event e.g. poor design and the construction of the building, provision of active cooling. **or;** Ability of a population/persons to access equipment or resources that can exacerbate/reduce the impacts before, during, or after a hazard event.

1.3 Level of Impacts

Table 1-3: Description of Level of Impacts [1]

Impact	**Description**	**Level of Impact**
Catastrophic	Widespread service failure with services unable to cope with wide-scale impacts	5
Major	Services seen to be in danger of failing completely with severe/widespread decline in service provision	4
Moderate	Service provision under severe pressure. Appreciable decline in	3

Impact	Description	Level of Impact
	service provision at a community level	
Minor	Isolated but noticeable examples of service declines	2
Negligible	Appearance or threat but no actual impact on service provision	1

1.4 Magnitude of Impact for Asset Damage Category

Table 1-4: Magnitude of Impact Relating to Asset Damage [1]

Risk Area	Negligible	Minor	Moderate	Major	Catastrophic
Asset Damage	Impact can be absorbed through normal activity	An adverse event that can be absorbed by taking business continuity action	A serious event that requires additional emergency business continuity	A critical event that requires extraordinary/emergency business continuous actions	Disaster with the potential to lead to shutdown or collapse or loss of assets network

2 IDENTIFICATION OF CLIMATE HAZARDS

2.1 Meath County Council Climate Change Risk Assessment

The Meath County Council Climate Change Risk Assessment has evaluated the consequence and likelihood of climate hazards risks [2]. The Climate Risk Assessment quantified both the short term (2020s) and medium-term (2050s) risks of Co. Meath.

Meath County Council defines Consequence as the level of harm or damage caused by a climate event and Likelihood as the probability of a climate event occurring, as presented in Table 2-1 below.

Table 2-1: Meath County Council Consequence and Likelihood Scale

Consequence Description	Consequence Score	Likelihood Description	Likelihood Score
Catastrophic	5	Almost Certain	5
Major	4	Likely	4
Moderate	3	Possible	3
Minor	2	Uncertain	2
Insignificant	1	Rare	1

The Risk is measured as a product of the Consequence and Likelihood and evaluated using the following scale (Table 2-2 below).

Table 2-2: Meath County Council Risk Scale

Risk Description	Risk Score
Low Risk	1 – 6
Medium Risk	7 – 14
High Risk	15 – 25

2.2 Met Éireann Historical Data

A minimum of 30 years of meteorological data from the Met Éireann Historical Database [3] was analysed to assess the frequency of climate hazards as presented in Table 1-1 above.

2.3 European Forest Fire Information System Wildfire Risk Viewer

The European Forest Fire Information System ('EFFIS') Wildfire Risk Viewer [4] was utilised to assess wildfire risk. The Wildfire Risk Viewer evaluates the level of risk based on the vegetation type, classifying land as Low, Medium or High Risk.

2.4 Geological Survey Ireland Landslide Susceptibility Mapping

The Geological Survey Ireland ('GSI') Landslide Susceptibility Mapping resource [5] was used to assess the potential risk of landslides in relation to the Proposed Development. The resource assesses landslide susceptibility based on geological, topographical and environmental factors and identifies areas prone to landslides by considering past landslide events.

2.5 Climate Hazards Associated with the Proposed Development

Table 2-3 below highlights the hazards identified through desk-based research.

Table 2-3: Hazards Identified as Relevant to the Proposed Development from Available Resources

Source	Hazards Identified	Projected Risk / Category of Risk (if applicable)
Meath County Council Climate Action Plan [6]	Heatwaves / Droughts	Increasing Risk
	Flooding	Increasing Risk
	Windstorms	Increasing Risk
	Extreme Cold	Decreasing Risk
	Heavy Snowfall	Decreasing Risk
EFFIS Wildfire Risk Viewer [4]	Wildfires	Low Risk
GSI Landslide Susceptibility Mapping [5]	Landslides	Low – High

3 REFERENCES

[1] GOI, "Technical Annex B Climate Change Risk Assessment," Government of Ireland , Dublin, 2023.

[2] Meath County Council, "Meath County Council Climate Change Risk Assessment," WSP, London, 2018.

[3] Met Éireann, "Historical Data," [Online]. Available: https://www.met.ie/climate/available-data/historical-data. [Accessed March 2025].

[4] EU Copernicus, "European Forest Fire Information System (EFFIS) Wildfire Risk Viewer," [Online]. Available: https://forest-fire.emergency.copernicus.eu/apps/fire.risk.viewer/. [Accessed March 2025].

[5] Geological Survey Ireland, "Landslides Susceptibility Mapping," 2025.

[6] RPS Group Limited, "Tier 1 Climate Change Risk Assessment, Kilkenny County Council," 2023.

[7] Government of Ireland, "Climate Action and Low Carbon Development (Amendment) Act 2021 S.I. 32 of 2021," 2021. [Online]. Available: https://www.irishstatutebook.ie/eli/2021/act/32/enacted/en/html. [Accessed August 2024].

[8] Department of Environment, Climate and Communications, "Guidelines for Local Authority Climate Action Plans, Technical Annex B - Climate Change Risk Assessment," Government of Ireland, 2023.

APPENDIX 10-2

Murrens Quarry EIAR GHG Emissions Calculations

Total Operational GHG Emissions

Proposed Development Phase	Total Operational Emissions $kgCO_2e$	Total Operational Emissions tCO_2e
Operational Phase Traffic Emissions (HGVs + Employee Movements)	1,071,506	648
Operational Phase Electricity	32,385	32
Operational Phase Plant Emissions	1,887,780	1,888
Total Operational Phase Emissions	**2,991,671**	**2,568**

National Carbon Budget/Emission Ceilings	Tonnes of CO_2e	Annual Operational Phase as %age of Emission Ceiling for 2026 - 2030
National Second Carbon Budget 2026 – 2030	200,000,000	0.006%[Note 1]
Transport Emission Ceiling 2026 – 2030	37,000,000	0.01%[Note 2]
Electricity Emission Ceiling 2026 – 2030	20,000,000	0.001%[Note 3]

Note 1: Percentage presents annual Operational GHG emissions / one year National Second Carbon Budget (2026-2030).

Note 2: Percentage presents annual Operational traffic emissions / one year of Transport Sectoral Ceiling (2026-2030).

Note 3: Percentage presents annual Operational electricity emissions / one year of Electricity Sectoral Ceiling (2026-2030).

Operational Traffic Emissions (HGVs)

rEIAR estimated distance (km) one way Estimated Distance Travelled one way (km) as provided by the Applicant and presented in rEIAR	80
DESNZ Emissions factor All HGVs 0% laden (kCO_2e per km)	0.64
DESNZ Emissions factor All HGVs 100% laden (kCO_2e per km)	0.98
HGV Maximum Daily Movements (one way)	16

Total HGVs per day	Total No. of Return Journeys*	Total Distance Travelled / Operational Phase per year (km)**	Emission Factor (kg of CO_2e per km)*** 0% laden and 100% laden	Total Annual kg CO_2e for Operational Phase 0% laden	Total Annual kg CO_2e for Operational Phase 100% laden	Total Tonnes CO2e / Operational Phase per year****
32	9,696	775,680	0% laden = 0.64 100% laden = 0.98	248,218	380,083	628

**Based on 32 daily round trips.*

***Based on a 303-day operational year.*

****Emission Factor kg of CO2e per km for All HGVs 0% laden and 100% from DESNZ 2024.*

*****Calculated based on 16 trips 0% laden + 16 trips 100% laden for a 303-day operational year.*

Operational Traffic Emissions (Employee Vehicles)

CSO 2022 Average Distance Travel one way (km)	16.8
Total Operational Days	303
Total Employee Vehicles	9

Total Employee Trips per day	No. of Employee Return Journeys per year*	Total Distance Travelled (km) / Operational Phase (includes return trip)**	Emission Factor (kg of CO2e per km)***	Total kg CO_2e / Operational Phase per year	Total Tonnes CO_2e for Operational Phase
18	5,454	91,627	0.218	19,975	20

**Based on a 303-day operational year.*

***Based on an average round trip distance of 33.6km per employee for a 303-day operational year*

****Emission Factor kg of CO_2e per km for Medium Car – Average taken from TII Carbon Tool.*

Output of TII Carbon Tool (Employee Vehicles)

Mode of Transport	Total distance travelled by workers during construction (km)	Transport tCO2e
Car - Medium	91627.00	19.9509

Operational Plant Emissions

Plant Operational Days	303
Plant Operational Hours (per week)	67
Plant Operational Hours (per day)	11.1

Plant Type	Total Number of Plant Used	Total Operating Hours during Operational Phase*	Fuel Use per 1 Plant (litres/hour)	Emission Factor (kg of CO_2e per litre)**	Total Fuel Consumption for Operational Phase per year (litres)	$kgCO_2e$ Operational Phase per year	tCO_2e Operational Phase per year***
Dry Mobile Screening Plant	1	3,363	10	3.341	33,633	112,368	112
Semi Mobile Crushing Plant	1	3,363	14	3.341	47,086	157,315	157
Tracked Excavators	2	6,727	18	3.341	121,079	404,524	405
Wheel Loaders	2	6,727	34	3.341	228,704	764,101	764
Rock Breakers	2	6,727	20	3.341	134,532	449,471	449
Total Plant Emissions (tCO_2e)						**1,887,780**	**1,888**

**Based on a 67-hour operational week and 303-day operational year considering total number of plant.*

***Emission Factor for diesel kg of CO_2e per litre taken from TII Carbon Tool.*

****Considers emissions from total number of plant.*

Operational Electricity Emissions

SEAI Emission Factor Electricity Consumption (gCO_2e/kWh) - 2024	254.8

Annual Average Electricity Usage (kWh)	Electricity Consumption Emission Factor (gCO_2e/Kwh)*	Total Annual gCO2e for Operational Phase	Total Annual kgCO2e / Operational Phase per year	Total Annual Tonnes CO_2e / Operational Phase per year
127,100	254.8	32,385,080	32,385	32

APPENDIX 11

APPENDIX 11

APPENDIX 11-1

Glossary of Acoustic Terminology

Abbreviation / Descriptor	**Description**
A Weighted	A time weighting given to noise values to amend the values to suit the human ear response to the various frequency components of the sound.
Acoustic environment	Sound from all sound sources as modified by the environment (BS ISO 12913-1:2013).
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far. *Note: The ambient sound comprises the residual sound and the specific sound when present.*
Ambient sound level, L_a = $L_{Aeq,\,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T. *Note: the ambient sound level is a measure of the residual sound and the specific sound when present.*
Background sound level, $L_{A90,\,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
dB (decibel)	A relative unit of measurements, based on a logarithmic scale to describe the ratio between the measured level and a reference or threshold level of 0dB. Unless otherwise stated 0dB within this report is $2x10^{-5}$ pascals (Pa).
Day	A 24 hour period from midnight to midnight.
Daytime	A 12 hour period between 07:00 – 19:00 hours, as per NG4
Evening-Time	A 4 hour period between 19:00 – 23:00 hours, as per NG4
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,\,T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T=t_2-t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given the following equation: $L_{\mathrm{Aeq},T} = 10\lg_{10}\left\{(1/T)\int_{t_1}^{t_2}[p_A(t)^2/p_0^2]\mathrm{d}t\right\}$ where: p_0 is the reference sound pressure (20 μPa); and $p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t *Note: The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.*
$L_{AN,T}$	The Fast interval, A-Weighted noise level in the for the 'N' percentile of the sampling interval 'T'.
$L_{A10,T}$	The A-Weighted noise level for the 10%ile of the sampling interval 'T', typically utilised to represent peak noise events such as intermittent passing traffic.
$L_{A90,T}$	The A-Weighted noise level in the lower 90 percentile of the sampling interval 'T', excludes intermittent features typical of traffic. See also background sound level.
$L_{A95,T}$	The A-Weighted noise level for the 95%ile of the sampling interval 'T'. Representative of steady noise events at a monitoring location.

$L_{Aeq,T}$	The equivalent continuous sound level, used to describe the fluctuating noise in terms of a single noise level over the same sampling time period (T). Also see ambient sound.
L_{den}	Day-evening-night equivalent level, calculated as: $Lden = 10Log\frac{1}{24}\left(12*10\frac{Lday}{10}+4*10\frac{Levening+5}{10}+8*10\frac{Lnight+10}{10}\right)$ Where the L_{day}, $L_{evening}$ and L_{night} are as defined in ISO1996-2:1987, and for the duration of 12 hours, 4 hours and 8 hours respectively, are A-weighted long term Leq sound level.
L_{day}	Day equivalent level. A-weighted Leq sound level measured over the 12 hour period from 07:00 hours to 19:00 hours.
$L_{evening}$	Evening equivalent level. A-weighted Leq sound level measured during the evening period of 19:00 hours to 23:00 hours.
L_{Amax}	The maximum RMS A-Weighted sound pressure level occurring within a specified time period.
L_{night}	Night equivalent level. A-weighted Leq sound level measured during the night period of 23:00 hours to 07:00 hours.
Measurement time interval, T_m	total time over which measurements are taken. *Note: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.*
Rating level, $L_{Ar, Tr}$	specific sound level plus any adjustment for the characteristic features of the sound.
Reference time interval, T_r	specified interval over which the specific sound level is determined. *Note: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h*
Residual sound	ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, $L_r = L_{Aeq,T}$	equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.
Specific sound level, $L_s = L_{Aeq,Tr}$	equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
Specific sound source	sound source being assessed.
Night-Time	An 8 hour period between 23:00 – 07:00 hours, as per NG4
Noise Ambient	The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far. Also see ambient sound.
Noise Background	The steady existing noise level present without contribution from any intermittent sources, The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, 'T' ($L_{AF90,T}$). Also see background sound level, $L_{A90, T}$.
Noise Specific	The sound arising from the source under investigation, disregarding all external and residual sources. Also see specific sound source.
NSR	Noise Sensitive Receptor - an identified dwelling, amenity area, recreational zone or other such place where a change in noise may result in a nuisance impact.
RMS	Root Mean Squared, mathematical method to account for swells and troughs within wave forms, such as sound.

Sound Power Level (L_W)	The logarithmic measure of sound power in comparison to a referenced sound intensity level of one picowatt (1pW) per m2. Utilised to express the intensity at source of a noise emission.
Sound Pressure Level (L_P)	Fluctuations in air pressure caused by the passage of a sound wave. The measurement of sound/noise through the use of a sound level meter, is a representation of these fluctuations in air pressure as they pass the instrument microphone.
Time Weighting	One of the averaging time for noise monitoring instrumentation: F – Fast, instrument samples every 125 milliseconds; S – Slow, instrument samples every 1 second; I – Impulsive, instrument samples every 35 milliseconds.

Note:

Unless otherwise stated all broadband noise values are A-weighted with a fast response.

Where 0dB is referenced it refers to the threshold of hearing – $2x10^{-5}$Pa.

All 1/3 octave values are unweighted/linear. (z-weighted on the Bruel and Kjaer software)

APPENDIX 11-2

APPENDIX 11-2-1

E2343

Input - Sources and Receivers - Model 01

Model: EIAR Model v1 - Model 01
Revision EIAR Model - Area
Group: (main group)
Listing of: Moving source, for method Industrial noise - ISO 9613-2:1996

Name	Desc.	ISO H	ISO Terr.	HDef.	Weighting	Flow(D)	Flow(E)	Flow(N)	Avg.speed	Max.dist.	Lw 31	Lw 63	Lw 125	Lw 250	Lw 500
HGV In	C.9.22	0.75	--	Relative	A	20	--	--	10	25.00	0.00	94.80	101.90	104.40	108.80
HGV Out	C.10.18	0.75	--	Relative	A	20	--	--	10	25.00	0.00	88.80	96.90	102.40	105.80
Trac Exc2	Tracked exvvator C9.11	0.75	--	Relative	A	25	--	--	10	25.00	0.00	92.80	100.90	104.40	113.80
Loading2	Wheele loader C9.07	0.75	--	Relative	A	156	--	--	10	25.00	--	89.80	99.90	106.40	109.80
Loading 1	Wheele loader C9.07	0.75	--	Relative	A	343	--	--	10	25.00	--	89.80	99.90	106.40	109.80
Trac Exc1	Tracked exvvator C9.11	0.75	--	Relative	A	25	--	--	10	25.00	0.00	92.80	100.90	104.40	113.80

Input - Sources and Receivers - Model 01

Model: EIAR Model v1 - Model 01
Revision EIAR Model - Area
Group: (main group)
Listing of: Moving source, for method Industrial noise - ISO 9613-2:1996

Name	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Red 31	Red 63	Red 125	Red 250	Red 500	Red 1k	Red 2k	Red 4k	Red 8k
HGV In	111.00	110.20	106.00	95.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HGV Out	106.00	103.20	100.00	92.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trac Exc2	115.00	116.20	113.00	106.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loading2	114.00	112.20	106.00	96.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loading 1	114.00	112.20	106.00	96.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trac Exc1	115.00	116.20	113.00	106.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Input - Sources and Receivers - Model 01

Model: EIAR Model v1 - Model 01
Revision EIAR Model - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613-2:1996

Name	Desc.	Height	Terrain L	HDef.	Type	DI	DI_Horz	DI_Vert	DI(0)	DI(10)	DI(20)	DI(30)	DI(40)	DI(50)	DI(60)	DI(70)
Screening	C10.14	1.50	128.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump	Washing Plant	1.50	126.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Screening	Screen source measurement	1.50	126.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Breake2	Rock breaker	1.50	120.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Breaker1	Rock breaker	1.50	130.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crusher	C1.14	1.50	128.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

E2343
Input - Sources and Receivers - Model 01

Model: EIAR Model v1 - Model 01
Revision EIAR Model - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613-2:1996

Name	DI(80)	DI(90)	DI(100)	DI(110)	DI(120)	DI(130)	DI(140)	DI(150)	DI(160)	DI(170)	DI(180)	Ca(D)	Ca(E)	Ca(N)	Weighting	No refl.	No building	No ind.site
Screening	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No	No
Pump	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No	No
Screening	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	Z	No	No	No
Breake2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	Z	No	No	No
Breaker1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	Z	No	No	No
Crusher	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No	No

E2343
Input - Sources and Receivers - Model 01

Model:	EIAR Model v1 - Model 01 Revision EIAR Model - Area
Group:	(main group)
Listing of:	Point sources, for method Industrial noise - ISO 9613-2:1996

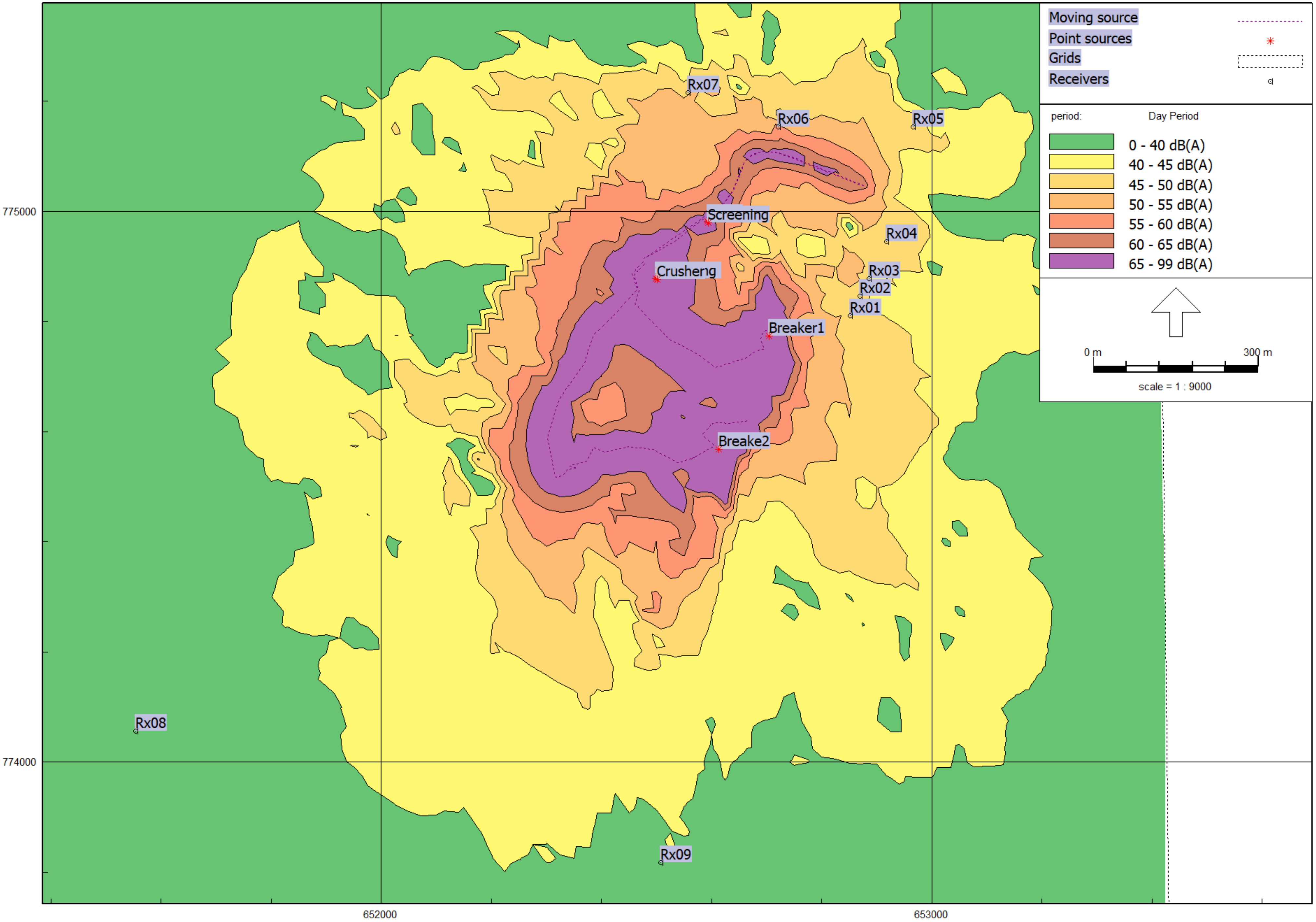
Name	Lw 31	Lw 63	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Red 31	Red 63	Red 125	Red 250	Red 500	Red 1k	Red 2k	Red 4k	Red 8k
Screening	0.00	94.80	97.90	98.40	102.80	103.00	100.20	98.00	88.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pump	--	76.80	85.90	79.40	78.80	82.00	82.20	77.00	72.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Screening	--	95.00	94.00	92.00	89.00	87.00	88.00	85.00	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Breake2	--	92.80	100.90	104.40	113.80	115.00	116.20	113.00	106.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Breaker1	--	92.80	100.90	104.40	113.80	115.00	116.20	113.00	106.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crusher	0.00	94.80	97.90	98.40	105.80	103.00	100.20	95.00	85.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

E2343
Input - Sources and Receivers - Model 01

Model:	EIAR Model v1 - Model 01 Revision EIAR Model - Area
Group:	(main group)
Listing of:	Receivers, for method Industrial noise - ISO 9613-2:1996

Name	Desc.	Terrain L	HDef.	Height A	Height B	Height C	Height D	Height E	Height F	Façade
Rx01	NSR01	136.95	Relative	1.50	--	--	--	--	--	No
Rx02		137.92	Relative	1.50	--	--	--	--	--	No
Rx03		136.00	Relative	1.50	--	--	--	--	--	No
Rx05		132.00	Relative	1.50	--	--	--	--	--	No
Rx06	NSR03	128.95	Relative	1.50	4.00	--	--	--	--	No
Rx07	NSR04	134.00	Relative	1.50	--	--	--	--	--	No
Rx04	NSR02	135.03	Relative	1.50	--	--	--	--	--	No
Rx08	NSR05	120.00	Relative	1.50	--	--	--	--	--	No
Rx09	NSR06	127.70	Relative	1.50	--	--	--	--	--	No

APPENDIX 11-2-2



ISO 9613-2:1996, [Revision EIAR Model - EIAR Model v1 - Model 01] , iNoise V2024.3 Pro Licensed to Joanna Skorka - Malone O'Regan Environmental Services Ltd

EIAR Model 01

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APPENDIX 11-2-3

E2343
Output - Results - Model 01

Report: Table of Results
Model: EIAR Model v1 - Model 01
LAeq: total results for receivers
Group: (main group)
Group Reduction: No

Name Receiver	Description	X	Y	Height	Day
Rx01_A	NSR01	652851.14	774810.16	1.50	48.0
Rx02_A		652869.85	774846.31	1.50	49.5
Rx03_A		652886.42	774878.27	1.50	49.8
Rx04_A	NSR02	652918.01	774945.28	1.50	49.9
Rx05_A		652966.03	775152.90	1.50	46.6
Rx06_A	NSR03	652721.19	775154.07	1.50	53.4
Rx06_B	NSR03	652721.19	775154.07	4.00	57.2
Rx07_A	NSR04	652556.91	775215.35	1.50	52.0
Rx08_A	NSR05	651554.21	774056.77	1.50	34.0
Rx09_A	NSR06	652507.85	773817.96	1.50	40.4

All shown dB values are A-weighted

APPENDIX 11-2-4

E2343
Input - Sources and Receivers - Model 02

Model:	EIAR Model v03 - Model 02 Revision EIAR Model - Area
Group:	(main group)
Listing of:	Moving source, for method Industrial noise - ISO 9613-2:1996

Name	Desc.	ISO H	ISO Terr.	HDef.	Weighting	Flow(D)	Flow(E)	Flow(N)	Avg.speed	Max.dist.	Lw 31	Lw 63	Lw 125	Lw 250	Lw 500
Trac Exc2	Tracked exvvator C9.11	0.75	--	Relative	A	25	--	--	10	25.00	0.00	92.80	100.90	104.40	113.80
Trac Exc1	Tracked exvvator C9.11	0.75	125.00	Relative	A	25	--	--	10	25.00	0.00	92.80	100.90	104.40	113.80
HGV In	C.9.22	0.75	--	Relative	A	20	--	--	10	25.00	0.00	94.80	101.90	104.40	108.80
HGV Out	C.10.18	0.75	--	Relative	A	20	--	--	10	25.00	0.00	88.80	96.90	102.40	105.80
Loading2	Wheele loader C9.07	0.75	--	Relative	A	147	--	--	10	25.00	--	89.80	99.90	106.40	109.80
Loading 1	Wheele loader C9.07	0.75	--	Relative	A	273	--	--	10	25.00	--	89.80	99.90	106.40	109.80

E2343
Input - Sources and Receivers - Model 02

Model: EIAR Model v03 - Model 02
Revision EIAR Model - Area
Group: (main group)
Listing of: Moving source, for method Industrial noise - ISO 9613-2:1996

Name	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Red 31	Red 63	Red 125	Red 250	Red 500	Red 1k	Red 2k	Red 4k	Red 8k
Trac Exc2	115.00	116.20	113.00	106.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Trac Exc1	115.00	116.20	113.00	106.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HGV In	111.00	110.20	106.00	95.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
HGV Out	106.00	103.20	100.00	92.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loading2	114.00	112.20	106.00	96.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Loading 1	114.00	112.20	106.00	96.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Input - Sources and Receivers - Model 02

Model:	EIAR Model v03 - Model 02 Revision EIAR Model - Area
Group:	(main group)
Listing of:	Point sources, for method Industrial noise - ISO 9613-2:1996

Name	Desc.	Height	Terrain L	HDef.	Type	DI	DI_Horz	DI_Vert	DI(0)	DI(10)	DI(20)	DI(30)	DI(40)	DI(50)	DI(60)	DI(70)
Breake2	Rock breaker	1.50	120.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Breaker1	Rock breaker	1.50	130.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Pump	Washing Plant	1.50	126.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Screening	Screen source measurement	1.50	126.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Screening	C10.14	1.50	128.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Crusher	C1.14	1.50	128.00	Relative	Normal point source	none	0	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Model: EIAR Model v03 - Model 02
Revision EIAR Model - Area
Group: (main group)
Listing of: Point sources, for method Industrial noise - ISO 9613-2:1996

Name	DI(80)	DI(90)	DI(100)	DI(110)	DI(120)	DI(130)	DI(140)	DI(150)	DI(160)	DI(170)	DI(180)	Ca(D)	Ca(E)	Ca(N)	Weighting	No refl.	No building	No ind.site
Breake2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	Z	No	No	No
Breaker1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	Z	No	No	No
Pump	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No	No
Screening	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	Z	No	No	No
Screening	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No	No
Crusher	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00	--	--	A	No	No	No

Input - Sources and Receivers - Model 02

Model:	EIAR Model v03 - Model 02 Revision EIAR Model - Area
Group:	(main group)
Listing of:	Point sources, for method Industrial noise - ISO 9613-2:1996

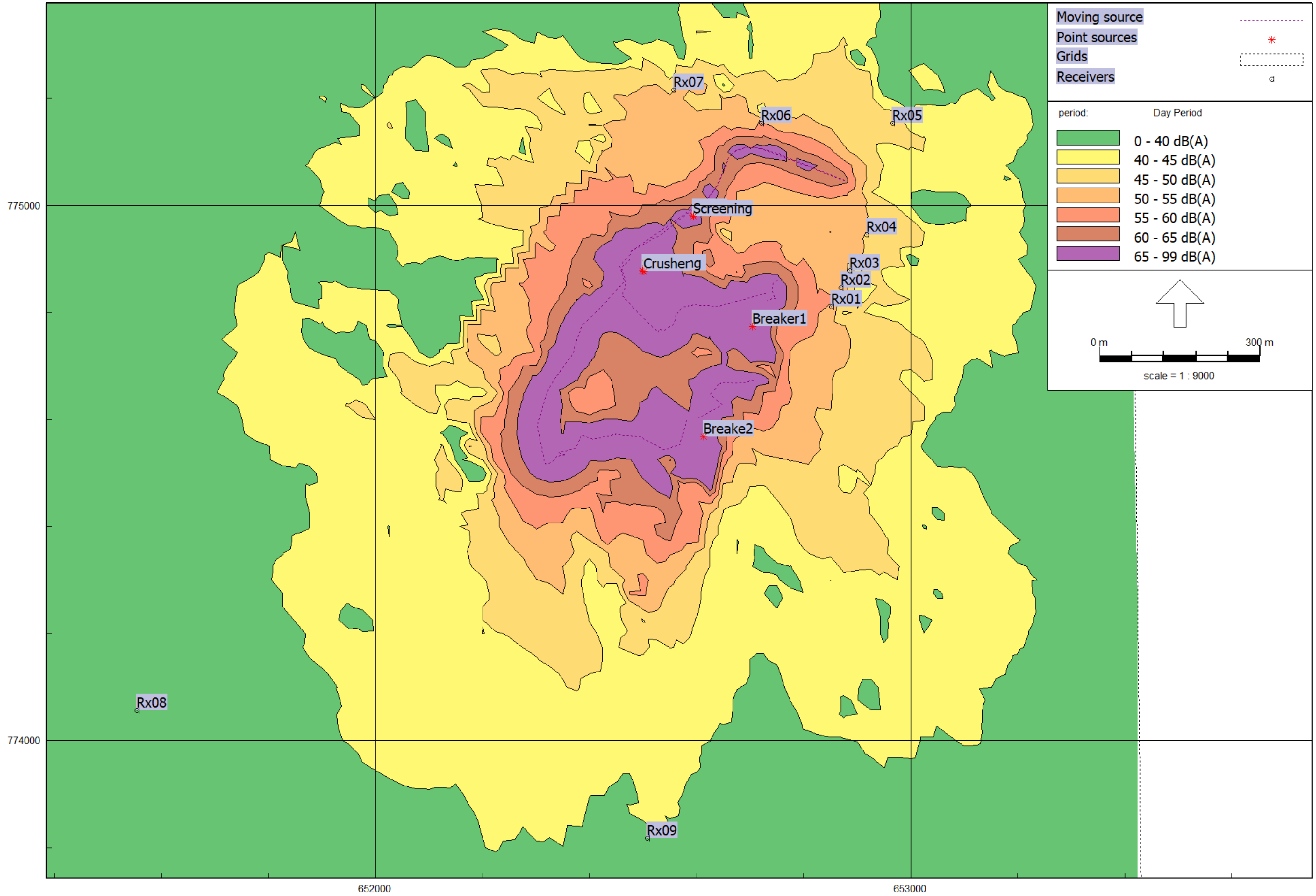
Name	Lw 31	Lw 63	Lw 125	Lw 250	Lw 500	Lw 1k	Lw 2k	Lw 4k	Lw 8k	Red 31	Red 63	Red 125	Red 250	Red 500	Red 1k	Red 2k	Red 4k	Red 8k
Breake2	--	92.80	100.90	104.40	113.80	115.00	116.20	113.00	106.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Breaker1	--	92.80	100.90	104.40	113.80	115.00	116.20	113.00	106.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pump	--	76.80	85.90	79.40	78.80	82.00	82.20	77.00	72.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Screening	--	95.00	94.00	92.00	89.00	87.00	88.00	85.00	81.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Screening	0.00	94.80	97.90	98.40	102.80	103.00	100.20	98.00	88.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Crusher	0.00	94.80	97.90	98.40	105.80	103.00	100.20	95.00	85.90	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

E2343
Input - Sources and Receivers - Model 02

Model:	EIAR Model v03 - Model 02 Revision EIAR Model - Area
Group:	(main group)
Listing of:	Receivers, for method Industrial noise - ISO 9613-2:1996

Name	Desc.	Terrain L	HDef.	Height A	Height B	Height C	Height D	Height E	Height F	Façade
Rx01	NSR01	136.95	Relative	1.50	--	--	--	--	--	No
Rx02		137.92	Relative	1.50	--	--	--	--	--	No
Rx03		136.00	Relative	1.50	--	--	--	--	--	No
Rx05		132.00	Relative	1.50	--	--	--	--	--	No
Rx06	NSR03	128.95	Relative	1.50	4.00	--	--	--	--	No
Rx07	NSR04	134.00	Relative	1.50	--	--	--	--	--	No
Rx04	NSR02	135.03	Relative	1.50	--	--	--	--	--	No
Rx08	NSR05	120.00	Relative	1.50	--	--	--	--	--	No
Rx09	NSR06	127.70	Relative	1.50	--	--	--	--	--	No

APPENDIX 11-2-5



EIAR Model 02

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ISO 9613-2:1996, [Revision EIAR Model - EIAR Model v03 - Model 02] , iNoise V2024.3 Pro Licensed to Joanna Skorka - Malone O'Regan Environmental Services Ltd

APPENDIX 11-2-6

E2343
Output - Results - Model 02

Report:	Table of Results
Model:	EIAR Model v03 - Model 02
LAeq:	total results for receivers
Group:	(main group)
Group Reduction:	No

Name Receiver	Description	X	Y	Height	Day
Rx01_A	NSR01	652851.14	774810.16	1.50	53.8
Rx02_A		652869.85	774846.31	1.50	54.3
Rx03_A		652886.42	774878.27	1.50	52.3
Rx04_A	NSR02	652918.01	774945.28	1.50	51.6
Rx05_A		652966.03	775152.90	1.50	46.7
Rx06_A	NSR03	652721.19	775154.07	1.50	52.8
Rx06_B	NSR03	652721.19	775154.07	4.00	56.7
Rx07_A	NSR04	652556.91	775215.35	1.50	52.3
Rx08_A	NSR05	651554.21	774056.77	1.50	34.2
Rx09_A	NSR06	652507.85	773817.96	1.50	41.0

All shown dB values are A-weighted

APPENDIX 11-3

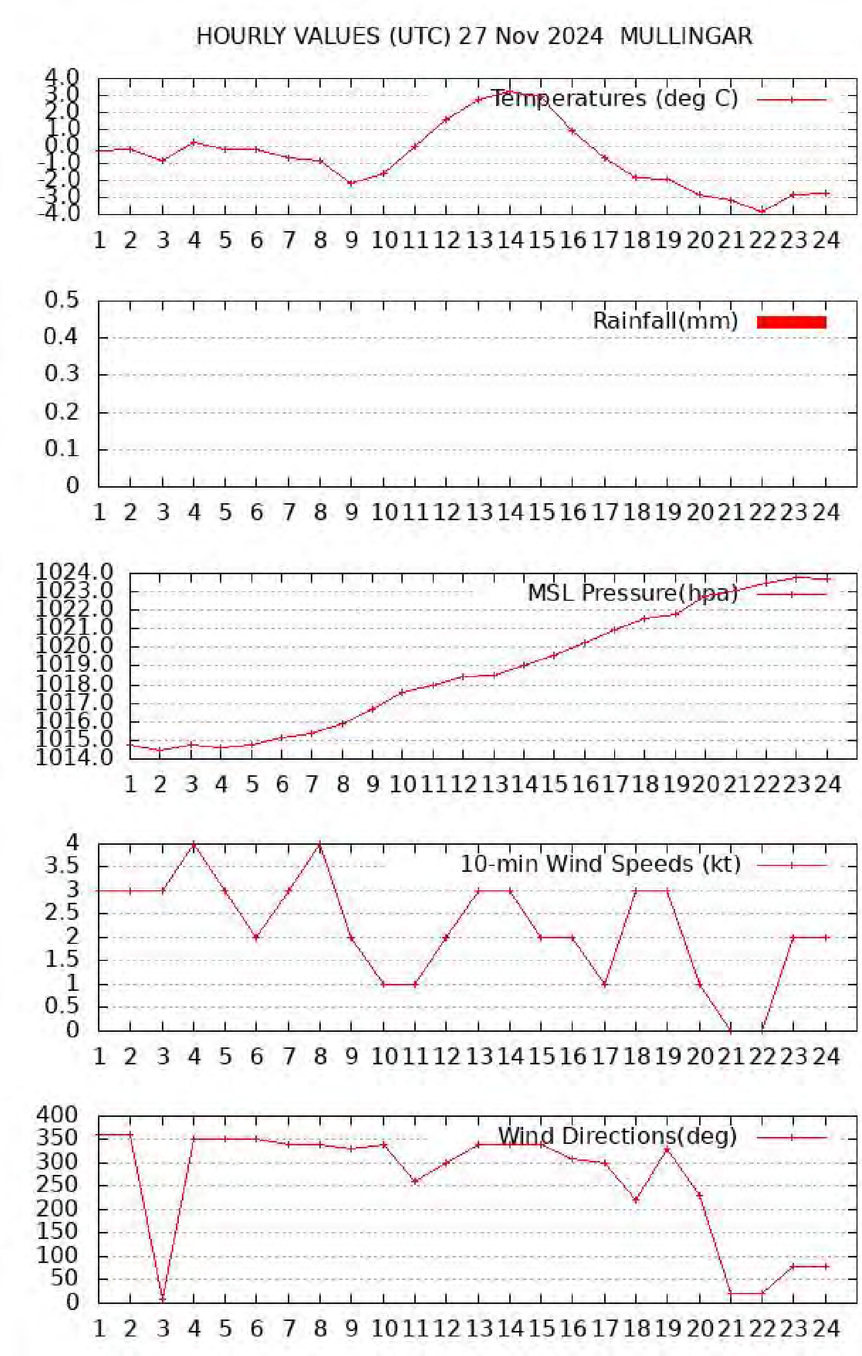
Daily Data

Weather station Data is available from 16/10/2015 to 10/03/2025

Select Station & Date: Station Mullingar Date 27/11/2024 Go

Weather Station Reports from Mullingar

Date	Rainfall (mm)	Max Temp (°C)	Min Temp (°C)	Grass Min Temp (°C)	Mean Wind Speed (knots)	Max Gust (>= 34 knots)	Sunshine (hours)
27/11/2024	0.0	3.4	-4.1	-8.4	2.1		



APPENDIX 11-4

CONTENTS

TABLES

PLATES

CHARTS

1 INTRODUCTION

This document supplies the frequency analysis charts, noise summary results and the sound level meter setup photos for each monitoring event.

Surveyor:	Dylan Morris	**Approver:**	Kenneth Goodwin
Revision Issue Number:	01	**Status:**	Final
Job Number:	E2343		

2 CALIBRATION OF SOUND LEVEL METER

The Sound Level Meter ('SLM') was the

- NTI XL2 Audio Acoustic Hand-held Analyser SLM.

The SLM is Type 1 and equipped with Frequency Analysis Software.

The monitoring equipment was calibrated prior to and following the measurement period using a:

- Cirrus CR515 field calibrator (Serial Number 95601).

Broadband noise levels were measured using the A-weighted network, and a fast-sampling interval, unless otherwise stated.

Table 2-1: Calibration of the Sound Level Meter

Parameter	Detail
Project Name:	E2343 Noise Summary
Device Info:	XL2, SNo. A2A-18871-E0, FW4.21 Type Approved
Mic Type:	NTi Audio M2230, SNo. 8112
Mic Sensitivity:	42.7 mV/Pa, User calibrated 2024-11-27 11:18

3 NOISE SURVEY SUMMARY

Surveyor: Dylan Morris **Survey Date:** 27th November 2024

TN Issue Date: 7 January 2025 **Survey Period:** 11:23 to 16:17.

Scope: This survey was undertaken to obtain baseline acoustic conditions in the vicinity of the Murren's Quarry. The summary noise results are presented in Table 3-1 below. A map of the noise monitoring locations is presented in Figure 3-1 below.

Table 3-1: Summary Noise Survey Results 27/11/2024

Type	Start	Elapsed Time (hh:mm:ss)	L_{Aeq} [dB]	$L_{90.0\%}$ [dB]	$L_{10.0\%}$ [dB]	L_{AFmax} [dB]	Commentary
NM1 R1	27/11/2024 11:23	00:30:00	40	32	43	57	Dominant: Birdsong. Faint off-site noise (W). Some site noise from trucks passing SLM while passing office
NM1 R2	27/11/2024 11:55	00:30:00	38	32	41	56	Dominant: Birdsong. Faint off-site noise (W). Some site noise from trucks passing SLM while passing office
NM2 R1	27/11/2024 12:32	00:30:00	55	35	55	77	Dominant: Traffic on R195. Occasional site reversing alarms (W)
NM2 R2	27/11/2024 13:03	00:30:00	56	36	57	82	Dominant: Traffic on R195. Occasional site reversing alarms (W)
NM3 R1	27/11/2024 15:16	00:30:00	66	38	63	88	Dominant: Traffic on R195. Off-site Reversing alarms (W). Repetitive hammering and reversing alarms at farmyard property (S).
NM3 R2	27/11/2024 15:47	00:30:00	68	41	69	88	Dominant: Traffic on R195. Site Reversing alarms (W). Repetitive hammering and reversing alarms at farmyard property (S).
NM4 R1	27/11/2024 14:06	00:30:00	55	30	42	85	Dominant: Traffic on nearby road. Reversing alarms on multiple occasions off-site (NW)
NM4 R2	27/11/2024 14:37	00:30:00	57	29	46	88	Dominant: Traffic on nearby road. Reversing alarms on multiple occasions off-site (NW)

Figure 3-1: Noise Monitoring Locations

4 NOISE MONITORING LOCATIONS 1/3 OCTAVE CHARTS

4-1 NM1 North of Quarry

Plate 1: NM1 Location

Chart 1: NM1 Run 1 1/3 Octave Frequency Analysis

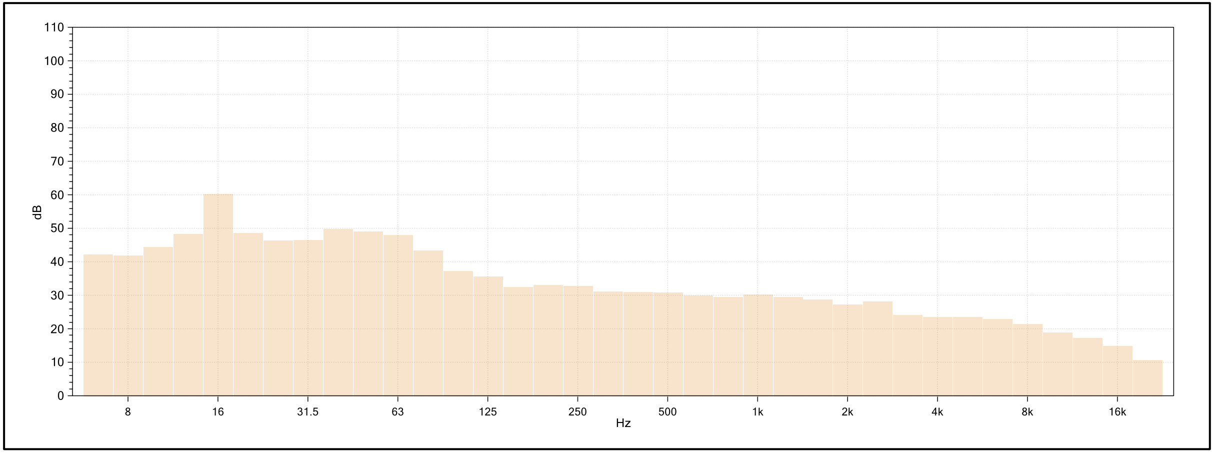
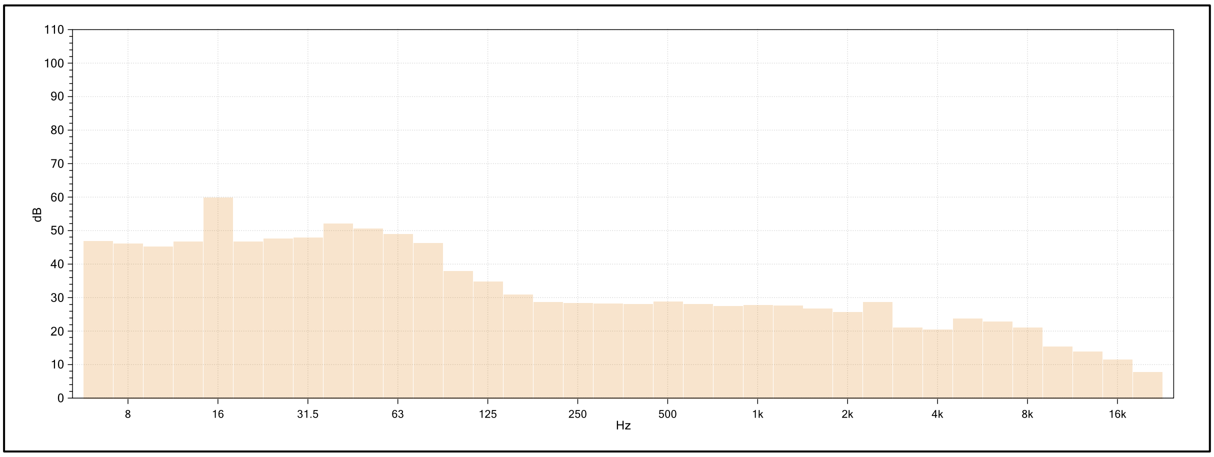


Chart 2: NM1 Run 2 1/3 Octave Frequency Analysis



4-2 NM2 East of Quarry roadside Entrance

Plate 2: NM2 Location

Chart 3: NM2 Run 1 1/3 Octave Frequency Analysis

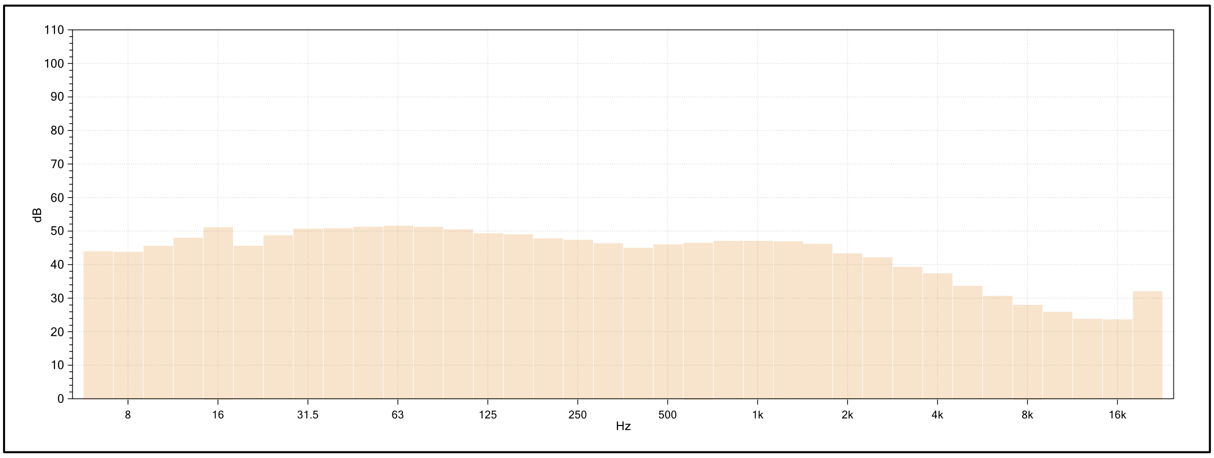
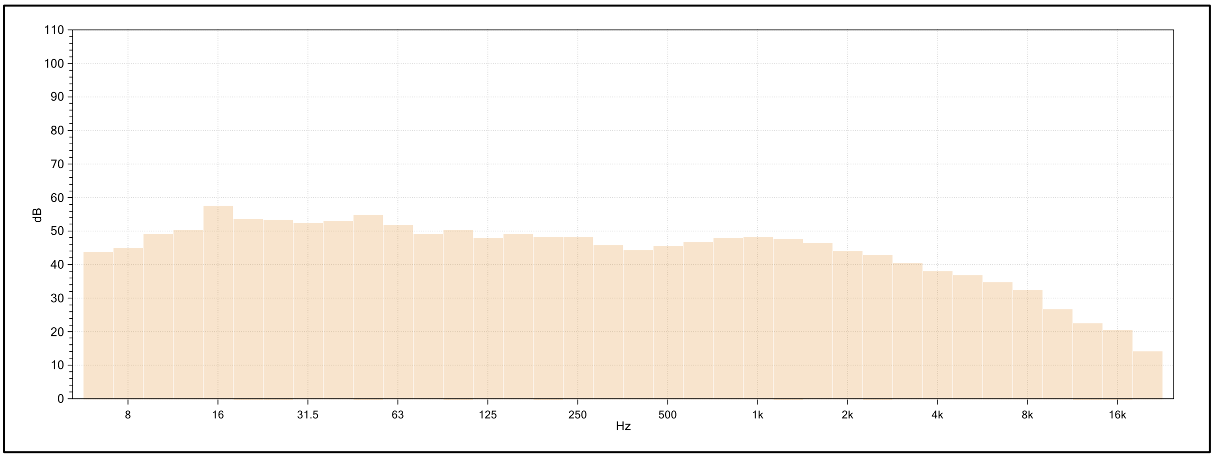


Chart 4: NM2 Run 2 1/3 Octave Frequency Analysis



4-3 NM3 Southeast of Quarry

Plate 3: NM3 Location

Chart 5: NM3 Run 1 1/3 Octave Frequency Analysis

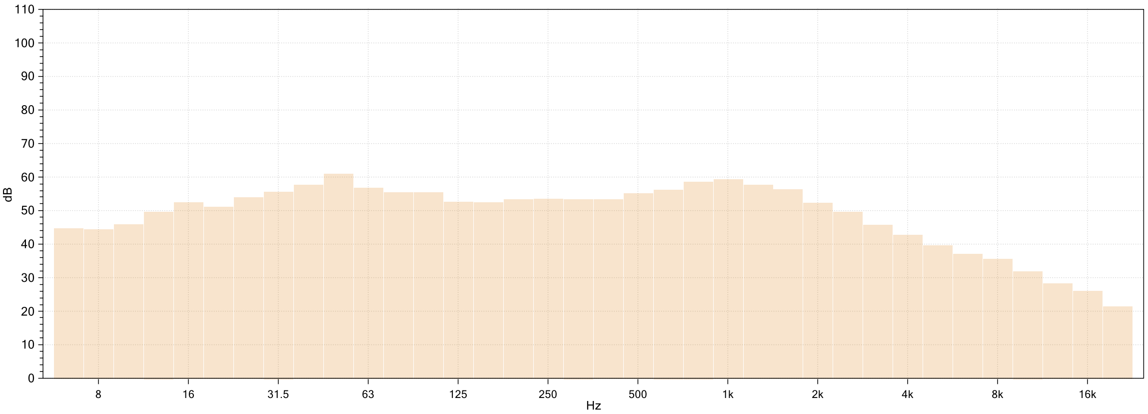
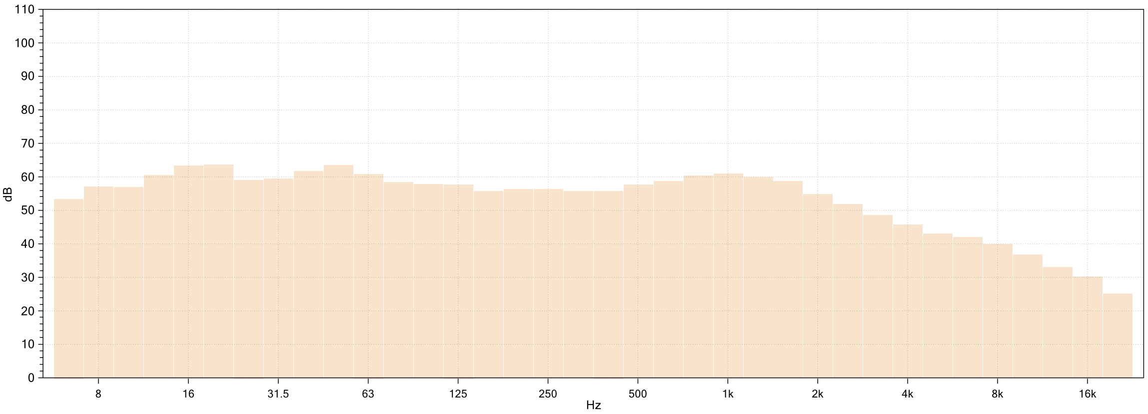


Chart 6: NM3 Run 2 1/3 Octave Frequency Analysis



4-4 NM4 Southwest of Quarry

Plate 4: NM4 Location

Chart 7: NM4 Run 1 1/3 Octave Frequency Analysis

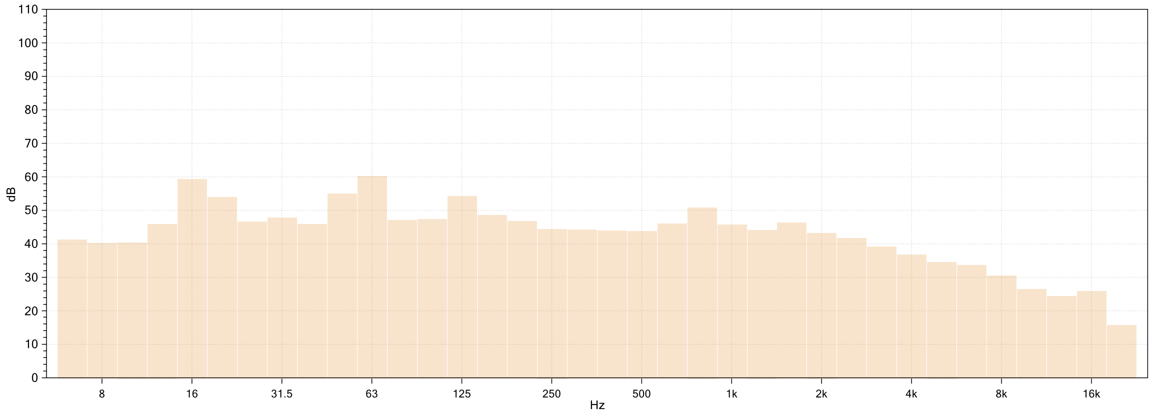
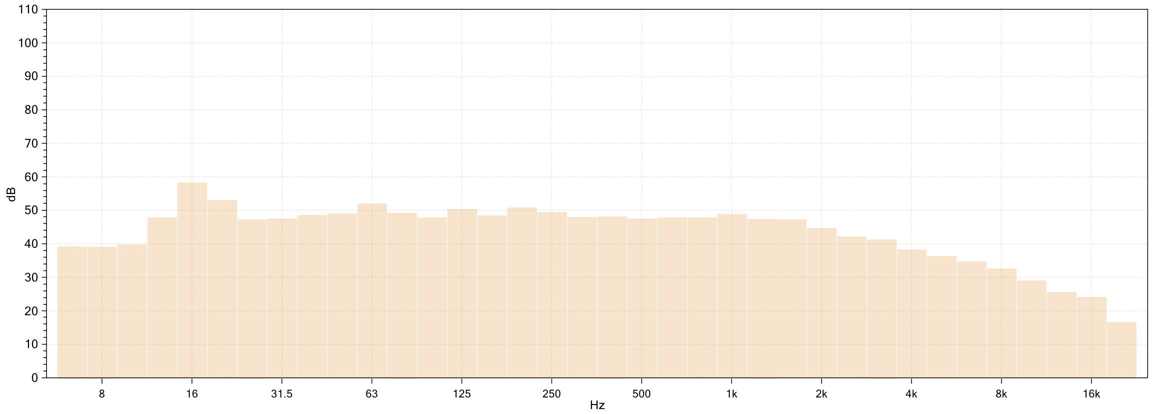


Chart 8: NM4 Run 2 1/3 Octave Frequency Analysis



APPENDIX 13

APPENDIX 13-1

Appendix 13-1: Recorded Monuments in the Study area

ME014-015--- BALTRASNA Ringfort - rath

Situated on a ridge in an undulating landscape. This is an oval grass-covered area (dims 47.5m N-S; 38m E-W) defined by an overgrown earthen bank (Wth of base 6.5-7m; int. H 0.5-0.8m; int. H 2.5-2.8m) separated by a fosse (Wth of top 7.5-8m; Wth of base 1.7-2m; ext. D 0.7m at ENE to 1.15m at WSW) from an outer overgrown bank (at WNW: Wth of base 4.3m; ext. H 0.7m), both of which only survive E-W-N. There are entrances through the inner bank at NNE (Wth of base 3m) and SSW (Wth 3m), both probably modern. Enclosure (ME0014-016----) is c. 70m to the SE.

ME014-016--- BALTRASNA Ringfort – rath

Situated in an undulating low-lying landscape. It is depicted as a circular embanked and wooded feature on the 1836 edition of the OS -6-inch map where it is described in gothic lettering as a ‘Fort’ and it is depicted as a small wood on the 1908 edition. This is a circular grass-covered and slightly domed area (diam. 58m N-S; 56m E-W) defined by a scarp (at W: Wth 2m; H 1.1m) and hedge. There is no visible fosse or entrance.

ME014-017--- BALTRASNA Ringfort – rath

Located on a rise in an undulating landscape. It is depicted as a hachured enclosure (ext. dims c. 65m NE-SW; c. 60m NW-SE) only on the 1908 edition of the OS 6-inch map. It is known locally as a ‘fort’ but had been removed c. 1969. It was still discernible as a subcircular area (dims c. 54m NE-SW; c. 44m NW-SE) defined by a soil change. It had been completely quarried away by 1995 (OSAP).

ME014-018--- BALTRASNA Ringfort – rath

The Archaeological Inventory of Co. Meath (Moore 1987, 59, No. 507) describes this site as a circular area defined by a scarp (diam. 30m) and outer fosse. Hut site in centre. Original entrance and causeway at NE. RMP file states the site is almost circular area 31m x 29m and enclosed by a grass-covered bank of earth and stone and a narrow shallow outer fosse. The entrance may have been a gap in the SE or NE. There is a fairly large 6-sided structure marked by a low grass-covered bank of earth and stone in the interior.

ME014-019---- MOYLAGH Ringfort – rath

Small circular area enclosed by the remains of an earth and stone bank and an enclosing fosse. East side of monument bulldozed during road-widening about 1979.

ME014-022---- ANNAGH Ringfort – rath

Small circular area enclosed by a bank of earth and stone and a shallow fosse and a low external earth and stone bank.

ME014-02301- ANNAGH Enclosure

D-shaped area 25m x 30m on a knoll enclosed by scarps and banks. Within it is a circular house platform 6.5m x 5m connected to the enclosure on its S side by a causeway 6.7m long and 4.2m wide. The entrance may be at NW. On a knoll to the south is an oval area enclosed by a well-defined bank with 2 large possible house platforms on the W slop of the northern part of the ridge. On the E slope of the ridge there is a circular features 7m across with a narrow bank and southern interior.

ME014-O2302- ANNAGH Field system

Field system associated with an oval enclosure.

ME14-O24--- GREENAN Ringfort – rath

Oval area enclosed by a grass-covered earthen bank with an external fosse. Possible original entrance at ENE.

ME014-026--- ANNAGH Enclosure

The Archaeological Inventory of Co. Meath (Moore 1987, 94, No. 917) describes this site as an oval area defined by an earthen bank (dims. 54m x 40m). Truncated, with modern entrance at SSE. Hut site with entrance on long side at N. Uneven interior. RMP file states this is an oval enclosure enclosed by a bank 3-4m wide and rising to c.0.5m over exterior. There are the foundations of a house toward the northern end measuring 11m x 5m with stone banks 1.5m wide and 0.5m high and an entrance at N.

ME014-028--- ANNAGH Enclosure

Large oval area enclosed by a low bank with possible original entrance at NNE. When visited on the 13th of July 2013 this site was found to be levelled.

ME014-029- ANNAGH Enclosure

The Archaeological Inventory of Co. Meath (Moore 1987, 94, No. 919) describes this site as an oval area, truncated on SE, defined by an earthen bank (dims 66m x 43m). The uneven interior has some slight banks and possible hut site. Destroyed on SE side by quarry. RMP file states that this is an enclosure 66m x 42.5m enclosed by a bank and truncated on E side. There are two rectangular structures in the interior 1. In the north is 18.4m x 11.5m has a low grass-covered stone wa11. 2 in the south is 7.7m x 5m

ME014-030--- ANNAGH Enclosure

Circular platform defined by a low scarped embankment.

ME014-031-- ANNAGH Earthwork

Round hillock enclosed by an embankment with an external fosse. Possible hut in interior. Possible tree-ring.

ME14-O57--- GREENAN Earthwork

Located at the bottom of a steep NE-facing slope. A small circular embanked enclosure (ext. diam. c. 20m) is depicted on the 1836 edition of the OS 6-inch map where it is described as a ‘Fort’, and it is depicted as a hachured feature (ext. diam. c. 30-35m) on the 1908 edition. This is a subcircular grass-covered platform (dims 18m N-S; 14.3m E-W) defined by a scarp (at WNW: Wth 0.7m; H 0.4m). There is no visible fosse or bank.

ME14-O62--- GLENAWARD Ringfort – rath

Located towards the bottom of a SW-facing slope and on the floor of a SE-NW valley. This is a circular grass-covered area (diam. 47m NE-SW; 45m NW-SE) defined by a slight earthen bank E-SW with some bushes but the perimeter is reduced to a scarp elsewhere, with a wide, deep and flat-bottomed outer fosse visible N-S-W. The original entrance is not identified. There is a cairn inside the perimeter at W which is thought locally to be the remains of a castle but no cut stone or outline is visible, and it is probably field stones.

APPENDIX 13-2

Appendix 13-2: Sites in the Sites and Monuments Record in the Study area

ME014-033---- MOYLAGH Ringfort – rath

Visible on Bing images (c. 2013), this feature was first brought to attention by Katherine McCormick. It is located at the W edge of a fairly high plateau and at the crest of a NW-facing slope. Subcircular grass-covered area (dims 35m NE-SW; c. 30m NW-SE) defined by an earthen bank (Wth 5-5.3m; int. H 0.2m; ext. H 0.3m) N-E and S-W. There is no identifiable entrance.

APPENDIX 13-3

GEOPHYSICAL SURVEY REPORT

Murrens Townland,
Oldcastle,
County Meath

Licence Number: **25R0022**

Date:
03/02/2025

J. M. Leigh Surveys Ltd.
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Leixlip
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SURVEY SUMMARY SHEET
MURRENS TOWNLAND, OLDCASTLE, COUNTY MEATH

Site Name	Murrens Townland, Oldcastle, County Meath	**JML Ref No.**	24063
Townland	Murrens	**Licence No.**	25R0022
County	County Meath	**Licence Holder**	Joanna Leigh
ITM (centre)	E652815, N775020	**Purpose**	Pre-planning site Investigation
Client	Malone O'Regan Environmental	**Reference No.**	NA

Ground Conditions The application is contained within a single field comprising of rough pasture. The site has a steep south facing slope at its northern extent, which was difficult to traverse. A further steep slope is at the eastern extent, adjacent to the main road.

Survey Type Detailed gradiometer survey totalling c. 1 hectares.

Summary

The survey identified parallel linear trends running through the data set east to west. These are indicative of a former trackway and are most likely agricultural in origin. Parallel linear trends perpendicular to this are indicative of ploughing activity.

A further faint linear trend in the south of the data set is orientated with the probable agricultural trackway and may represent a former field division.

No clear responses indicative of archaeology were recorded. Although isolated responses of possible interest were identified, there is no clear archaeological pattern, and these may equally represent more deeply buried ferrous debris.

Fieldwork Date 21st January 2025

Report Date 03/02/2025 **Report Author** Joanna Leigh

Contents

Geophysical Survey Report
Murrens Townland, Oldcastle,
County Meath

1 Introduction

1.1 A geophysical survey has been conducted by J. M. Leigh Surveys Ltd. at a site in the townland of Murrens, Oldcastle, County Meath. This survey has been undertaken on behalf of Malone O'Regan Environmental as part of a wider pre-planning investigation for a proposed quarry extension.

1.2 The application area totals c.1 hectare in size and is located to the northeastern extent of an existing quarry. Oldcastle is c.5km to the north and the R195 regional road forms the eastern boundary of the application area. Figure 1 presents the site location at a scale of 1:2,500.

1.3 There are no recorded monuments within the application area. The closest monument is a ringfort (RMP ME014-019), which is c.130m to the north of the application area.

1.4 The main aim of the survey was to identify any geophysical responses that may represent the remains of unknown archaeological features within the application area. A detailed gradiometer survey was conducted under licence 25R0022, issued by the Department of Housing, Local Government and Heritage.

2 Survey Ground Conditions and Further Information

2.1 The application area is contained within a single filed comprising of rough pasture. The northern extents of the site comprise of a steep south facing slope which was difficult to traverse. The ground also slopes sharply at the eastern extent, adjacent to the R195. The existing quarry is to the south and west of the site and defined by large earthen mounds.

3 Survey Methodology

3.1 A detailed gradiometer survey detects subtle variations in the local magnetic field and measurements are recorded in nano-Tesla (nT). Some archaeological features such as ditches, large pits and fired features have an enhanced magnetic signal and can be detected through recorded survey.

3.2 Data was collected with a Bartington Grad 601-2 instrument. This is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey fast and effective.

3.3 The instrument is calibrated in the field to ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.01nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.

3.4 All data was collected in ‘zigzag’ traverses. Grid orientation was positioned to facilitate data collection and remained constant throughout the survey. Data was collected with a sample interval of 0.25m and a traverse interval of 1m. The survey grid was set out using a GPS VRS unit. Survey tie-in information is available upon request.

4 Data Display

4.1 A summary greyscale image of the survey results is presented in Figure 2, at a scale of 1:1,250.

4.2 Figure 3 presents the interpretation of the results, also at a scale of 1:1,250.

4.3 Numbers in parentheses in the text refer to specific responses highlighted in the interpretation diagrams (Figure 3).

4.4 Isolated ferrous responses in the gradiometer data highlighted in the interpretation diagram most likely represent modern ferrous litter and debris and are not of archaeological interest. These are not discussed in the text unless considered relevant.

4.5 The raw gradiometer data is presented in archive format in Appendix A1.01. The raw data is displayed as a greyscale image and xy-trace plot, both at a scale of 1:500. The archive plots are used to aid interpretation of the results and are for reference only. These are available as PDF images upon request.

4.6 The display formats referred to above and the interpretation categories are discussed in the summary technical information section at the end of this report.

5 Survey Results & Conclusion

5.1 Parallel faint liner trends (1) traverse the dataset east to west. These are c.5m apart and most likely represent a former trackway. These are most likely agricultural in origin.

5.2 Further parallel linear trends (2) are perpendicular to (1) and are indicative of ploughing activity.

5.3 Further faint linear trends (3) appear to be aligned with (1) and may represent a former field boundary or division. This is most likely agricultural in origin.

5.4 Isolated responses (4) within the data are evident. Although it is possible that they are of archaeological interest, interpretation is cautious. The responses have no clear archaeological pattern and may equally represent more deeply buried modern ferrous debris.

5.5 Consultation with a licensed archaeologist and with the Department of Housing, Local Government and Heritage is recommended to establish if any additional archaeological works are required.

6 Technical Information Section

Instrumentation & Methodology

Detailed Gradiometer Survey

Detailed gradiometer survey can either be targeted across a specific area of interest or conducted as a blanket survey across an entire application area, often as a standalone methodology.

Sampling methodologies can vary but a typical survey is conducted with a sample interval of 0.25m and a traverse interval of 1m. This allows detection of potential archaeological responses. Data is collected in grids measuring 40m x 40m, with the data displayed accordingly. A more detailed survey methodology may be applied where archaeological remains are thought likely. This can sometimes produce results with a more detailed resolution. A survey with a grid size of 20m x 20m and a traverse interval of 0.5m will provide a data set with high resolution.

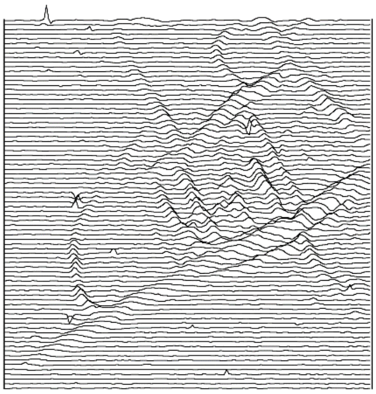
Bartington GRAD 601-2

The Bartington Grad 601-2 instrument is a specifically designed gradiometer for use in archaeological prospection. The gradiometer operates with a dual sensor capacity making survey fast and effective. The sensors have a separation of 1m allowing greater sensitivity.

Frequent realignment of the instruments and zero drift correction ensure a constant high quality of data. Extremely sensitive, these instruments can detect variations in soil magnetism to 0.1nT, affording diverse application throughout a variety of archaeological, soil morphological and geological conditions.

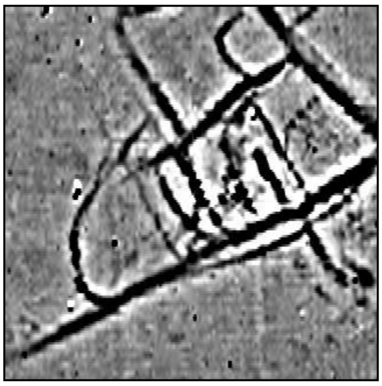
Gradiometer Data Display & Presentation

XY Trace



The data are presented as a series of linear traces, enabling a semi-profile display of the respective anomalies along the X and Y-axes. This display option is essential for distinguishing between modern ferrous materials (buried metal debris) and potential archaeological responses. The XY trace plot provides a linear display of the magnitude of the response within a given data set.

*Greyscale**



As with dot density plots, the greyscale format assigns a cell to each datum according to its location on the grid. The display of each data point is conducted at fine increments, allowing the full range of values to be displayed within the given data set. This display method also enables the identification of discrete responses that may be at the limits of instrument detection. In the summary diagrams processed, interpolated data is presented. Raw un-interpolated data is presented in the archive drawings along with the xy-trace plots.

Interpretation

An interpretation of the data is made using the plots presented in the final report, in addition to examination of the raw and processed data. The project managers' knowledge and experience allow a detailed interpretation of the survey results with respect to archaeological potential.

**XY Trace and raw greyscale plots are presented in archive form for display of the raw survey data. Summary greyscale images of the interpolated data are included for presentation purposes and to assist interpretation. The archive plots are provided as PDF images upon request.*

Glossary of Interpretation Terms

Categories of responses may vary for different data sets. The list below are the most used categories for describing geophysical responses, as presented in the summary interpretation diagrams.

Archaeology

This category refers to responses which are interpreted as of clear archaeological potential and are supported by further archaeological evidence such as aerial photography or excavation. The term is generally associated with significant concentrations of former settlement, such as ditched enclosures, pits, and associated features.

? Archaeology

This term corresponds to anomalies that display typical archaeological patterns where no record of comparative archaeological evidence is available. In some cases, it may prove difficult to distinguish between these and evidence of more recent activity also visible in the data.

Area of Increased Magnetic Response

These responses often lack any distinctive archaeological form, and it is therefore difficult to assign any specific interpretation. The resulting responses are site specific, possibly associated with concentrations of archaeological debris or more recent disturbance to underlying archaeological features.

Trend

This category refers to low-level magnetic responses barely visible above the magnetic background of the soil. Interpretation is tentative, as these anomalies are often at the limits of instrument detection.

Ploughing/Ridge & Furrow

Visible as a series of linear responses, these anomalies equate with recent or archaeological cultivation activity.

? Natural

A broad response resulting from localised natural variations in the magnetic background of the subsoil; presenting as broad amorphous responses most likely resulting from geological features.

Ferrous Response

These anomalies exhibit a typically strong magnetic response, often referred to as ‘iron spikes,’ and are the result of modern metal debris located within the topsoil.

Area of Magnetic Disturbance

This term refers to large-scale magnetic interference from existing services or structures. The extent of this interference may in some cases obscure anomalies of potential archaeological interest.

Bibliography

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English Heritage (2008) '*Geophysical guidelines: Geophysical Survey in Archaeological Field Evaluation*.' Second Edition.

Gaffney, C. Gater, J. & Ovenden, S. (2006) '*The use of Geophysical Techniques in Archaeological Evaluations.*' IFA Paper No. 6.

Gaffney, C & Gater, J (2003). '*Revealing the buried past: Geophysics for Archaeologists*.' Tempus Publishing Limited.

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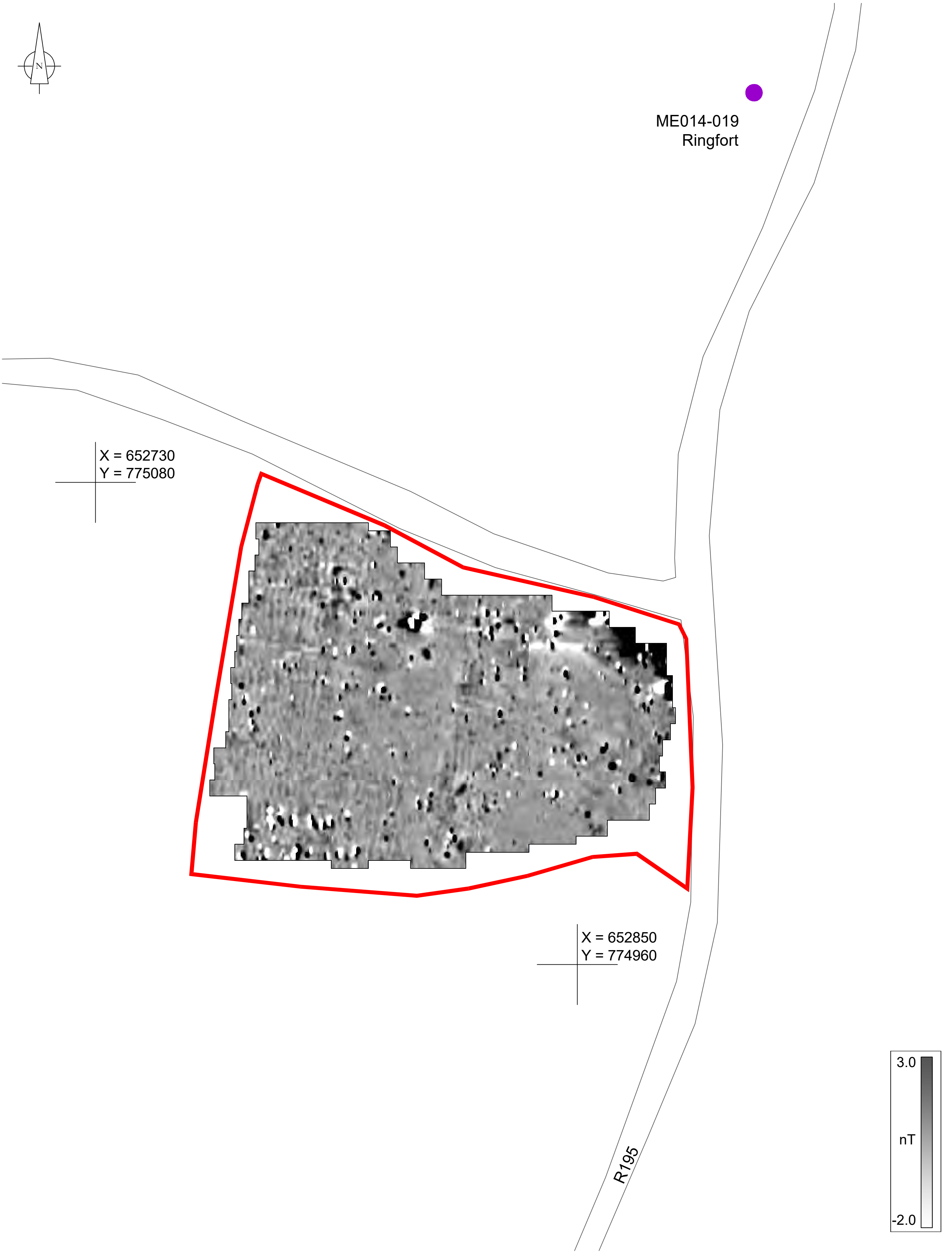
List of Figures

Archive Data Supplied as a PDF Upon Request

🟥 Application Area

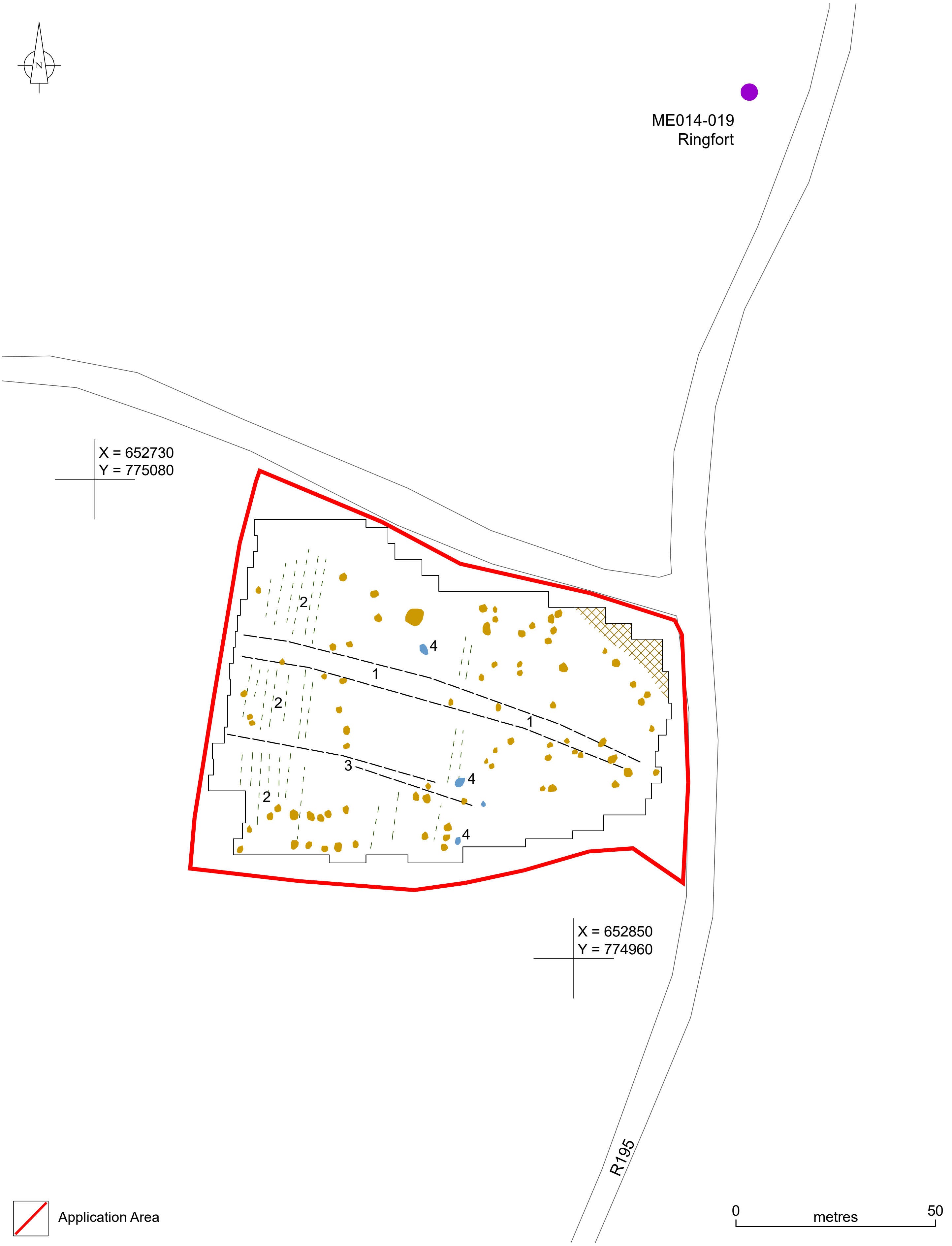
🟩 Detailed Gradiometer Survey

Client: Malone O'Regan Environmental	Project: Geophysical Survey Murrens Townland, Oldcastle, Co. Meath	Title: Site & Survey Location	J.M. Leigh Surveys Ltd. www.jmlsurveys.com	Scale @ A4: 1:2,500 Figure: 1 Licence No.: 24R0022 Issue Date: 03.02.2025



🟥 Application Area

Client: Malone O'Regan Environmental	Project: Geophysical Survey Murrens Townland, Oldcastle, Co. Meath	Title: Summary Greysale Image	J.M. Leigh Surveys Ltd. www.jmlsurveys.com	Scale @ A4: 1:1,250 Figure: 2 Licence No.: 24R0022 Issue Date: 03.02.2025



🟥 ?Archaeology

Trend

Ploughing

● Modern ferrous

▨ Modern magnetic disturbance

Client:

Malone O'Regan
Environmental

Project:

Geophysical Survey
Murrens Townland,
Oldcastle, Co. Meath

Title:

Summary Interpretation

J.M. Leigh
Surveys Ltd.
www.jmlsurveys.com

Scale @ A4:	1:1,250
Figure:	3
Licence No.:	24R0022
Issue Date:	03.02.2025

APPENDIX 14

APPENDIX 14-1

IDASO
Innovative Data Solutions

Idaso Ltd
National Science Park,
Dublin Road, Mullingar,
Co Westmeath, Ireland

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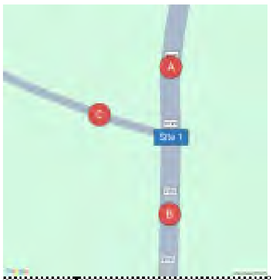
Ph: +353 (0) 4483 18019
Email: info@idaso.ie

www.idaso.ie

Data Analysis Services
Traffic-Transportation- Commercial-Innovation

241010 - R195 Quarry, Co. Meath

with compliments



IDASO

Survey Name: 241010 - R195 Quarry, Co. Meath
Site: Site 1
Location: R195/L68185
Date: Tue 14-Jan-2025
AM Peak: 07:30 — 08:30 **Total:** 134
PM Peak: 17:00 — 18:00 **Total:** 156
15 Min Peak: 17:00 — 17:15 **Total:** 50

Arm A - R195
Arm B - R195
Arm C - L68185

	A => A									A => B									A => C								
TIME	P/C	M/C	CAR	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	LGV	OGV1	OGV2	PSV	TOT	PCU
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07:45	0	0	0	0	0	0	0	0	0	0	0	17	3	0	2	0	22	24.6	0	0	3	1	0	0	0	4	4
H/TOT	0	0	0	0	0	0	0	0	0	0	0	49	3	0	2	0	54	56.6	0	0	7	1	0	0	0	8	8
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12:45	0	0	0	0	0	0	0	0	0	0	0	8	2	0	1	0	11	12.3	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	35	7	2	3	0	47	51.9	0	0	1	1	0	1	0	3	4.3
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18:45	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	6	6	0	0	0	0	0	0	0	0	0
H/TOT	0	0	0	0	0	0	0	0	0	0	0	36	0	1	0	0	37	37.5	0	0	1	0	0	0	0	1	1
12 TOT	0	0	0	1	0	0	0	1	1	0	0	431	76	13	23	1	544	581.4	0	0	20	2	0	6	0	28	35.8

B => A									B => B									B => C								
P/C	M/C	CAR	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	LGV	OGV1	OGV2	PSV	TOT	PCU
0	0	6	1	2	2	0	11	14.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	6	0	1	0	0	7	7.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	13	1	0	1	0	15	16.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	11	0	0	0	0	11	11	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
0	0	36	2	3	3	0	44	49.4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
0	0	6	2	0	1	1	10	12.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	15	2	0	0	1	18	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	7	2	0	0	0	9	9	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	17	18.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	44	6	0	2	2	54	58.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	11	5	0	1	1	18	20.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	11	0	0	0	0	11	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2.3
0	0	12	0	0	0	0	12	12	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	3.3
0	0	12	3	1	0	0	16	16.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	46	8	1	1	1	57	59.8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	0	3	5.6
0	0	8	0	0	0	0	8	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2.3
0	0	7	0	0	1	0	8	9.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	8	3	1	2	0	14	17.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	4	1	1	0	0	6	6.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	27	4	2	3	0	36	40.9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2.3
0	0	3	2	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	3	4.3
0	0	2	3	0	1	0	6	7.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	9	1	0	1	0	11	12.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	9	2	2	1	0	14	16.3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1.5
0	0	23	8	2	3	0	36	40.9	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	0	4	5.8
0	0	6	1	1	1	0	9	10.8	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
0	0	7	2	0	0	0	9	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	4	1	0	1	0	6	7.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	3	0	2	0	0	5	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2.3
0	0	20	4	3	2	0	29	33.1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	2	3.3
0	0	10	2	0	0	0	12	12	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	12	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	4	0	1	0	0	5	5.5	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	3.3
0	0	2	0	1	1	0	4	5.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	26	4	2	1	0	33	35.3	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	3.3
0	0	11	1	0	0	0	12	12	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	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	1	0	2	3.3	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	10	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	26	3	0	1	0	30	31.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	6	0	0	2	0	8	10.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	4	0	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
0	0	11	5	0	3	0	19	22.9	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	2	3.3
0	0	7	1	2	0	0	10	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	28	6	2	5	0	41	48.5	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	3	4.3
0	0	7	0	1	0	1	9	10.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	9	7	0	1	0	17	18.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2.3
0	0	11	9	2	0	0	22	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	9	2	0	0	1	12	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	36	18	3	1	2	60	64.8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2.3
0	0	13	5	0	1	0	19	20.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2.3
0	0	18	1	0	0	0	19	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	17	1	0	0	0	18	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	29	2	0	0	0	31	31	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	77	9	0	1	0	87	88.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2.3
0	0	14	3	0	0	0	17	17	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	15	15	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
0	0	10	0	0	1	0	11	12.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	7	0	1	0	0	8	8.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	45	4	1	1	0	51	52.8	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1
0	0	434	76	19	24	5	558	603.7	0	0	0	0	0	0	0	0	0	0	0	6	3	1	9	0	19	31.2

C => A									C => B									C => C								
P/C	M/C	CAR	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	LGV	OGV1	OGV2	PSV	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	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	1	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	3	1	0	0	0	4	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	1	0	2	3.3	0	0	0	0	0	1	0	1	2.3	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	0	0	1	0	2	3.3	0	0	0	0	0	1	0	1	2.3	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	1	2.3	0	0	1	0	0	1	0	2	3.3	0	0	0	0	0	0	0	0	0
0	0	1	0	0	1	0	2	3.3	0	0	1	0	0	1	0	2	3.3	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	0	0	0	0	1	1	0	0	0	0	0	1	0	1	2.3	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	0	0	0	0	1	1	0	0	0	0	0	1	0	1	2.3	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1	1	0	0	0	0	0	1	0	1	2.3	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	1	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	1	2.3	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0
0	0	0	1	0	2	0	3	5.6	0	0	2	1	0	1	0	4	5.3	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	1	1.5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	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	0	0	0	1	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	0	2	2.5	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	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	0	1	2.3	0	0	0	0	0	1	0	1	2.3	0	0	0	0	0	0	0	0	0
0	0	0	0	0	1	0	1	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	2	0	2	4.6	0	0	0	0	0	1	0	1	2.3	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2	0	0	0	0	2	2	0	0	0	0	0	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	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
0	0	2	0	0	0	0	2	2	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	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	0	1	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	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	0	1	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	2	0	2	4.6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	1	1	0	0	0	0	0	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	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
0	0	2	1	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2	0	0	0	0	2	2	0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0
0	0	5	1	0	0	0	6	6	0	0	3	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0
0	0	2	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	1	0	2	3.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	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	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	4	0	0	1	0	5	6.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	1	1	0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	2	0	0	0	0	2	2	0	0	1	1	0	0	0	2	2	0	0	0	0	0	0	0	0	0
0	0	19	4	1	9	0	33	45.2	0	0	9	3	0	5	0	17	23.5	0	0	0	0	0	0	0	0	0

APPENDIX 14-2

Existing R195 / L68185 Priority Junction - AM Peak Hour

2024 AM Peak - Base Flows

From / To	R195 (south)	L68185	R445 (north)	**Totals**
R195 (south)	0	1	54	**55**
L68185	1	0	4	**5**
R445 (north)	68	6	0	**74**
Totals	**69**	**7**	**58**	**134**

2026 AM Peak - Development Operational (Existing Flows + 1.68%)

From / To	R195 (south)	L68185	R445 (north)	**Totals**
R195 (south)	0	1	55	**56**
L68185	1	0	4	**5**
R445 (north)	69	6	0	**75**
Totals	**70**	**7**	**59**	**136**

2031 AM Peak - Development Operational (Existing Flows + 10.50%)

From / To	R195 (south)	L68185	R445 (north)	**Totals**
R195 (south)	0	1	60	**61**
L68185	1	0	4	**6**
R445 (north)	75	7	0	**82**
Totals	**76**	**8**	**64**	**148**

2041 AM Peak - Development Operational (Existing Flows + 15.00%)

From / To	R195 (south)	L68185	R445 (north)	**Totals**
R195 (south)	0	1	62	**63**
L68185	1	0	5	**6**
R445 (north)	78	7	0	**85**
Totals	**79**	**8**	**67**	**154**

Existing R195 / L68185 Priority Junction - PM Peak Hour

2024 PM Peak - Base Flows

From / To	R195 (south)	L68185	R445 (north)	**Totals**
R195 (south)	0	4	59	**63**
L68185	5	0	0	**5**
R445 (north)	87	1	0	**88**
Totals	**92**	**5**	**59**	**156**

2026 PM Peak - Development Operational (Existing Flows + 1.68%)

From / To	R195 (south)	L68185	R445 (north)	**Totals**
R195 (south)	0	4	60	**64**
L68185	5	0	0	**5**
R445 (north)	88	1	0	**89**
Totals	**94**	**5**	**60**	**159**

2031 PM Peak - Development Operational (Existing Flows + 10.50%)

From / To	R195 (south)	L68185	R445 (north)	**Totals**
R195 (south)	0	4	65	**70**
L68185	6	0	0	**6**
R445 (north)	96	1	0	**97**
Totals	**102**	**6**	**65**	**172**

2041 PM Peak - Development Operational (Existing Flows + 15.00%)

From / To	R195 (south)	L68185	R445 (north)	**Totals**
R195 (south)	0	5	68	**72**
L68185	6	0	0	**6**
R445 (north)	100	1	0	**101**
Totals	**106**	**6**	**68**	**179**

APPENDIX 14-3

Junctions 9

PICADY 9 - Priority Intersection Module

Version: 9.5.0.6896

For sales and distribution information, program advice and maintenance, contact TRL:
+44 (0)1344 379777 software@trl.co.uk www.trlsoftware.co.uk

Filename: Existing Junciton.j9
Path: S:\Jobs\2024\24242 Murrens Quarry, Meath EIAR\24242-02\Reports\Working\PICADY
Report generation date: 30/04/2025 16:45:01

Summary of junction performance

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	2025							
Stream B-AC	0.0	6.78	0.01	A	0.0	8.58	0.01	A
Stream C-AB	0.0	6.17	0.01	A	0.0	6.04	0.00	A
	2026							
Stream B-AC	0.0	6.78	0.01	A	0.0	8.58	0.01	A
Stream C-AB	0.0	6.16	0.01	A	0.0	6.04	0.00	A
	2031							
Stream B-AC	0.0	6.81	0.01	A	0.0	8.66	0.02	A
Stream C-AB	0.0	6.15	0.01	A	0.0	6.00	0.00	A
	2041							
Stream B-AC	0.0	6.76	0.01	A	0.0	8.69	0.02	A
Stream C-AB	0.0	6.14	0.01	A	0.0	5.99	0.00	A

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	17/02/2025
Version	
Status	(new file)
Identifier	
Client	
Jobnumber	
Enumerator	ROADPLAN01\jbyrne
Description	

Units

Distance units	Speed units	Traffic units input	Traffic units results	Flow units	Average delay units	Total delay units	Rate of delay units
m	kph	Veh	Veh	perHour	s	-Min	perMin

Analysis Options

Vehicle length (m)	Calculate Queue Percentiles	Calculate detailed queueing delay	Calculate residual capacity	RFC Threshold	Average Delay threshold (s)	Queue threshold (PCU)
5.75				0.85	36.00	20.00

Demand Set Summary

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2025	AM	ONE HOUR	07:45	09:15	15	✓
D2	2025	PM	ONE HOUR	16:45	18:15	15	✓
D3	2026	AM	ONE HOUR	07:45	09:15	15	✓
D4	2026	PM	ONE HOUR	16:45	18:15	15	✓
D5	2031	AM	ONE HOUR	07:45	09:15	15	✓
D6	2031	PM	ONE HOUR	16:45	18:15	15	✓
D7	2041	AM	ONE HOUR	07:45	09:15	15	✓
D8	2041	PM	ONE HOUR	16:45	18:15	15	✓

Analysis Set Details

ID	Include in report	Network flow scaling factor (%)	Network capacity scaling factor (%)
A1	✓	100.000	100.000

2025, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.56	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	R195 (south)		Major
B	Quarry Access		Minor
C	R195 (north)		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	6.40			82.0	✓	0.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	3.20	15	15

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (Veh/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	500	0.089	0.226	0.142	0.323
1	B-C	646	0.097	0.246	-	-
1	C-B	621	0.237	0.237	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2025	AM	ONE HOUR	07:45	09:15	15	✓

Default vehicle mix	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	55	100.000
B		ONE HOUR	✓	5	100.000
C		ONE HOUR	✓	74	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	B	C
From	A	0	1	54
	B	1	0	4
	C	68	6	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	10	10	10
	B	10	10	10
	C	10	10	10

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.01	6.78	0.0	A	5	7
C-AB	0.01	6.17	0.0	A	6	9
C-A					62	93
A-B					1	1
A-C					50	74

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	542	0.007	4	0.0	0.0	6.685	A
C-AB	5	1	589	0.008	5	0.0	0.0	6.163	A
C-A	51	13			51				
A-B	0.75	0.19			0.75				
A-C	41	10			41				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	540	0.008	4	0.0	0.0	6.724	A
C-AB	6	2	594	0.010	6	0.0	0.0	6.124	A
C-A	61	15			61				
A-B	0.90	0.22			0.90				
A-C	49	12			49				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	6	1	536	0.010	5	0.0	0.0	6.781	A
C-AB	8	2	600	0.013	8	0.0	0.0	6.072	A
C-A	74	18			74				
A-B	1	0.28			1				
A-C	59	15			59				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	6	1	536	0.010	6	0.0	0.0	6.781	A
C-AB	8	2	600	0.013	8	0.0	0.0	6.075	A
C-A	74	18			74				
A-B	1	0.28			1				
A-C	59	15			59				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	540	0.008	5	0.0	0.0	6.725	A
C-AB	6	2	594	0.010	6	0.0	0.0	6.127	A
C-A	61	15			61				
A-B	0.90	0.22			0.90				
A-C	49	12			49				

09:00 - 09:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	542	0.007	4	0.0	0.0	6.687	A
C-AB	5	1	589	0.008	5	0.0	0.0	6.165	A
C-A	51	13			51				
A-B	0.75	0.19			0.75				
A-C	41	10			41				

2025, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.32	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D2	2025	PM	ONE HOUR	16:45	18:15	15	✓

Default vehicle mix	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	63	100.000
B		ONE HOUR	✓	5	100.000
C		ONE HOUR	✓	88	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	**B**	**C**
From	**A**	0	4	59
	B	5	0	0
	C	87	1	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	**B**	**C**
From	**A**	10	10	10
	B	10	10	10
	C	10	10	10

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.01	8.58	0.0	A	5	7
C-AB	0.00	6.04	0.0	A	1	2
C-A					80	120
A-B					4	6
A-C					54	81

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	434	0.009	4	0.0	0.0	8.359	A
C-AB	0.85	0.21	597	0.001	0.84	0.0	0.0	6.037	A
C-A	65	16			65				
A-B	3	0.75			3				
A-C	44	11			44				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	431	0.010	4	0.0	0.0	8.449	A
C-AB	1	0.26	603	0.002	1	0.0	0.0	5.975	A
C-A	78	20			78				
A-B	4	0.90			4				
A-C	53	13			53				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	6	1	425	0.013	5	0.0	0.0	8.577	A
C-AB	1	0.33	612	0.002	1	0.0	0.0	5.892	A
C-A	96	24			96				
A-B	4	1			4				
A-C	65	16			65				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	6	1	425	0.013	6	0.0	0.0	8.577	A
C-AB	1	0.33	612	0.002	1	0.0	0.0	5.894	A
C-A	96	24			96				
A-B	4	1			4				
A-C	65	16			65				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	431	0.010	5	0.0	0.0	8.451	A
C-AB	1	0.26	603	0.002	1	0.0	0.0	5.978	A
C-A	78	20			78				
A-B	4	0.90			4				
A-C	53	13			53				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	434	0.009	4	0.0	0.0	8.361	A
C-AB	0.85	0.21	597	0.001	0.85	0.0	0.0	6.039	A
C-A	65	16			65				
A-B	3	0.75			3				
A-C	44	11			44				

2026, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.55	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2026	AM	ONE HOUR	07:45	09:15	15	✓

Default vehicle mix	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	56	100.000
B		ONE HOUR	✓	5	100.000
C		ONE HOUR	✓	75	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	B	C
From	A	0	1	55
	B	1	0	4
	C	69	6	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	10	10	10
	B	10	10	10
	C	10	10	10

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.01	6.78	0.0	A	5	7
C-AB	0.01	6.16	0.0	A	6	9
C-A					63	94
A-B					1	1
A-C					50	76

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	542	0.007	4	0.0	0.0	6.687	A
C-AB	5	1	589	0.008	5	0.0	0.0	6.159	A
C-A	52	13			52				
A-B	0.75	0.19			0.75				
A-C	41	10			41				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	539	0.008	4	0.0	0.0	6.728	A
C-AB	6	2	594	0.010	6	0.0	0.0	6.120	A
C-A	61	15			61				
A-B	0.90	0.22			0.90				
A-C	49	12			49				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	6	1	536	0.010	5	0.0	0.0	6.785	A
C-AB	8	2	601	0.013	8	0.0	0.0	6.067	A
C-A	75	19			75				
A-B	1	0.28			1				
A-C	61	15			61				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	6	1	536	0.010	6	0.0	0.0	6.785	A
C-AB	8	2	601	0.013	8	0.0	0.0	6.070	A
C-A	75	19			75				
A-B	1	0.28			1				
A-C	61	15			61				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	539	0.008	5	0.0	0.0	6.728	A
C-AB	6	2	594	0.010	6	0.0	0.0	6.123	A
C-A	61	15			61				
A-B	0.90	0.22			0.90				
A-C	49	12			49				

09:00 - 09:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	542	0.007	4	0.0	0.0	6.687	A
C-AB	5	1	589	0.008	5	0.0	0.0	6.162	A
C-A	52	13			52				
A-B	0.75	0.19			0.75				
A-C	41	10			41				

2026, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.32	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2026	PM	ONE HOUR	16:45	18:15	15	✓

Default vehicle mix	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	64	100.000
B		ONE HOUR	✓	5	100.000
C		ONE HOUR	✓	89	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	**B**	**C**
From	**A**	0	4	60
	B	5	0	0
	C	88	1	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	**B**	**C**
From	**A**	10	10	10
	B	10	10	10
	C	10	10	10

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.01	8.58	0.0	A	5	7
C-AB	0.00	6.04	0.0	A	1	2
C-A					81	121
A-B					4	6
A-C					55	83

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	434	0.009	4	0.0	0.0	8.364	A
C-AB	0.85	0.21	597	0.001	0.84	0.0	0.0	6.034	A
C-A	66	17			66				
A-B	3	0.75			3				
A-C	45	11			45				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	430	0.010	4	0.0	0.0	8.456	A
C-AB	1	0.26	604	0.002	1	0.0	0.0	5.971	A
C-A	79	20			79				
A-B	4	0.90			4				
A-C	54	13			54				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	6	1	425	0.013	5	0.0	0.0	8.585	A
C-AB	1	0.33	613	0.002	1	0.0	0.0	5.887	A
C-A	97	24			97				
A-B	4	1			4				
A-C	66	17			66				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	6	1	425	0.013	6	0.0	0.0	8.585	A
C-AB	1	0.33	613	0.002	1	0.0	0.0	5.887	A
C-A	97	24			97				
A-B	4	1			4				
A-C	66	17			66				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	430	0.010	5	0.0	0.0	8.458	A
C-AB	1	0.26	604	0.002	1	0.0	0.0	5.974	A
C-A	79	20			79				
A-B	4	0.90			4				
A-C	54	13			54				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	434	0.009	4	0.0	0.0	8.366	A
C-AB	0.85	0.21	597	0.001	0.85	0.0	0.0	6.036	A
C-A	66	17			66				
A-B	3	0.75			3				
A-C	45	11			45				

2031, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.56	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D5	2031	AM	ONE HOUR	07:45	09:15	15	✓

Default vehicle mix	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	61	100.000
B		ONE HOUR	✓	5	100.000
C		ONE HOUR	✓	82	100.000

Origin-Destination Data

Demand (Veh/hr)

	To			
		A	**B**	**C**
From	**A**	0	1	60
	B	1	0	4
	C	75	7	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
		A	**B**	**C**
From	**A**	10	10	10
	B	10	10	10
	C	10	10	10

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.01	6.81	0.0	A	5	7
C-AB	0.01	6.15	0.0	A	7	11
C-A					68	102
A-B					1	1
A-C					55	83

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	541	0.007	4	0.0	0.0	6.702	A
C-AB	6	1	591	0.010	6	0.0	0.0	6.146	A
C-A	56	14			56				
A-B	0.75	0.19			0.75				
A-C	45	11			45				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	538	0.008	4	0.0	0.0	6.746	A
C-AB	7	2	597	0.012	7	0.0	0.0	6.105	A
C-A	67	17			67				
A-B	0.90	0.22			0.90				
A-C	54	13			54				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	6	1	534	0.010	5	0.0	0.0	6.807	A
C-AB	9	2	604	0.015	9	0.0	0.0	6.049	A
C-A	81	20			81				
A-B	1	0.28			1				
A-C	66	17			66				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	6	1	534	0.010	6	0.0	0.0	6.807	A
C-AB	9	2	604	0.015	9	0.0	0.0	6.052	A
C-A	81	20			81				
A-B	1	0.28			1				
A-C	66	17			66				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	538	0.008	5	0.0	0.0	6.746	A
C-AB	7	2	597	0.012	7	0.0	0.0	6.105	A
C-A	67	17			67				
A-B	0.90	0.22			0.90				
A-C	54	13			54				

09:00 - 09:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	4	1	541	0.007	4	0.0	0.0	6.705	A
C-AB	6	1	591	0.010	6	0.0	0.0	6.149	A
C-A	56	14			56				
A-B	0.75	0.19			0.75				
A-C	45	11			45				

2031, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.34	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	2031	PM	ONE HOUR	16:45	18:15	15	✓

Default vehicle mix	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	69	100.000
B		ONE HOUR	✓	6	100.000
C		ONE HOUR	✓	97	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	**B**	**C**
From	**A**	0	4	65
	B	6	0	0
	C	96	1	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	**B**	**C**
From	**A**	10	10	10
	B	10	10	10
	C	10	10	10

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.02	8.66	0.0	A	6	8
C-AB	0.00	6.00	0.0	A	1	2
C-A					88	132
A-B					4	6
A-C					60	89

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	432	0.010	4	0.0	0.0	8.412	A
C-AB	0.86	0.21	601	0.001	0.85	0.0	0.0	6.002	A
C-A	72	18			72				
A-B	3	0.75			3				
A-C	49	12			49				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	428	0.013	5	0.0	0.0	8.514	A
C-AB	1	0.26	608	0.002	1	0.0	0.0	5.934	A
C-A	86	22			86				
A-B	4	0.90			4				
A-C	58	15			58				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	7	2	422	0.016	7	0.0	0.0	8.659	A
C-AB	1	0.33	617	0.002	1	0.0	0.0	5.843	A
C-A	105	26			105				
A-B	4	1			4				
A-C	72	18			72				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	7	2	422	0.016	7	0.0	0.0	8.659	A
C-AB	1	0.33	617	0.002	1	0.0	0.0	5.843	A
C-A	105	26			105				
A-B	4	1			4				
A-C	72	18			72				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	428	0.013	5	0.0	0.0	8.516	A
C-AB	1	0.26	608	0.002	1	0.0	0.0	5.937	A
C-A	86	22			86				
A-B	4	0.90			4				
A-C	58	15			58				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	432	0.010	5	0.0	0.0	8.413	A
C-AB	0.86	0.21	601	0.001	0.86	0.0	0.0	6.004	A
C-A	72	18			72				
A-B	3	0.75			3				
A-C	49	12			49				

2041, AM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.58	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D7	2041	AM	ONE HOUR	07:45	09:15	15	✓

Default vehicle mix	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	63	100.000
B		ONE HOUR	✓	6	100.000
C		ONE HOUR	✓	85	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	B	C
From	A	0	1	62
	B	1	0	5
	C	78	7	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	10	10	10
	B	10	10	10
	C	10	10	10

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.01	6.76	0.0	A	6	8
C-AB	0.01	6.14	0.0	A	7	11
C-A					71	106
A-B					1	1
A-C					57	85

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	546	0.008	4	0.0	0.0	6.648	A
C-AB	6	1	593	0.010	6	0.0	0.0	6.134	A
C-A	58	15			58				
A-B	0.75	0.19			0.75				
A-C	47	12			47				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	543	0.010	5	0.0	0.0	6.693	A
C-AB	7	2	598	0.012	7	0.0	0.0	6.091	A
C-A	69	17			69				
A-B	0.90	0.22			0.90				
A-C	56	14			56				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	7	2	539	0.012	7	0.0	0.0	6.756	A
C-AB	9	2	606	0.015	9	0.0	0.0	6.033	A
C-A	85	21			85				
A-B	1	0.28			1				
A-C	68	17			68				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	7	2	539	0.012	7	0.0	0.0	6.756	A
C-AB	9	2	606	0.015	9	0.0	0.0	6.033	A
C-A	85	21			85				
A-B	1	0.28			1				
A-C	68	17			68				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	543	0.010	5	0.0	0.0	6.693	A
C-AB	7	2	598	0.012	7	0.0	0.0	6.094	A
C-A	69	17			69				
A-B	0.90	0.22			0.90				
A-C	56	14			56				

09:00 - 09:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	546	0.008	5	0.0	0.0	6.648	A
C-AB	6	1	593	0.010	6	0.0	0.0	6.137	A
C-A	58	15			58				
A-B	0.75	0.19			0.75				
A-C	47	12			47				

2041, PM

Data Errors and Warnings

No errors or warnings

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.33	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D8	2041	PM	ONE HOUR	16:45	18:15	15	✓

Default vehicle mix	Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	73	100.000
B		ONE HOUR	✓	6	100.000
C		ONE HOUR	✓	101	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	**B**	**C**
From	**A**	0	5	68
	B	6	0	0
	C	100	1	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	**B**	**C**
From	**A**	10	10	10
	B	10	10	10
	C	10	10	10

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.02	8.69	0.0	A	6	8
C-AB	0.00	5.99	0.0	A	1	2
C-A					92	137
A-B					5	7
A-C					62	94

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	431	0.010	4	0.0	0.0	8.432	A
C-AB	0.86	0.22	602	0.001	0.85	0.0	0.0	5.989	A
C-A	75	19			75				
A-B	4	1			4				
A-C	51	13			51				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	427	0.013	5	0.0	0.0	8.539	A
C-AB	1	0.26	609	0.002	1	0.0	0.0	5.919	A
C-A	90	22			90				
A-B	4	1			4				
A-C	61	15			61				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	7	2	421	0.016	7	0.0	0.0	8.690	A
C-AB	1	0.34	619	0.002	1	0.0	0.0	5.824	A
C-A	110	27			110				
A-B	6	1			6				
A-C	75	19			75				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	7	2	421	0.016	7	0.0	0.0	8.690	A
C-AB	1	0.34	619	0.002	1	0.0	0.0	5.824	A
C-A	110	27			110				
A-B	6	1			6				
A-C	75	19			75				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	427	0.013	5	0.0	0.0	8.539	A
C-AB	1	0.26	609	0.002	1	0.0	0.0	5.919	A
C-A	90	22			90				
A-B	4	1			4				
A-C	61	15			61				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	5	1	431	0.010	5	0.0	0.0	8.433	A
C-AB	0.86	0.22	602	0.001	0.86	0.0	0.0	5.989	A
C-A	75	19			75				
A-B	4	1			4				
A-C	51	13			51				