EIAR Volume 3

Appendices

Proposed Residential Development

Lands at Cornamaddy,
Athlone,
County Westmeath

On behalf of

Marina Quarter Limited

December 2022

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Ground Investigations Ireland

Cornamaddy Athlone Northern Site

Glenveagh Properties

Ground Investigation Report

December 2022

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DOCUMENT CONTROL SHEET

Project Title	Cornamaddy Athlone Northern Site
Client	Glenveagh Properties
Engineer	AKM Design
Project No	12205-09-22
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A	Final	C McParland	J Cashen	B Sexton	Dublin	14 December 2022

Ground Investigations Ireland Ltd. present the results of the fieldworks and laboratory testing in accordance with the specification and related documents provided by or on behalf of the client The possibility of variation in the ground and/or groundwater conditions between or below exploratory locations or due to the investigation techniques employed must be taken into account when this report and the appendices inform designs or decisions where such variation may be considered relevant. Ground and/or groundwater conditions may vary due to seasonal, man-made or other activities not apparent during the fieldworks and no responsibility can be taken for such variation. The data presented and the recommendations included in this report and associated appendices are intended for the use of the client and the client's geotechnical representative only and any duty of care to others is excluded unless approved in writing.

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1.0 Preamble

On the instructions of AKM Design, a site investigation was carried out by Ground Investigations Ireland Ltd. (GII) in October 2022, at the site of the proposed residential development in Cornamaddy, Athlone, County Westmeath.

2.0 Overview

2.1. Background

It is proposed to construct a new residential development with associated services, access roads and car parking at the proposed site. At the time of the site investigation the site was predominantly greenfield however the southern portion of the site was previously used as a compound for neighbouring development. There was also a possible water treatment system located in the north of the site. The site is situated in Cornamaddy, east of Athlone Town, County Westmeath. The proposed construction is envisaged to consist of conventional and piled foundations and pavement make up with some local excavations forservices and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 19 No. Trial Pits to a maximum depth of 3.50m BGL
- Carry out 3 No. Soakaways to determine a soil infiltration value to BRE Digest 365
- Carry out 2 No. Percussive Boreholes to recover soil sample and to determine soil strength.
- Carry out 48 No. Dynamic Probes to determine soil strength/density characteristics
- Carry out 9 No. Plate bearing tests to determine the modulus of subgrade reaction and equivalent CBR values
- Geotechnical & Environmental Laboratory testing
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-

situ testing were undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015+A1:2020.

3.2. Trial Pits

The trial pits were excavated using a 14T tracked excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged, and photographed by a Geo-Environmental Engineer prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered, and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 3 of this Report.

3.4. Dynamic Probing

The dynamic probe tests (DPH) were carried out at the locations shown in the location plan in Appendix 1 in accordance with B.S. 1377: Part 9 1990. The test consists of mechanically driving a cone with a 50kg weight in 100mm intervals and monitoring the number of blows required. An equivalent Standard Penetration Test (SPT) 'N' value may be calculated by dividing the total number of blows over a 300mm drive length by 1.5. The dynamic probe logs are provided in Appendix 4 of this Report.

3.5. Percussive Boreholes

The percussive boreholes were carried out at the locations shown in the location plan in Appendix 1 using a Tecopsa SPT Tec 10 percussion drilling rig. The method consists of a 1m long steel tube with a cutting edge and an internal plastic liner which is mechanically driven into the ground utilising a 63.5kg weight falling a height of 760mm. Upon completion of the 1m sample, the tube is withdrawn, and the plastic liner removed and sealed for logging and sub sampling by a Geo-Environmental Engineer. The tube is replaced in the borehole and a subsequent 1m sample can be recovered. At the end of each metre, a standard penetration test (SPT) is the carried out. Occasionally outer casing or a reduced diameter tube is utilised to enable the window sample to progress in difficult drilling conditions. Geotechnical or environmental soil samples can be recovered from each of the liners following logging. The borehole records are provided in Appendix 5 of this Report.

3.6. Surveying

The exploratory hole locations have been recorded using a KQGeo M8 GNSS System which records the coordinates and elevation of the locations to ITM as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.7. In-situ Plate Bearing Test

The plate bearing tests were carried out using a 457mm diameter plate at the locations shown on the site plan in Appendix 1. The plate was loaded in increments using a hydraulic jack and an excavator to provide a reaction and the displacement was monitored in accordance with BS1377 Part 9 using independently mounted digital strain gauges. The constrained modulus and equivalent CBR are calculated in accordance with HD29/75 and are provided on the test reports in Appendix 6 of this Report.

3.8. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.

Environmental & Chemical testing as required by the specification, including the Rilta Suite, pH and sulphate testing was carried out by Element Materials Technology Laboratory in the United Kingdom (UK). The Rilta suite testing includes both Solid Waste and Leachate Waste Acceptance Criteria.

Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), hydrometer, and California Bearing Ratio (CBR) tests were carried out by Professional Soils Laboratory (PSL) in the UK.

The results of the laboratory testing are included in Appendix 7 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to in-situ and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were consistent across the site and generally comprised;

- Topsoil / Peat
- Made Ground / Possible Made Ground
- Cohesive Deposits
- Granular Deposits

TOPSOIL: Topsoil was encountered in many of the exploratory holes and was present to a maximum depth of 0.40m BGL.

PEAT: Peat was encountered from ground level in most of the exploratory holes and was generally described as *dark brown slightly gravelly clayey pseudo fibrous PEAT.* At the locations of the trial pits and boreholes, the thickness of peat varied from 0.20m to 4.60m BGL. The results of the dynamic probes indicate the peat or very soft cohesive deposits may extend to depths of over 6.00m BGL.

MADE GROUND: Made Ground deposits were encountered in exploratory holes TP-01, TP-02, TP-11, and TP-12, and were present to depths ranging from 0.50m to 1.20m BGL. These deposits were described generally as greyish *brown / brown slightly sandy gravelly silty Clay with occasional cobbles and boulders* and contained *rare fragments of plastic.* TP-01 had the most anthropogenic material with *occasional fragments of metal, timber, concrete, and steel* noted. In addition to this, possible made ground deposits were noted to a maximum depth of 1.50m BGL. No anthropogenic material was observed within the possible made ground deposits.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Peat and were described typically as *grey / grey mottled brown slightly sandy slightly gravelly silty CLAY or a Grey slightly sandy slightly gravelly clayey SILT with occasional to many cobbles and boulders*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. These deposits had occasional (<5%), some (5%-20%) or many (20%-50%) cobble and boulder content, where noted on the exploratory hole logs.

GRANULAR DEPOSITS: Granular deposits were encountered beneath the cohesive deposits at TP-09, TP-11, TP-18, and TP-19. These were typically described as *grey slightly sandy slightly clayey slightly silty subangular to subrounded fine to coarse GRAVEL with many cobbles or grey / greyish brown slightly* *gravelly clayey silty fine to coarse SAND.* The secondary sand/gravel and fines constituents varied across the site and with depth, while occasional (<5%), some (5%-20%) or many (20%-50%) cobble and boulder content was also present, where noted on the exploratory hole logs. It should be noted that many of the trial pits where granular deposits or groundwater were encountered, experienced instability. This was described either as side wall spalling or as side wall collapse in the remarks section at the base of the trial pit logs.

4.2. In-situ Strength Testing

The correlated DPH blow counts indicate that the overburden deposits are very soft, soft, or soft to firm to depths of 1.00m to 6.30m BGL.

4.3. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred. We would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with time of year, rainfall, nearby construction, and other factors.

4.4. Laboratory Testing

4.4.1. Geotechnical Laboratory Testing

To be included in final report.

4.4.2. Chemical Laboratory Testing

To be included in final report.

4.4.3. Environmental Laboratory Testing

A number of samples were analysed for a suite of parameters which allows for the assessment of the sampled material in terms of total pollutant content for classification of materials as *hazardous* or *non-hazardous*. The suite also allows for the assessment of the sampled material in terms of suitability for placement at licenced landfills (inert, stable non-reactive, hazardous etc.). The parameter list for the suite includes analysis of the solid samples for arsenic, barium, cadmium, chromium, copper, cyanide, lead, nickel, mercury, zinc, speciated aliphatic and aromatic petroleum hydrocarbons, pH, sulphate, sulphide, moisture content, soil organic matter and an asbestos screen.
The suite also includes those parameters specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC), which for the solid samples are total organic carbon (TOC), speciated aliphatic and aromatic petroleum hydrocarbons, BTEX, phenol, polychlorinated biphenyls (PCB) and PAH.

As part of the suite a leachate is generated from the solid sample, which is analysed for antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, chloride, fluoride, soluble sulphate, sulphide, phenols, dissolved organic carbon (DOC) and total dissolved solids (TDS).
While the laboratory report provides a comparison with the waste acceptance criteria limits it does not provide a waste classification of the material sampled nor does it comment on any potentially hazardous properties of the materials tested. The possibility for contamination, not revealed by the testing undertaken should be borne in mind particularly where Made Ground deposits are present, or the previous site use or location indicate a risk of environmental variation. The waste classification report is included under the cover of a separate report by Ground Investigations Ireland.

5.0 Recommendations & Conclusions

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Foundations

Due to the presence of Peat and very soft cohesive deposits over a significant portion of the site, a specific assessment with respect to the development should be carried out. The Peat and very soft cohesive deposits are in places very deep, such that that conventional foundation and ground improvement solutions become very difficult to construct. Piing is an option however the construction of roads, car parking and gardens may also require to be piled such that the settlement between the houses and the footpaths & roads remains within tolerable limits. The mobilisation of heavy equipment will also require significant engineering input into the design of working platforms to provide a stable base for cranes or piling equipment. The below table presents the locations where the depth of very soft deposits is significant (>1.0m BGL) and/or the depth to a suitable bearing stratum may be problematic (>2.0m BGL).

Exploratory Hole	"0" N100 blow count	"4" N100 blow count	Comment
No.	m BGL	m BGL	
BH-01	>2.7	>2.7	
BH-02	>4.6	>4.6	
DP-01	1.5	1.5	
DP-07	3.2	4.4	
DP-08	6.1	6.3	
DP-09	4.9	6	
DP-23	2.6	2.7	
DP-25	2.9	3	
DP-26	0.9	1.3	
DP-27	1.1	1.4	
DP-28	1.8	1.9	
DP-29	0.6	2.6	
DP-30	1.6	2.7	
DP-31	2.4	2.6	
DP-36	1.2	2.6	
DP-39	1.7	3.8	
DP-46	1.1	1.8	

At some locations, where granular or cohesive deposits are present at a shallow depth, an allowable bearing capacity of 80 kN/m^2 is available for conventional strip or pad foundations. The presence of cobbles and boulders in this stratum may have resulted in shallow refusals at a number of locations. The depth of the proposed foundations should be assessed for excavation stability, which is noted on the trial pit logs. Where loose, soft or very soft deposits are present at a shallow depth these should be excavated and replaced with appropriately compacted granular fill or the slab suspended.

Piled foundations are recommended where the thickness of peat or soft deposits exceed conventional levels and may be required for the road and service network in the affected areas, to prevent deformation from excessive total and differential settlement. Consultation with a specialist piling contractor is recommended to determine the most suitable pile design. Negative skin friction from the very soft peat and/or cohesive deposits should be considered in the pile design due to the possibility of loading from working platforms or the adjacent pavement make up.

Exploratory Hole	ABC	Depth	Comment	Exploratory Hole	ABC	Depth	Comment
No.	kN/m^2	m BGL		No.	kN/m^2	m BGL	
DP-02	80	1	Shallow Refusal	DP-22	80	0.8	
DP-03	80	1.9		DP-24	80	1.2	
DP-04	80	1.6		DP-32	80	0.8	Shallow Refusal
DP-05	80	1		DP-33	80	0.8	Shallow Refusal
DP-06	80	1.2		DP-34	80	0.8	Shallow Refusal
DP-10	80	0.8	Shallow Refusal	DP-35	80	0.8	Shallow Refusal
DP-11	80	1.1	Shallow Refusal	DP-37	80	0.8	
DP-12	80	0.8		DP-38	80	0.8	
DP-13	80	0.8	Shallow Refusal	DP-40	80	0.8	Shallow Refusal
DP-14	80	1.7		DP-41	80	0.8	Shallow Refusal
DP-15	80	1.8		DP-42	80	0.8	Shallow Refusal
DP-16	80	1.2		DP-43	80	0.8	Shallow Refusal
DP-17	80	0.8		DP-44	80	0.8	
DP-18	80	0.8		DP-45	80	0.8	
DP-19	80	0.8		DP-47	80	1.9	
DP-20	80	1.2		DP-48	80	0.8	
DP-21	80	0.8					

The possibility for variation in the depth of the made ground in the vicinity of these foundations should be considered and foundation inspections should be carried out. Any soft spots encountered at the proposed foundation depths should be excavated and replaced with lean mix concrete.

In any part of the site, should part of the foundation be on both granular and cohesive deposits we would recommend that all the foundations of the unit in question be lowered to the competent deeper stratum or suitably reinforced to avoid problems with differential settlement.

Ground bearing floor slabs are recommended to be based on the firm cohesive deposits or medium dense granular deposits, with an appropriate depth of compacted hardcore specified by the consulting engineer and in accordance with the limits and guidelines in SR21:2014 +A1:2016 and/or NRA SRW CL808 Type E granular stone fill. Where the depth of Made Ground, peat or soft deposits deposits exceeds 0.90m, and/or piling is proposed, then suspended floor slabs should be considered.

5.3. External Pavements

The proposed pavements are recommended to be designed in accordance with the CBR test results included in the Appendices of this Report. The low CBR test results indicate that a capping layer or a sufficient depth of crushed stone fill may be required. Plate bearing tests are recommended at the time of construction to verify the design assumptions for the proposed pavement make up and to verify adequate compaction has been achieved.

The presence of peat across much of the site should also be noted by the designer. Where the material is too thick to be excavated and replaced, piling techniques may need to be utilised to prevent deformation from excessive settlement of the road and service network. The use of a geogrid and separation membrane may improve the performance of the proposed pavement and enable a more economical pavement design to be achieved, a specialist supplier is recommended to advise of the required strength, depth, and type of geotextile for the proposed design.

5.4. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry. Excavations in the Made Ground, Peat or soft Cohesive Deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits. Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported and are likely to require dewatering due to the groundwater seepages noted in the exploratory hole logs in the Appendices of this Report. The groundwater and stability noted on the trial pit logs should be consulted when determining the most appropriate construction methods for excavations.

Any waste material to be removed off site should be disposed of to a suitably licenced landfill. The environmental testing completed during the ground investigation is reported under the cover of a separate GII Waste Classification Report.

5.5. Soakaway Design

At the locations of IT-01, IT-02 and IT-03 the water level dropped too slowly to allow calculation of 'f' the soil infiltration rate. These locations are therefore not recommended as suitable for soakaway design and construction.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Figures

Site Location

Indicative Site Boundary

Client:

Glenveagh

Project Code:

12205-09-22

Project Title:

Cornamaddy Athlone Northern Site

Drawing Title:

Figure 1 Site Location

GROUND INVESTIGATIONS IRELAND
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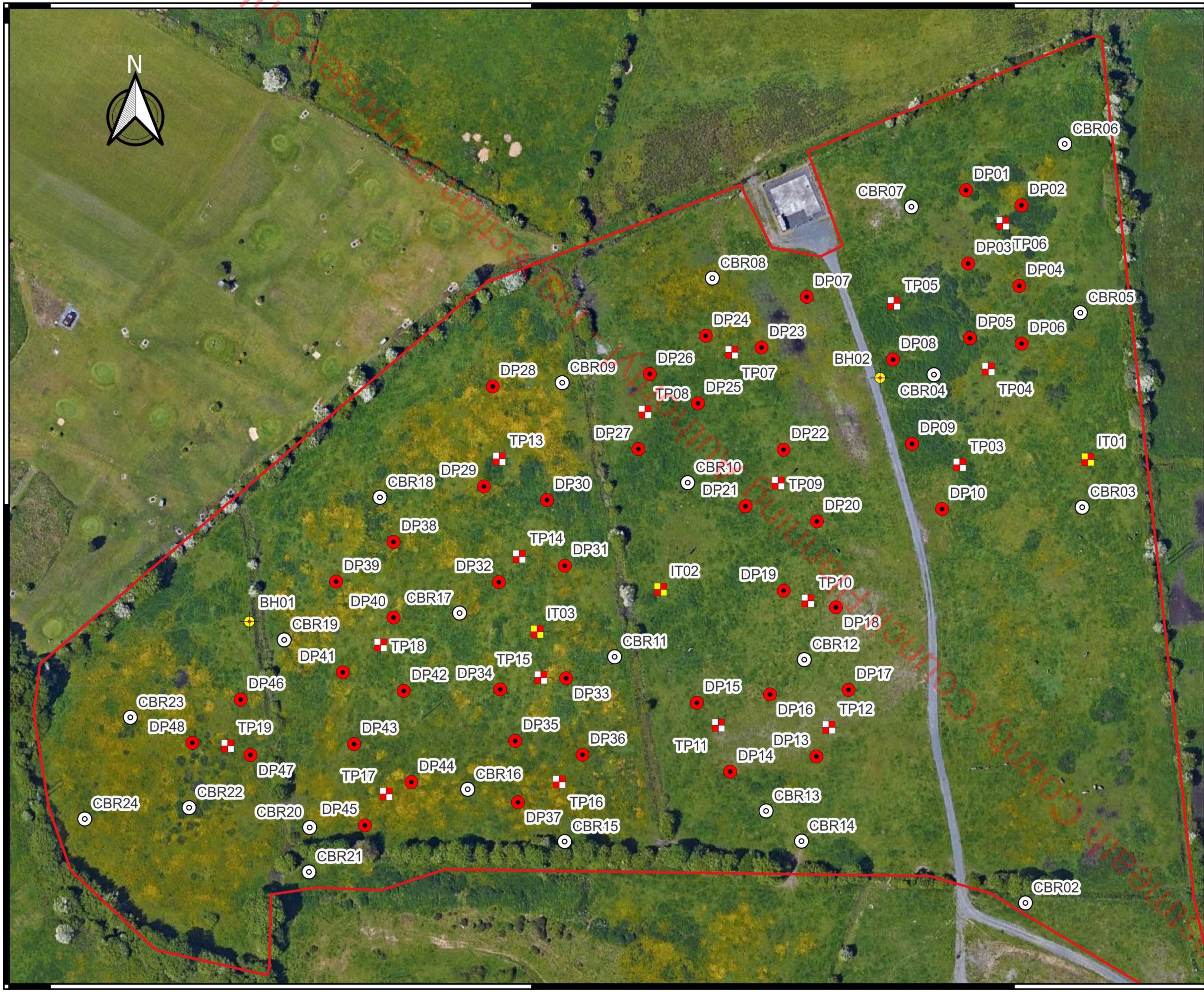
0 60 120 180 240 300 m

Drawn By:	Date:
JC	12-12-2022



Indicative Site Boundary
Trial Pit
Soakaway Pit
Dynamic Probe
CBR
Borehole

Client:

Glenveagh

Project Code:
12205-09-22

Project Title:
Cornamaddy Athlone Northern Site

Drawing Title:
Figure 2
Site Investigation Points 1 of 2

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0 15 30 45 60 75 m

Drawn By: JC

Date: 12-12-2022

Indicative Site Boundary
Trial Pit
Soakaway Pit
Dynamic Probe
CBR
Borehole

Client:

Glenveagh

Project Code:
12205-09-22

Project Title:
Cornamaddy Athlone Northern Site

Drawing Title:
Figure 3
Site Investigation Points 2 of 2

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0 15 30 45 60 75 m

Drawn By: JC
Date: 12-12-2022

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-01
Machine: 14T Tracked excavator; Method: Trial Pit	Client: AKM Design	Job Number: 12205-09-22

Dimensions	Ground Level (mOD)	Location	Dates	Engineer	Sheet
5.30m x 1.8m x 1.5m (L x W x D)	44.01	606441.3 E 742904.1 N	24/10/2022		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.60	ES				(0.60)	MADE GROUND: Greyish brown slightly sandy gravelly silty Clay with occasional cobbles and boulders and with occasional fragments of metal, timber, plastic, concrete and steel.		
0.50	B			43.41	0.60 (0.20)	MADE GROUND: Grey fine to coarse Sand		
				43.21	0.80 (0.70)	Possible MADE GROUND: Firm orangish brown slightly sandy slightly gravelly silty Clay with occasional cobbles and boulders		
1.50	B			42.51	1.50	Complete at 1.50m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion
Trial pit terminated due to potentially encountering services

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-01

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-02

Machine : 14T tracked excavator / Method : Trial Pit	Dimensions: 4.90m 1.80m x 3.00m (L x W x D)	Ground Level (mOD): 42.46	Client: AKM Design	Job Number: 12205-09-22
	Location: 606337.1 E 742950.2 N	Dates: 24/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.90	ES					MADE GROUND: Greyish brown slightly sandy slightly gravelly silty Clay with occasional cobbles and boulders and with rare fragments of plastic		
0.50	B				(0.90)			
			Seepage(1) at 0.90m.	41.56	0.90	Very soft dark brown clayey SILT		1
					(0.20)			
				41.36	1.10	Firm to stiff grey mottled brown slightly sandy slightly gravelly silty CLAY		
1.50	B				(1.20)			
				40.16	2.30	Stiff grey slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders		
					(0.70)			
				39.46	3.00	Complete at 3.00m		

Plan

Remarks

Groundwater encountered at 0.90m BGL; Seepage
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP	12205-09-22.TP-02

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-03
Machine: 14T Tracked excavator; Method: Trial Pit	Dimensions: 5.10m x 1.80m x 3.00m (L x W x D)	Ground Level (mOD): 40.50	Client: AKM Design	Job Number: 12205-09-22
	Location: 606177.4 E 743216.1 N	Dates: 21/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(1.40)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT with occasional boulders		
1.40-2.10	ES		Fast Ingress(1) at 1.50m.	39.10	1.40 (0.70)	Very soft grey slightly gravelly clayey SILT with occasional organic fibres		∇1
2.00	B							
				38.40	2.10 (0.40)	Very soft light grey slightly gravelly clayey SILT with occasional organic fibres		
				38.00	2.50 (0.50)	Firm to stiff grey slightly sandy slightly gravelly silty CLAY with many cobbles and boulders		
				37.50	3.00	Complete at 3.00m		

Plan

Remarks

Groundwater encountered at 1.50m BGL; Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-03

Ground Investigations Ireland Ltd
www.gii.ie

Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 5.00m x 1.80m x 1.50m (L x W x D)	**Ground Level (mOD)** 40.41	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606189.4 E 743255.9 N	**Dates** 21/10/2022	**Engineer**	**Sheet** 1/1

Site: Cornamaddy Athlone Northern Site

Trial Pit Number: TP-04

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Possible MADE GROUND: Dark brown slightly gravelly clayey pseudo fibrous Peat with many cobbles and boulders		
				39.91	0.50 (0.30)	Possible MADE GROUND: Orangish brown slightly sandy slightly gravelly silty Clay with occasional cobbles and boulders		∇1
			Fast Ingress(1) at 0.70m.	39.61	0.80 (0.70)	Soft grey slightly sandy gravelly clayey SILT with many cobbles and boulders		
				38.91	1.50	Terminated at 1.50m		

Plan

Remarks

Groundwater encountered at 0.70m BGL; Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion
Trial pit terminated due to groundwater obscuring view

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-04

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-05

Machine : 14T tracked excavator	Dimensions: 5.20m x 1.80m x 2.70m (L x W x D)	Ground Level (mOD): 40.34	Client: AKM Design	Job Number: 12205-09-22
Method : Trial Pit	Location: 606150.1 E 743283.1 N	Dates: 21/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.75)	MADE GROUND: Dark brown slightly gravelly clayey pseudo fibrous Peat with rare fragments of timber and plastic		
				39.59	0.75 (0.55)	Very soft light grey slightly gravelly SILT with occasional cobbles and boulders		
			Fast Ingress(1) at 1.20m.					∇1
1.30-2.00	ES			39.04	1.30 (0.70)	Very soft grey slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders		
1.50	B							
				38.34	2.00 (0.70)	Very soft slightly sandy gravelly clayey SILT with many cobbles and boulders		
2.50	B							
				37.64	2.70	Complete at 2.70m		

Plan

Remarks

Groundwater encountered at 1.20m BGL; Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-05

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-06
Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 5.40m x 1.80m x 3.40m (L x W x D)	Ground Level (mOD): 40.15	Client: AKM Design	Job Number: 12205-09-22
	Location: 606195.3 E 743316.4 N	Dates: 21/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(1.00)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
1.00-2.70	ES		Fast Ingress(1) at 1.20m.	39.15	1.00 (1.70)	Very soft light grey clayey SILT with organic fibres		∇1
				37.45	2.70 (0.70)	Very soft slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders		
3.40	B			36.75	3.40	Complete at 3.40m		

Plan

Remarks

Groundwater encountered at 1.20m BGL; Fast Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-06

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-07
Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 5.50m x 1.80m x 3.00m (L x W x D)	Ground Level (mOD): 40.32	Client: AKM Design	Job Number: 12205-09-22
	Location: 606082.8 E 743262.8 N	Dates: 20/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(1.10)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
0.70	B		Medium Ingress(1) at 0.70m.					∇1
				39.22	1.10	Very soft light grey clayey SILT with organic fibres		
1.10-2.30	ES							
			Medium Ingress(2) at 1.30m.					∇2
1.70	B				(1.20)			
				38.02	2.30	Firm grey silty CLAY with occasional cobbles and rare boulders		
2.70	B				(0.70)			
				37.32	3.00	Complete at 3.00m		

Plan

Remarks

Groundwater encountered at 0.70m BGL and 1.30m BGL; Medium Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-07

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-08

Machine : 14T tracked excavator	Dimensions	Ground Level (mOD)	Client	Job Number
Method : Trial Pit	5.00m x 1.80m x 1.70m (L x W x D)	40.46	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606046.8 E 743238.1 N	20/10/2022		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.75)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
			Fast Ingress(1) at 0.80m.	39.71	0.75 (0.35)	Soft to firm orangish brown slightly sandy gravelly silty CLAY with many cobbles and boulders		∇1
				39.36	1.10 (0.30)	Soft to firm grey slightly sandy slightly gravelly clayey SILT with occasional cobbles and rare boulders		
1.50	B			39.06	1.40 (0.30)	Firm grey slightly sandy slightly gravelly clayey SILT with occasional cobbles and rare boulders		
				38.76	1.70	Terminated at 1.70m		

Plan

Remarks

Groundwater encountered 0.80m BGL; Fast Ingress
Trial pit unstable; side walls collapsed
Trial pit backfilled upon completion
Trial pit terminated due to groundwater obscuring view

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-08

Ground Investigations Ireland Ltd
www.gii.ie

Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 5.10m x 1.80m x 2.80m (L x W x D)	**Ground Level (mOD)** 40.68	**Site** Cornamaddy Athlone Northern Site **Client** AKM Design	**Trial Pit Number** TP-09 **Job Number** 12205-09-22
	Location 606102.1 E 743208.5 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Peaty TOPSOIL		
				40.48	0.20 (0.20)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
				40.28	0.40 (0.80)	Soft to firm grey mottled brown slightly sandy slightly gravelly clayey SILT with occasional cobbles and boulders		
			Medium Ingress(1) at 1.00m.					∇1
				39.48	1.20	Firm grey slightly sandy gravelly silty CLAY with many cobbles and boulders		
1.50	B				(1.10)			
				38.38	2.30	Medium dense grey slightly gravelly clayey silty fine to coarse SAND with many cobbles and boulders		
2.50	B				(0.50)			
				37.88	2.80	Complete at 2.80m		

Plan

Remarks

Groundwaer encountered at 1.00m BGL; Medium Ingress
Trial pit unstable; side walls collapsed
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-09

Ground Investigations Ireland Ltd www.gii.ie	Site Cornamaddy Athlone Northern Site	Trial Pit Number TP-10

Machine : 14T tracked excavator Method : Trial Pit	Dimensions 5.00m x 1.80m x 2.70m (L x W x D)	Ground Level (mOD) 42.26	Client AKM Design	Job Number 12205-09-22
	Location 606114.4 E 743159.7 N	Dates 20/10/2022	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Peaty TOPSOIL		
0.20-0.80	ES			42.06	0.20	Possible MADE GROUND: Grey mottled brown sandy slightly gravelly silty Clay		
0.50	B				(0.60)			
				41.46	0.80	Firm grey mottled brown slightly sandy slightly gravelly clayey SILT with occasional cobbles and boulders		
					(0.70)			
				40.76	1.50	Firm greyish brown slightly sandy gravelly silty CLAY with many cobbles and boulders		
2.00	B				(1.20)			
				39.56	2.70	Complete at 2.70m		

Plan

Remarks

No groundwater encountered
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-10

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-11

Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 5.40m x 1.80m x 2.70m (L x W x D)	Ground Level (mOD): 41.00	Client: AKM Design	Job Number: 12205-09-22
	Location: 606077.3 E 743108 N	Dates: 20/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Peaty TOPSOIL		
0.20-0.50	ES			40.80	0.20 (0.30)	MADE GROUND: Brown slightly sandy gravelly silty Clay. (Reworked)		
				40.50	0.50 (0.30)	Possible MADE GROUND: Dark brown slightly gravelly clayey pseudo fibrous PEAT with occasional fragments of wood		
1.00	B		Fast Ingress(1) at 0.80m.	40.20	0.80 (0.90)	Very soft grey silty CLAY with occasional cobbles and rare boulders		∇1
				39.30	1.70 (0.65)	Firm grey silty CLAY with occasional cobbles and rare boulders		
2.50	B			38.65	2.35 (0.35)	Medium dense grey slightly sandy silty clayey subangular to subrounded fine to coarse GRAVEL		
				38.30	2.70	Complete at 2.70m		

Plan

Remarks

Groundwater encountered at 0.80m BGL; Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-11

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-12

Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 5.00m x 1.80m x 3.00m (L x W x D)	Ground Level (mOD): 43.29	Client: AKM Design	Job Number: 12205-09-22
	Location: 606123.1 E 743107.2 N	Dates: 20/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Peaty TOPSOIL		
0.20-1.20	ES			43.09	0.20	MADE GROUND: Brown slightly sandy slightly gravelly silty Clay with rare fragments of plastic.		
0.70	B				(1.00)			
				42.09	1.20	Firm brown slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders		
					(0.60)			
				41.49	1.80	Stiff brown slightly sandy gravelly silty CLAY with many cobbles and boulders		
					(1.20)			
2.50	B							
				40.29	3.00	Complete at 3.00m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-12

Ground Investigations Ireland Ltd
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Site	Trial Pit Number
Cornamaddy Athlone Northern Site	TP-13

Machine : 14T tracked excavator Method : Trial Pit	Dimensions 5.50m x 1.80m x 2.60 (L x W x D)	Ground Level (mOD) 40.22	Client AKM Design	Job Number 12205-09-22
	Location 605986.4 E 743218.6 N	Dates 20/10/2022	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.60)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT with rootlets		
			Fast Ingress(1) at 0.60m.	39.62	0.60 (0.15)	Very soft orangish brown slightly sandy gravelly silty CLAY with many cobbles and boulders		∇1
0.75-2.00	ES			39.47	0.75	Very soft grey clayey SILT with rare cobbles		
1.00	B				(1.25)			
				38.22	2.00 (0.60)	Very soft slightly sandy gravelly clayey SILT with many cobbles and boulders		
2.30	B							
				37.62	2.60	Complete at 2.60m		

Plan

Remarks

Groundwater encountered at 0.60m BGL; Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-13

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Trial Pit Number: **TP-14**
Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions:** 5.40m x 1.80m 3.00m (L x W x D) **Ground Level (mOD):** 41.82	**Client:** AKM Design	**Job Number:** 12205-09-22
	Location: 605994.6 E 743178.1 N **Dates:** 20/10/2022	**Engineer:**	**Sheet:** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL		
0.50	B			41.42	0.40 (0.90)	Firm grey mottled brown slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders		
1.50	B			40.52	1.30 (1.20)	Firm grey mottled brown slightly sandy gravelly silty CLAY with many cobbles and boulders		
				39.32	2.50 (0.50)	Firm to stiff grey mottled brown slightly sandy gravelly silty CLAY with many cobbles and boulders		
				38.82	3.00	Complete at 3.00m		

Plan

Remarks

No groundwater encountered
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-14

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-15

Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 5.50m x 1.80m x 3.00m (L x W x D)	Ground Level (mOD): 41.92	Client: AKM Design	Job Number: 12205-09-22
	Location: 606003.6 E 743127.9 N	Dates: 20/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
0.30-0.70	ES			41.62	0.30	Soft greyish brown slightly sandy gravelly silty CLAY with occasional cobbles and rare boulders		
0.50	B				(0.40)			
				41.22	0.70	Firm grey mottled brown slightly sandy gravelly clayey SILT with occasional cobbles and boulders		
					(0.80)			
				40.42	1.50	Firm grey mottled brown slightly sandy gravelly clayey SILT with many cobbles and boulders		
					(0.70)			
				39.72	2.20	Firm greyish brown slightly sandy gravelly silty CLAY with many cobbles and boulders		
					(0.80)			
3.00	B			38.92	3.00	Complete at 3.00m		

Plan

Remarks

No groundwater encountered
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-15

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-16

Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 5.30m x 1.80m x 2.40m (L x W x D)	Ground Level (mOD): 40.43	Client: AKM Design	Job Number: 12205-09-22
	Location: 606011.3 E 743084.5 N	Dates: 20/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
			Fast Ingress(1) at 0.50m.	39.93	0.50	Very soft light grey slightly sandy slightly gravelly silty CLAY with occasional cobbles		∇1
					(0.70)			
				39.23	1.20	Very soft grey silty CLAY with occasional cobbles		
1.70	B				(1.00)			
				38.23	2.20 (0.20)	Firm grey slightly sandy slightly gravelly silty CLAY with many cobbles and boulders		
				38.03	2.40	Terminated at 2.40m		

Plan

Remarks

Groundwater encountered at 0.50m BGL; Fast Ingress
Trial pit unstable; side walls collapsed
Trial pit backfilled upon completion
Terminated due to trial pit collapse

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-16

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Trial Pit Number: **TP-17**
Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 5.30m x 1.80m x 3.00m (L x W x D) **Ground Level (mOD)** 41.84	**Client** AKM Design	**Job Number** 12205-09-22
	Location 605939.4 E 743079.5 N **Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
0.20-1.40	ES			41.64	0.20	Firm grey mottled brown slightly sandy slightly gravelly silty CLAY with occasional cobbles		
0.50	B				(1.20)			
				40.44	1.40	Firm to stiff grey mottled brown slightly sandy slightly gravelly silty CLAY with many cobbles and occasional boulders		
					(0.80)			
				39.64	2.20	Firm to stiff grey slightly silty sandy gravelly CLAY with many cobbles and boulders		
2.50	B				(0.80)	Multiple sand lens encountered between 2.20m to 3.00m BGL		
			Seepage(1) at 3.00m.	38.84	3.00	Complete at 3.00m		∇1

Plan

Remarks

Groundwater encountered at 3.00m BGL; Seepage
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-17

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-18
Machine : 14T tracked excavator; Method : Trial Pit	Dimensions: 5.00m x 1.80m x 3.00m (L x W x D)	Ground Level (mOD): 43.08	Client: AKM Design	Job Number: 12205-09-22
	Location: 605937.1 E 743141.4 N	Dates: 20/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				42.88	0.20 (0.30)	Soft brown slightly sandy slightly gravelly CLAY		
0.50-1.10	ES			42.58	0.50 (0.60)	Medium dense greyish brown slightly clayey gravelly silty fine to coarse SAND with occasional cobbles and boulders		
1.00	B							
				41.98	1.10 (0.60)	Firm to stiff grey mottled brown slightly sandy slightly gravelly silty CLAY with many cobbles and boulders		
				41.38	1.70	Stiff grey sandy gravelly slightly clayey SILT with many cobbles and boulders		
2.00	B				(1.30)			
				40.08	3.00	Complete at 3.00m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-18

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-19
Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 5.50m x 1.80m x 2.70m (L x W x D)	Ground Level (mOD): 40.61
	Client: AKM Design	Job Number: 12205-09-22
	Location: 605873.7 E 743099.5 N	Dates: 20/10/2022
	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.70)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT with occasional fragments of wood		
0.70-1.40	ES		Seepage(1) at 0.60m.	39.91	0.70	Very soft light grey slightly sandy slightly gravelly clayey SILT with many cobbles and boulders		∇1
1.00	B				(0.70)			
			Fast Ingress(2) at 1.50m.	39.21	1.40 (0.50)	Soft dark grey slightly sandy slightly gravelly clayey SILT with many cobbles and boulders		∇2
2.00	B			38.71	1.90 (0.40)	Stiff to very stiff dark grey slightly sandy slightly gravelly clayey SILT with many cobbles and boulders		
				38.31	2.30 (0.40)	Medium dense dark grey slightly sandy slightly clayey slightly silty subangular to subrounded fine to coarse GRAVEL with many cobbles and boulders		
				37.91	2.70	Complete at 2.70m		

Plan

Remarks

Groundwater encountered at 0.60m and 1.50m BGL; Seepage and Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-19

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-01

TP-01

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-01

TP-01

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-01

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-02

TP-02

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-02

TP-02

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-02

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-03

TP-03

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-03

TP-03

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-03

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-04

TP-04

Cornamaddy Athlone Northern Site – Trial Pit Photographs

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TP-04

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-04

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-05

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-06

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-07

TP-07

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-07

TP-07

Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-08

TP-08

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-08

TP-08

Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

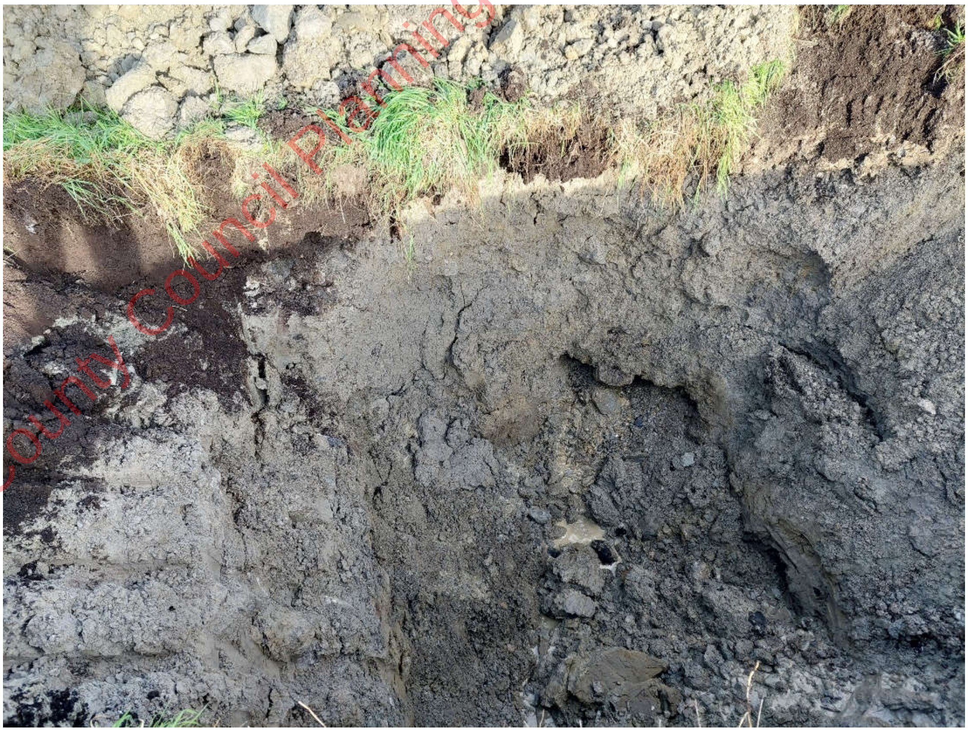
TP-09

TP-09

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-09

TP-09



Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-09

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-10

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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TP-10

Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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TP-18

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-18

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-19

TP-19

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-19

TP-19

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-19

APPENDIX 3 – Soakaway Testing Records

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

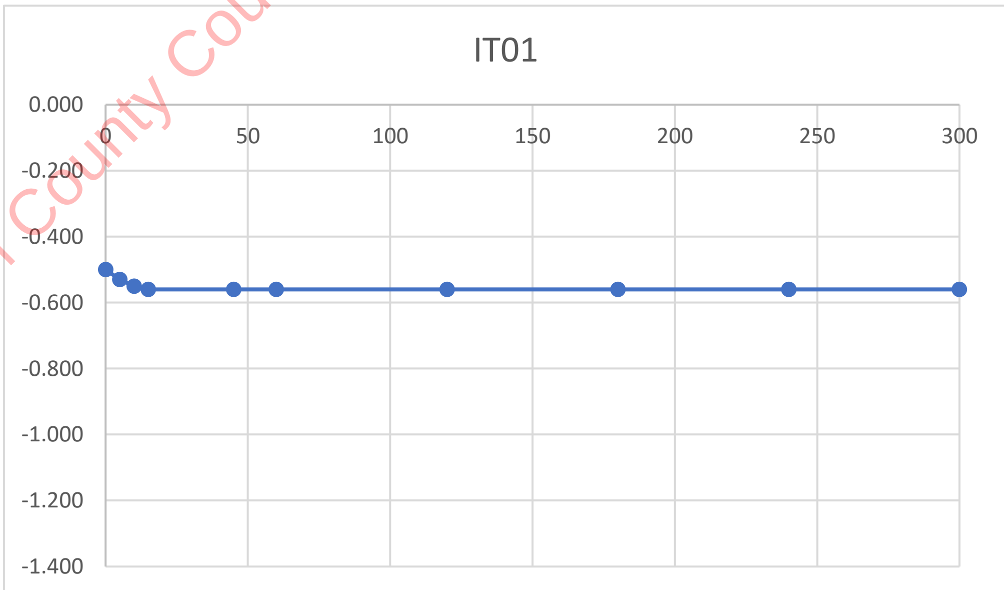
Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

IT01
Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.50m x 1.80m x 1.50m (L x W x D)

Date	Time	Water level (m bgl)
21/10/2022	0	-0.500
21/10/2022	5	-0.530
21/10/2022	10	-0.550
21/10/2022	15	-0.560
21/10/2022	45	-0.560
21/10/2022	60	-0.560
21/10/2022	120	-0.560
21/10/2022	180	-0.560
21/10/2022	240	-0.560
21/10/2022	300	-0.560

***Soakaway - Pit Backfilled**

Start Depth	Depth of Pit	Difference	75% Full	25% Full
0.500	1.500	1.000	0.750	1.250



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

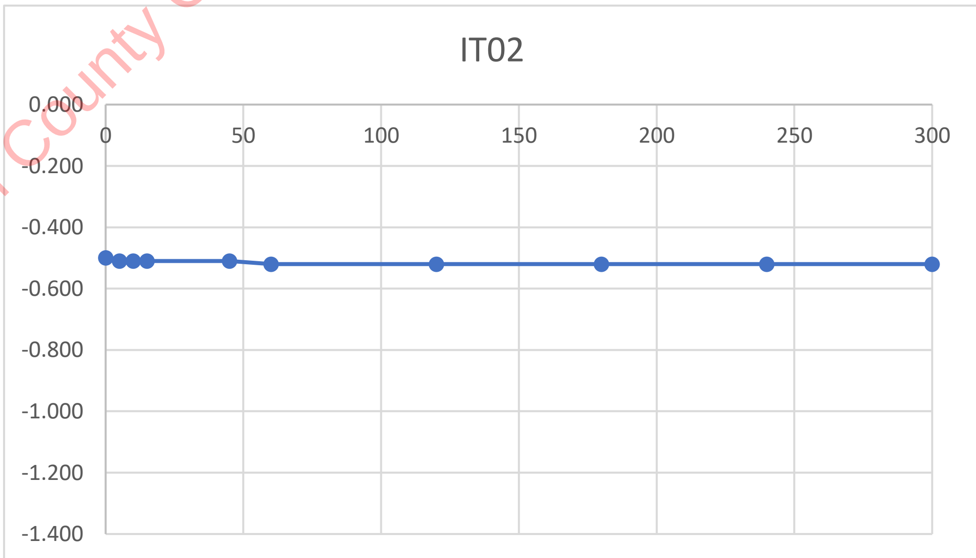
Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

IT02
Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.60m x 1.80m x 1.60m (L x W x D)

Date	Time	Water level (m bgl)
21/10/2022	0	-0.500
21/10/2022	5	-0.510
21/10/2022	10	-0.510
21/10/2022	15	-0.510
21/10/2022	45	-0.510
21/10/2022	60	-0.520
21/10/2022	120	-0.520
21/10/2022	180	-0.520
21/10/2022	240	-0.520
21/10/2022	300	-0.520

***Soakaway - Pit Backfilled**

Start Depth	Depth of Pit	Difference	75% Full	25% Full
0.500	1.600	1.100	0.775	1.325



GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

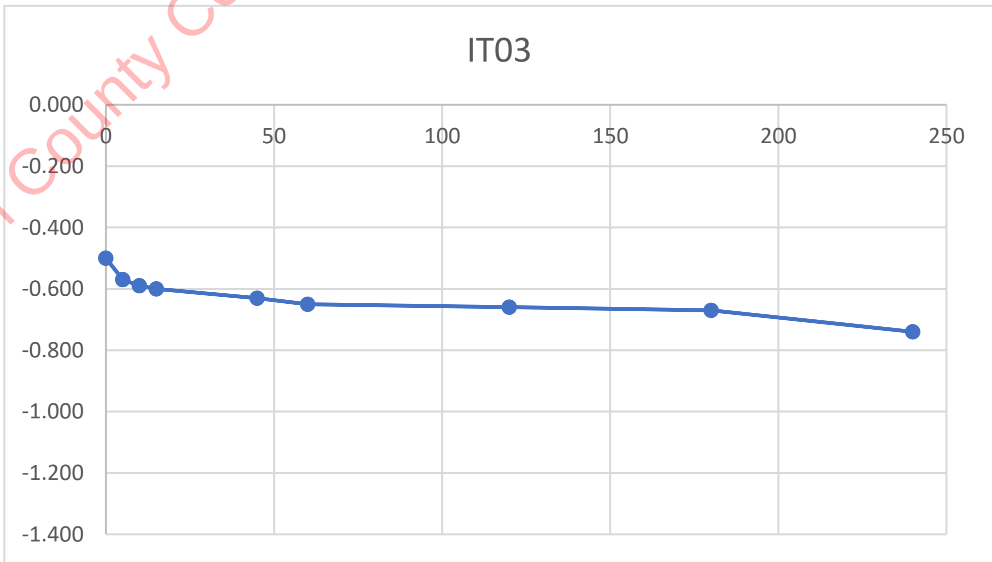
Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

IT03
Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.40m x 1.80m x 1.40m (L x W x D)

Date	Time	Water level (m bgl)
21/10/2022	0	-0.500
21/10/2022	5	-0.570
21/10/2022	10	-0.590
21/10/2022	15	-0.600
21/10/2022	45	-0.630
21/10/2022	60	-0.650
21/10/2022	120	-0.660
21/10/2022	180	-0.670
21/10/2022	240	-0.740
21/10/2022	300	-0.780

***Soakaway - Pit Backfilled**

Start Depth	Depth of Pit	Difference	75% Full	25% Full
0.500	1.400	0.900	0.725	1.175



Cornamaddy Athlone Northern Site – Soakaway Photographs

IT-01

IT-01

Cornamaddy Athlone Northern Site – Soakaway Photographs

IT-01

IT-01

Cornamaddy Athlone Northern Site – Soakaway Photographs

IT-01

IT-01

Cornamaddy Athlone Northern Site – Soakaway Photographs

IT-02

IT-02

Cornamaddy Athlone Northern Site – Soakaway Photographs

IT-02

IT-02

Cornamaddy Athlone Northern Site – Soakaway Photographs

IT-02

IT-02

Cornamaddy Athlone Northern Site – Soakaway Photographs

IT-03

IT-03

Cornamaddy Athlone Northern Site – Soakaway Photographs

IT-03

IT-03

Cornamaddy Athlone Northern Site – Soakaway Photographs

IT-03

IT-03

APPENDIX 4 – Dynamic Probe Records

Ground Investigations Ireland Ltd
www.gii.ie

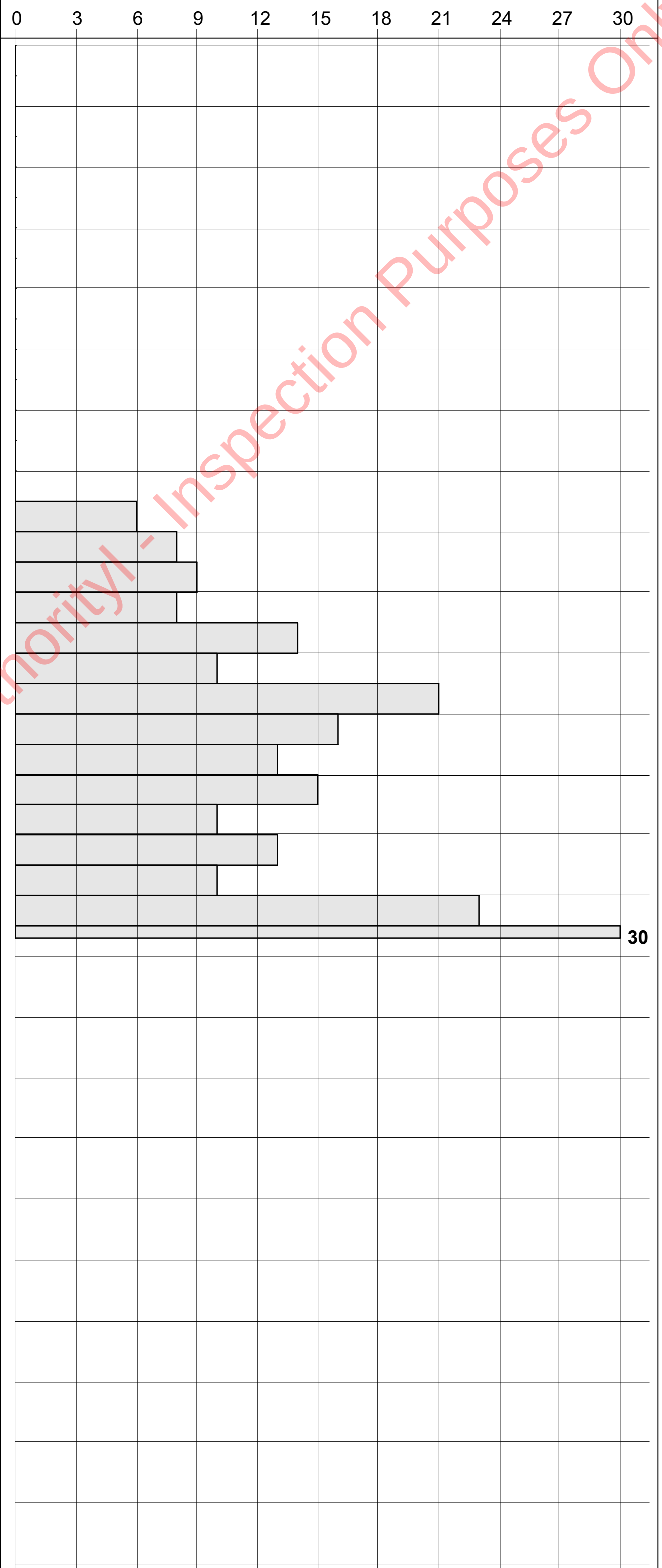
Site	Probe Number
Cornamaddy Athlone Northern Site	DP-01

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.20	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606180.2 E 743330.8 N	21/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	0	
0.70-0.80	0	
0.80-0.90	0	
0.90-1.00	0	
1.00-1.10	0	
1.10-1.20	0	
1.20-1.30	0	
1.30-1.40	0	
1.40-1.50	0	
1.50-1.60	6	
1.60-1.70	8	
1.70-1.80	9	
1.80-1.90	8	
1.90-2.00	14	
2.00-2.10	10	
2.10-2.20	21	
2.20-2.30	16	
2.30-2.40	13	
2.40-2.50	15	
2.50-2.60	10	
2.60-2.70	13	
2.70-2.80	10	
2.80-2.90	23	
2.90-2.94	30	

Level (mOD)	Depth (m)
40.20	0.00
39.70	0.50
39.20	1.00
38.70	1.50
38.20	2.00
37.70	2.50
37.20	3.00
36.70	3.50
36.20	4.00
35.70	4.50
35.20	5.00

Blows for Depth Increment



Remarks
Refusal at 2.94m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-01

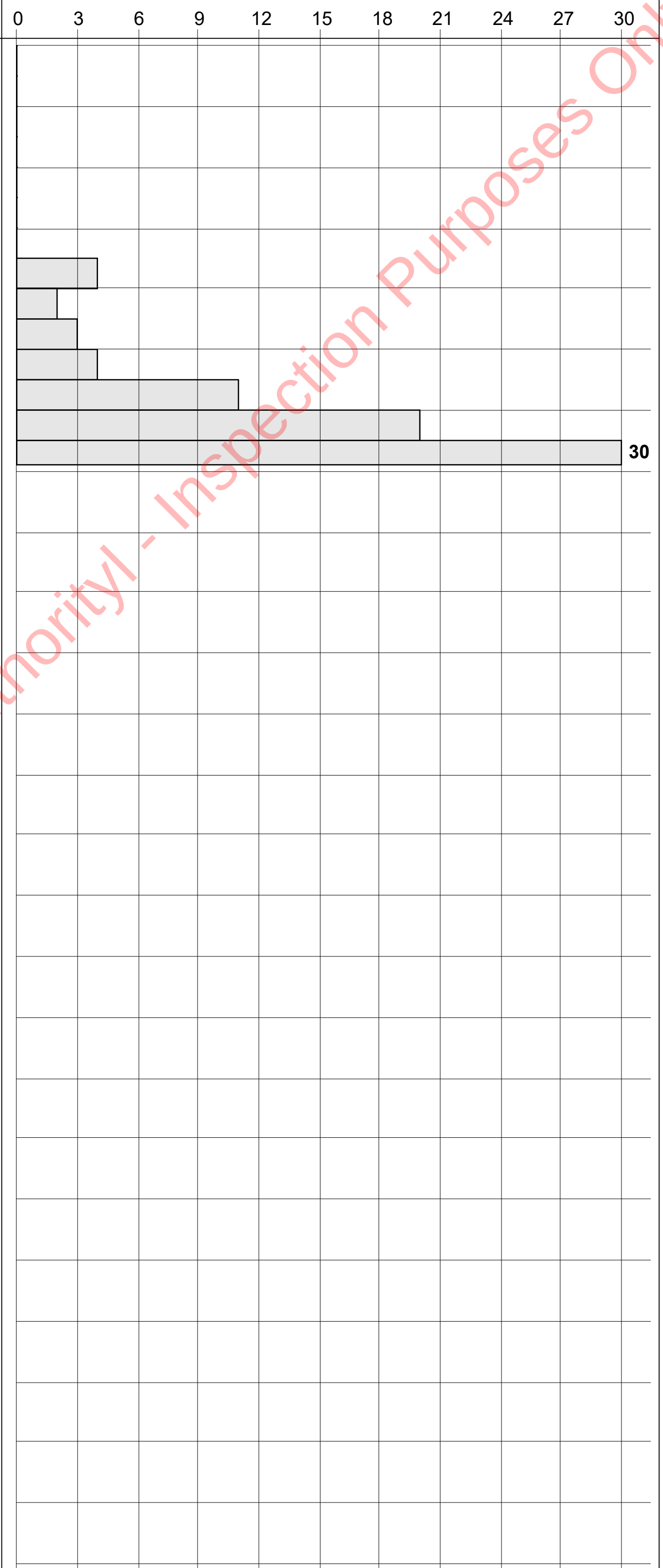
Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Probe Number: DP-02

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.16	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606203.1 E 743324.5 N	21/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	0	
0.70-0.80	4	
0.80-0.90	2	
0.90-1.00	3	
1.00-1.10	4	
1.10-1.20	11	
1.20-1.30	20	
1.30-1.38	30	

Level (mOD)	Depth (m)
40.16	0.00
39.66	0.50
39.16	1.00
38.66	1.50
38.16	2.00
37.66	2.50
37.16	3.00
36.66	3.50
36.16	4.00
35.66	4.50
35.16	5.00

Blows for Depth Increment



Remarks
Refusal at 1.38m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No. 12205-09-22.DP-02

Ground Investigations Ireland Ltd
www.gii.ie

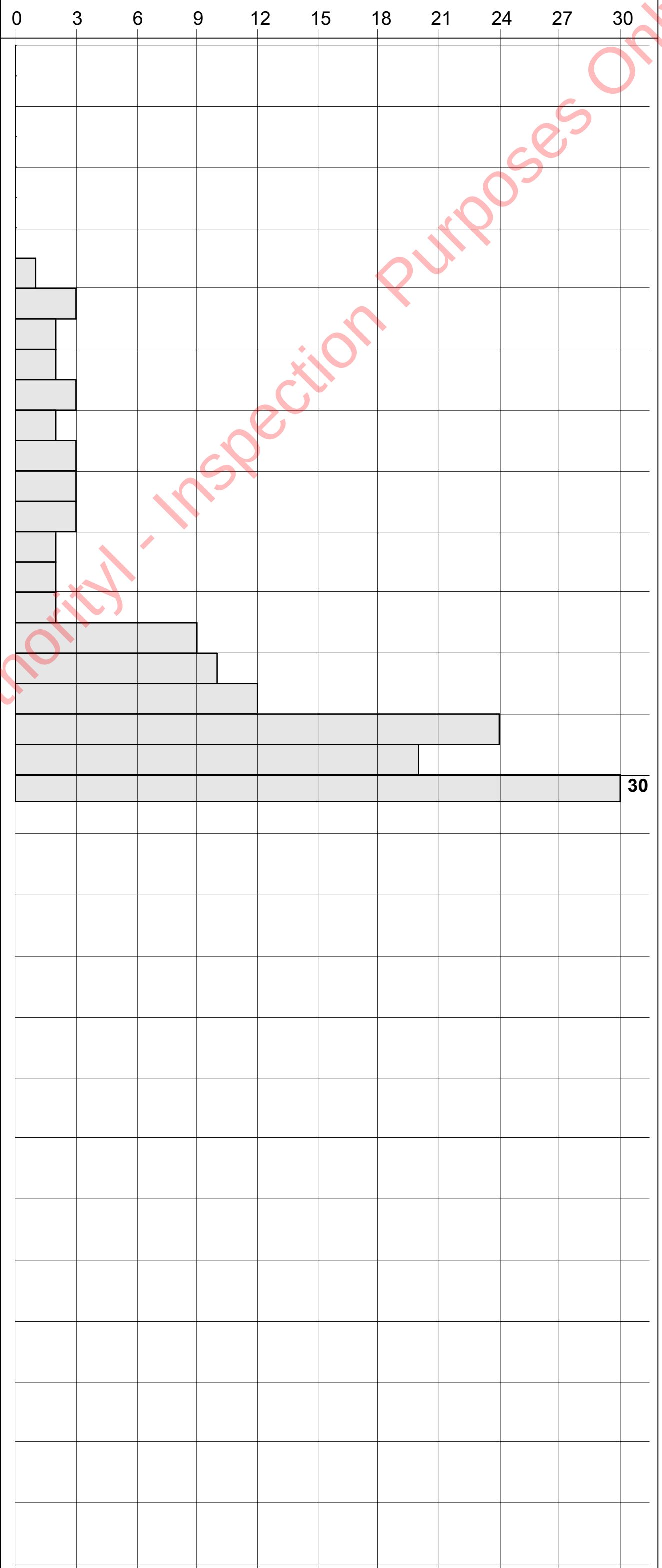
Site	Probe Number
Cornamaddy Athlone Northern Site	DP-03

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.43	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606181 E 743300.3 N	21/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	0	
0.70-0.80	1	
0.80-0.90	3	
0.90-1.00	2	
1.00-1.10	2	
1.10-1.20	3	
1.20-1.30	2	
1.30-1.40	3	
1.40-1.50	3	
1.50-1.60	3	
1.60-1.70	2	
1.70-1.80	2	
1.80-1.90	2	
1.90-2.00	9	
2.00-2.10	10	
2.10-2.20	12	
2.20-2.30	24	
2.30-2.40	20	
2.40-2.49	30	

Level (mOD)	Depth (m)
40.43	0.00
39.93	0.50
39.43	1.00
38.93	1.50
38.43	2.00
37.93	2.50
37.43	3.00
36.93	3.50
36.43	4.00
35.93	4.50
35.43	5.00

Blows for Depth Increment



Remarks
Refusal at 2.49m BGL

Scale (approx)	Logged By
1:25	CMP

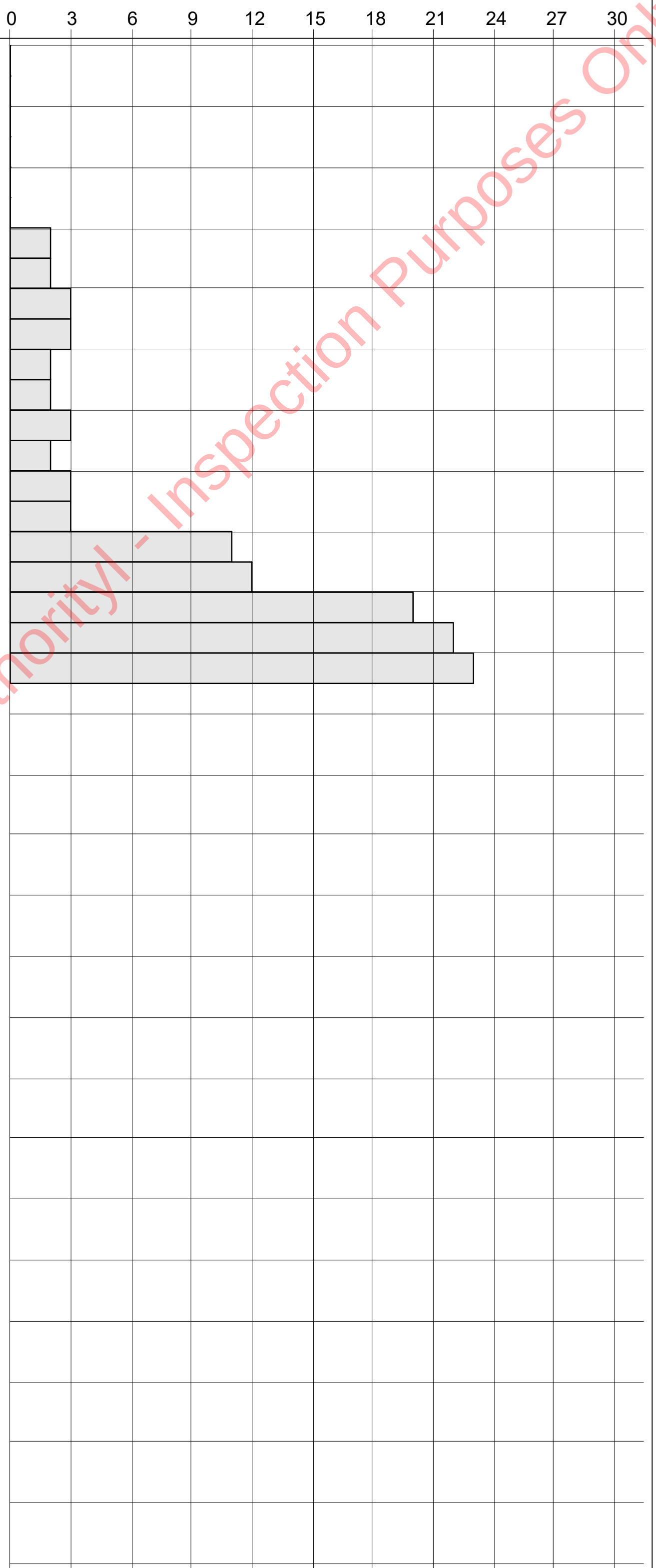
Figure No.
12205-09-22.DP-03

Ground Investigations Ireland Ltd www.gii.ie			**Site** Cornamaddy Athlone Northern Site	**Probe Number** DP-04
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 40.39	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606202.3 E 743291.1 N	**Dates** 21/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	2	
0.70-0.80	2	
0.80-0.90	3	
0.90-1.00	3	
1.00-1.10	2	
1.10-1.20	2	
1.20-1.30	3	
1.30-1.40	2	
1.40-1.50	3	
1.50-1.60	3	
1.60-1.70	11	
1.70-1.80	12	
1.80-1.90	20	
1.90-2.00	22	
2.00-2.10	23	

Level (mOD)	Depth (m)
40.39	0.00
39.89	0.50
39.39	1.00
38.89	1.50
38.39	2.00
37.89	2.50
37.39	3.00
36.89	3.50
36.39	4.00
35.89	4.50
35.39	5.00

Blows for Depth Increment



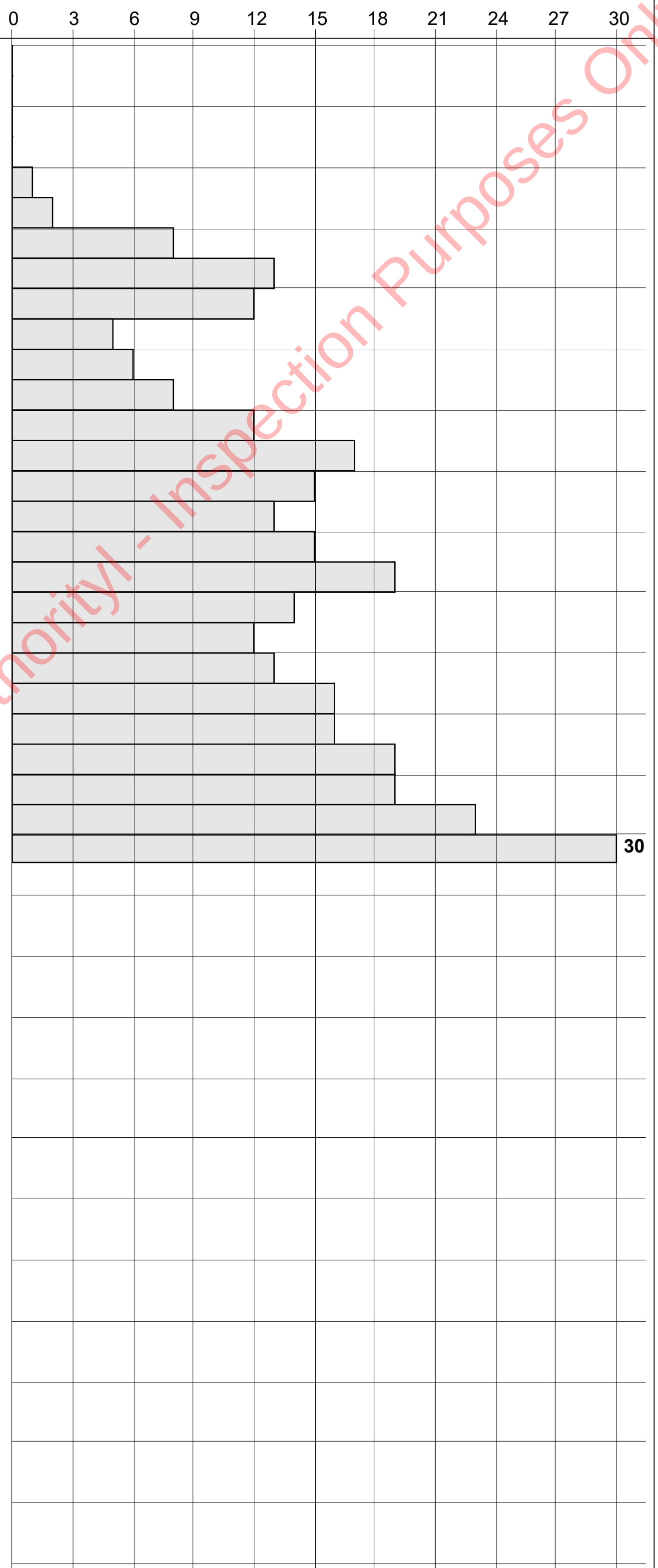
Remarks Refusal at 2.10m BGL	**Scale (approx)** 1:25	**Logged By** CMP
	Figure No. 12205-09-22.DP-04	

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Probe Number: DP-05
Method: Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Cone Dimensions: Diameter 43.70mm; Ground Level (mOD): 40.49	Client: AKM Design	Job Number: 12205-09-22
	Location: 606181.7 E 743269.3 N; Dates: 21/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	1	
0.50-0.60	2	
0.60-0.70	8	
0.70-0.80	13	
0.80-0.90	12	
0.90-1.00	5	
1.00-1.10	6	
1.10-1.20	8	
1.20-1.30	12	
1.30-1.40	17	
1.40-1.50	15	
1.50-1.60	13	
1.60-1.70	15	
1.70-1.80	19	
1.80-1.90	14	
1.90-2.00	12	
2.00-2.10	13	
2.10-2.20	16	
2.20-2.30	16	
2.30-2.40	19	
2.40-2.50	19	
2.50-2.60	23	
2.60-2.69	30	

Level (mOD)	Depth (m)
40.49	0.00
39.99	0.50
39.49	1.00
38.99	1.50
38.49	2.00
37.99	2.50
37.49	3.00
36.99	3.50
36.49	4.00
35.99	4.50
35.49	5.00

Blows for Depth Increment



Remarks
Refusal at 2.69m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-05

Ground Investigations Ireland Ltd
www.gii.ie

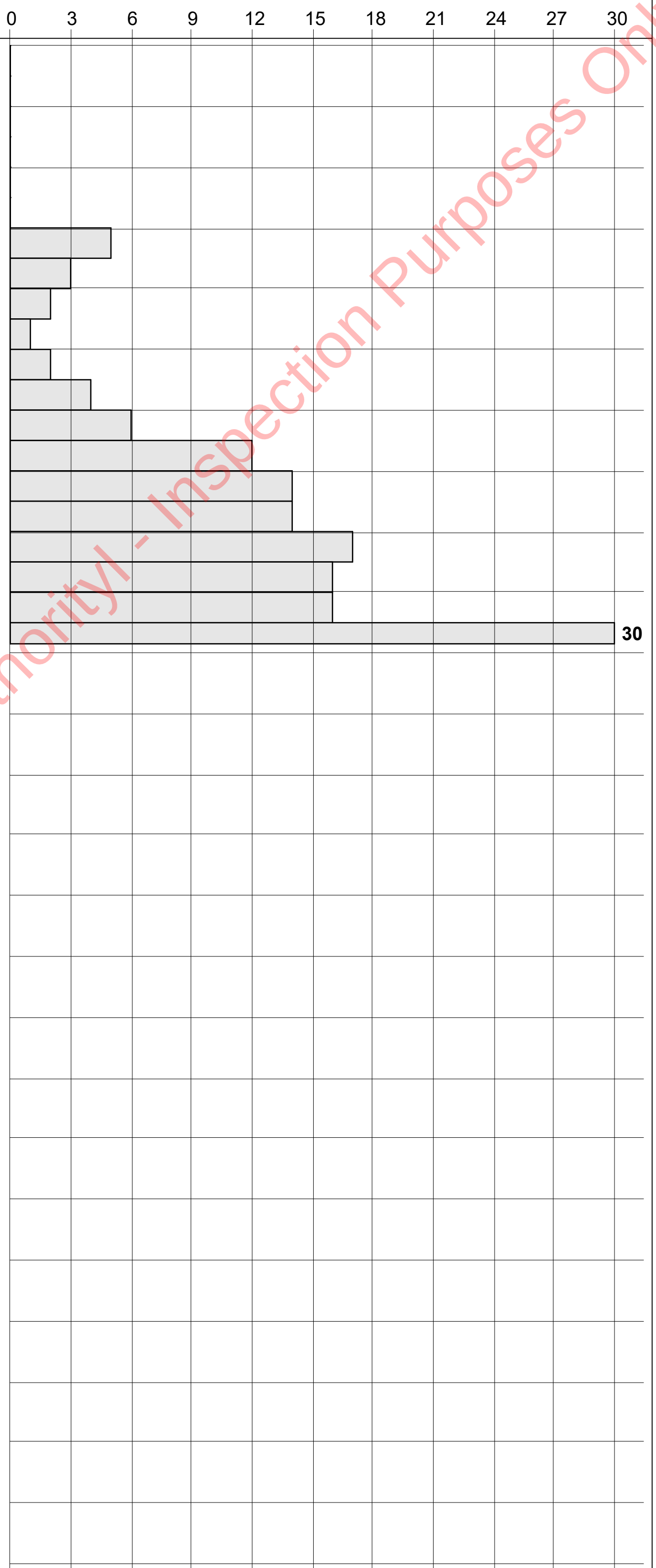
Site	Probe Number
Cornamaddy Athlone Northern Site	DP-06

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.39	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606203.2 E 743267.1 N	21/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	5	
0.70-0.80	3	
0.80-0.90	2	
0.90-1.00	1	
1.00-1.10	2	
1.10-1.20	4	
1.20-1.30	6	
1.30-1.40	12	
1.40-1.50	14	
1.50-1.60	14	
1.60-1.70	17	
1.70-1.80	16	
1.80-1.90	16	
1.90-1.97	30	

Level (mOD)	Depth (m)
40.39	0.00
39.89	0.50
39.39	1.00
38.89	1.50
38.39	2.00
37.89	2.50
37.39	3.00
36.89	3.50
36.39	4.00
35.89	4.50
35.39	5.00

Blows for Depth Increment



Remarks
Refusal at 1.97m BGL

Scale (approx)	Logged By
1:25	CMP

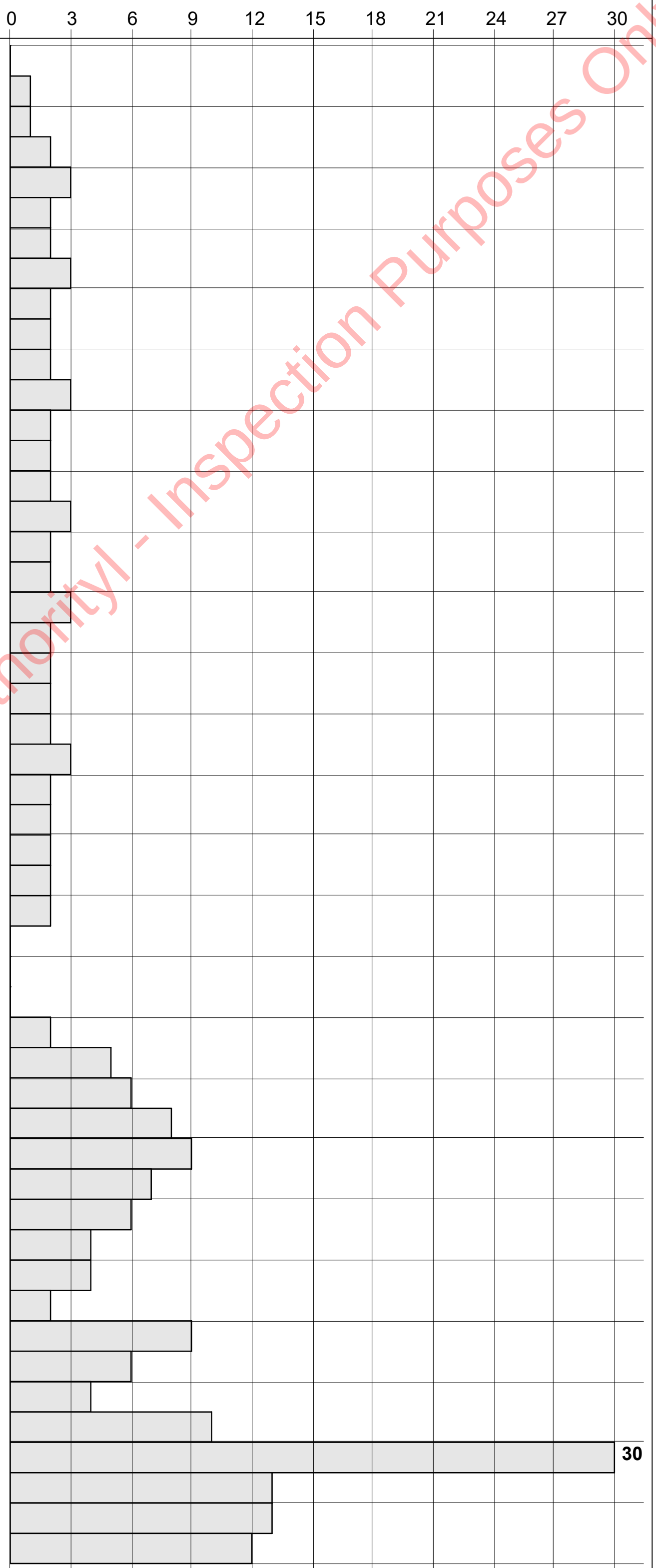
Figure No.
12205-09-22.DP-06

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Probe Number: **DP-07**

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.15	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606114 E 743286.4 N	19/10/2022		1/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	0		40.15	0.00
0.10-0.20	1			
0.20-0.30	1			
0.30-0.40	2			
0.40-0.50	3			
0.50-0.60	2		39.65	0.50
0.60-0.70	2			
0.70-0.80	3			
0.80-0.90	2			
0.90-1.00	2			
1.00-1.10	2		39.15	1.00
1.10-1.20	3			
1.20-1.30	2			
1.30-1.40	2			
1.40-1.50	2			
1.50-1.60	3		38.65	1.50
1.60-1.70	2			
1.70-1.80	2			
1.80-1.90	3			
1.90-2.00	2			
2.00-2.10	2		38.15	2.00
2.10-2.20	2			
2.20-2.30	2			
2.30-2.40	3			
2.40-2.50	2			
2.50-2.60	2		37.65	2.50
2.60-2.70	2			
2.70-2.80	2			
2.80-2.90	2			
2.90-3.00	0			
3.00-3.10	0		37.15	3.00
3.10-3.20	0			
3.20-3.30	2			
3.30-3.40	5			
3.40-3.50	6			
3.50-3.60	8		36.65	3.50
3.60-3.70	9			
3.70-3.80	7			
3.80-3.90	6			
3.90-4.00	4			
4.00-4.10	4		36.15	4.00
4.10-4.20	2			
4.20-4.30	9			
4.30-4.40	6			
4.40-4.50	4			
4.50-4.60	10		35.65	4.50
4.60-4.70	30			
4.70-4.80	13			
4.80-4.90	13			
4.90-5.00	12		35.15	5.00

Blows for Depth Increment

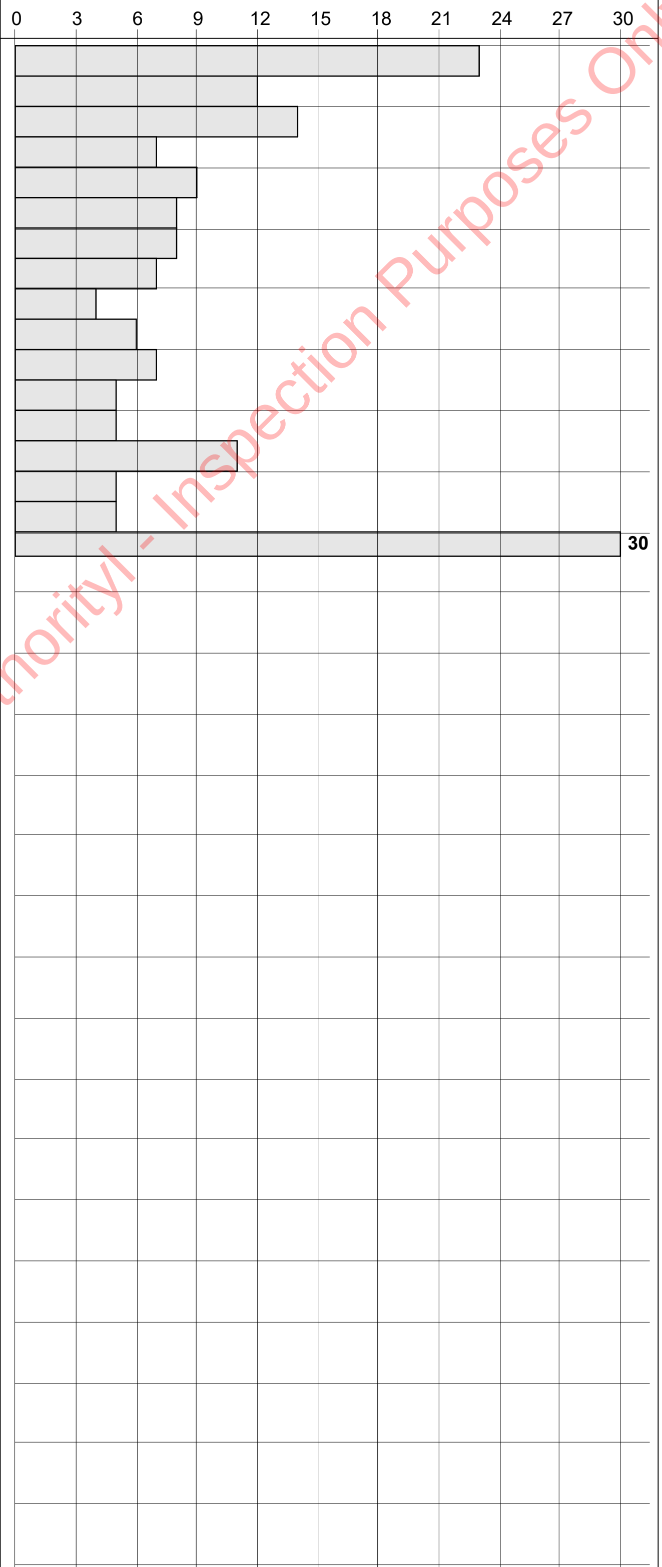


Remarks	Scale (approx)	Logged By
Refusal at 6.68m BGL	1:25	CMP
	Figure No. 12205-09-22.DP-07	

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Probe Number **DP-07**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 40.15	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606114 E 743286.4 N	**Dates** 19/10/2022	**Engineer**	**Sheet** 2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
5.00-5.10	23		35.15	5.00
5.10-5.20	12			
5.20-5.30	14			
5.30-5.40	7			
5.40-5.50	9			
5.50-5.60	8		34.65	5.50
5.60-5.70	8			
5.70-5.80	7			
5.80-5.90	4			
5.90-6.00	6			
6.00-6.10	7		34.15	6.00
6.10-6.20	5			
6.20-6.30	5			
6.30-6.40	11			
6.40-6.50	5			
6.50-6.60	5		33.65	6.50
6.60-6.68	30			
			33.15	7.00
			32.65	7.50
			32.15	8.00
			31.65	8.50
			31.15	9.00
			30.65	9.50
			30.15	10.00

Blows for Depth Increment



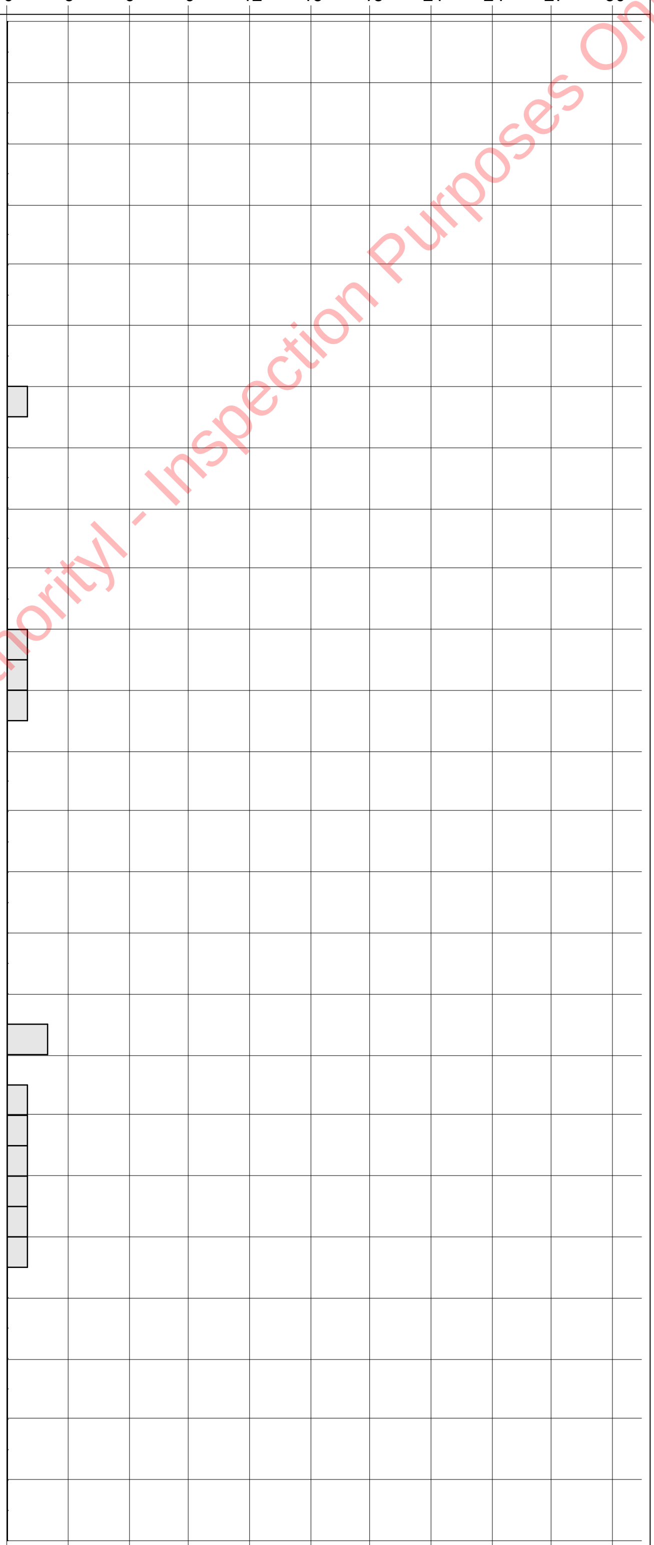
Remarks	Scale (approx) 1:25	Logged By CMP
	Figure No. 12205-09-22.DP-07	

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Probe Number: DP-08

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.34	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606149.8 E 743260.5 N	21/10/2022		1/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	0		40.34	0.00
0.10-0.20	0			
0.20-0.30	0			
0.30-0.40	0			
0.40-0.50	0			
0.50-0.60	0		39.84	0.50
0.60-0.70	0			
0.70-0.80	0			
0.80-0.90	0			
0.90-1.00	0			
1.00-1.10	0		39.34	1.00
1.10-1.20	0			
1.20-1.30	1			
1.30-1.40	0			
1.40-1.50	0			
1.50-1.60	0		38.84	1.50
1.60-1.70	0			
1.70-1.80	0			
1.80-1.90	0			
1.90-2.00	0			
2.00-2.10	1		38.34	2.00
2.10-2.20	1			
2.20-2.30	1			
2.30-2.40	0			
2.40-2.50	0			
2.50-2.60	0		37.84	2.50
2.60-2.70	0			
2.70-2.80	0			
2.80-2.90	0			
2.90-3.00	0			
3.00-3.10	0		37.34	3.00
3.10-3.20	0			
3.20-3.30	0			
3.30-3.40	2			
3.40-3.50	0			
3.50-3.60	1		36.84	3.50
3.60-3.70	1			
3.70-3.80	1			
3.80-3.90	1			
3.90-4.00	1			
4.00-4.10	1		36.34	4.00
4.10-4.20	0			
4.20-4.30	0			
4.30-4.40	0			
4.40-4.50	0			
4.50-4.60	0		35.84	4.50
4.60-4.70	0			
4.70-4.80	0			
4.80-4.90	0			
4.90-5.00	0		35.34	5.00

Blows for Depth Increment

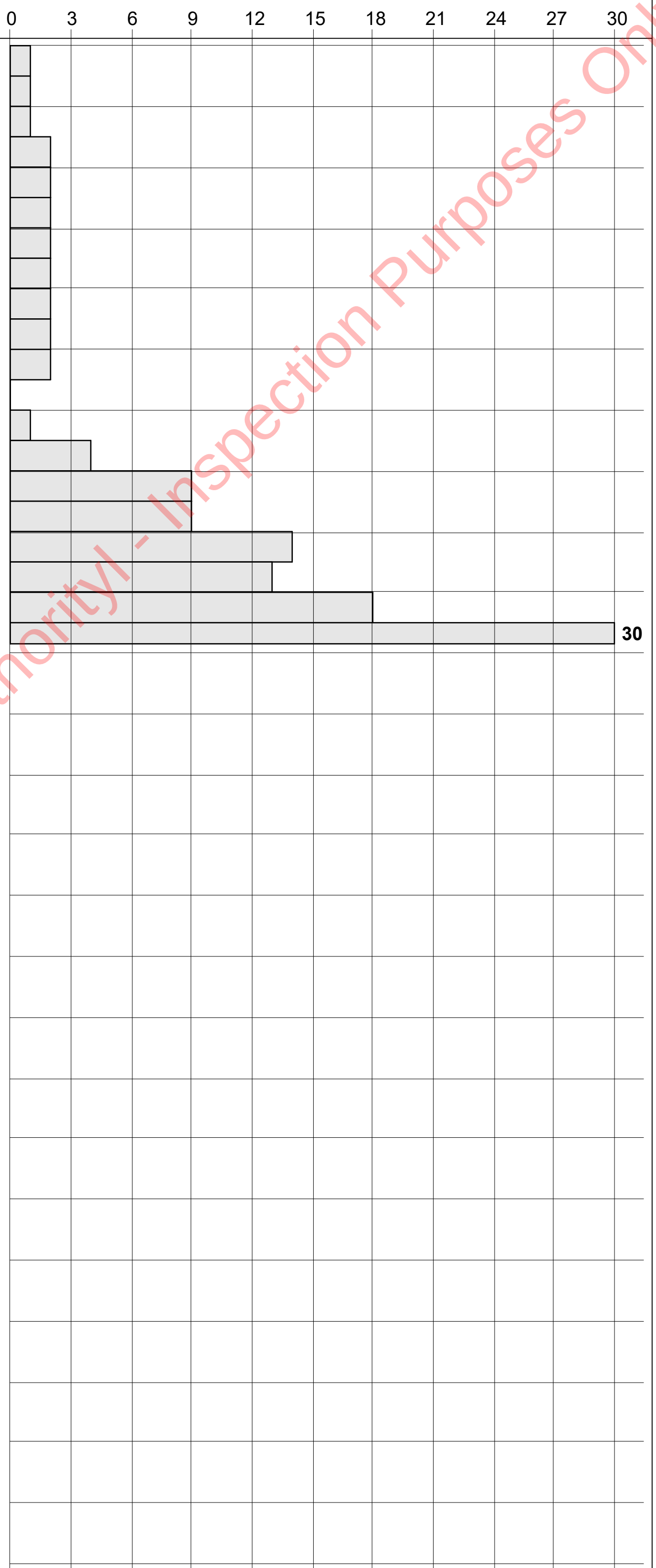


Remarks	Scale (approx)	Logged By
Refusal at 6.97m BGL	1:25	CMP
	Figure No.	
	12205-09-22.DP-08	

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Probe Number: DP-08
Method: Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Cone Dimensions: Diameter 43.70mm	Ground Level (mOD): 40.34	Client: AKM Design	Job Number: 12205-09-22
	Location: 606149.8 E 743260.5 N	Dates: 21/10/2022	Engineer:	Sheet: 2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
5.00-5.10	1		35.34	5.00
5.10-5.20	1			
5.20-5.30	1			
5.30-5.40	2			
5.40-5.50	2			
5.50-5.60	2		34.84	5.50
5.60-5.70	2			
5.70-5.80	2			
5.80-5.90	2			
5.90-6.00	2			
6.00-6.10	2		34.34	6.00
6.10-6.20	0			
6.20-6.30	1			
6.30-6.40	4			
6.40-6.50	9			
6.50-6.60	9		33.84	6.50
6.60-6.70	14			
6.70-6.80	13			
6.80-6.90	18			
6.90-6.97	30			
			33.34	7.00
			32.84	7.50
			32.34	8.00
			31.84	8.50
			31.34	9.00
			30.84	9.50
			30.34	10.00

Blows for Depth Increment



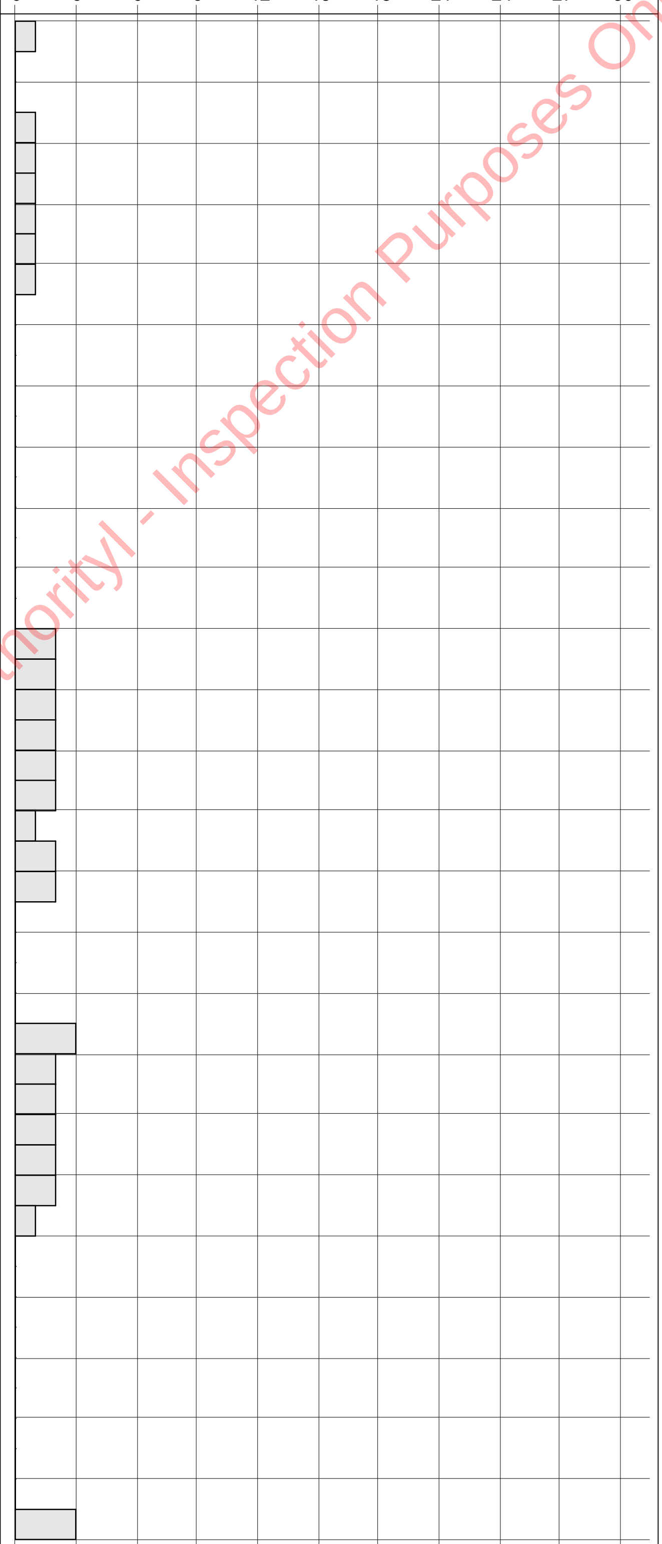
Remarks	Scale (approx)	Logged By
	1:25	CMP
	Figure No. 12205-09-22.DP-08	

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Probe Number: **DP-09**
Method: Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions**: Diameter 43.70mm	**Ground Level (mOD)**: 40.51	**Client**: AKM Design	**Job Number**: 12205-09-22
	Location: 606157.7 E 743225.5 N	**Dates**: 21/10/2022	**Engineer**:	**Sheet**: 1/2

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	1	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	1	
0.40-0.50	1	
0.50-0.60	1	
0.60-0.70	1	
0.70-0.80	1	
0.80-0.90	1	
0.90-1.00	0	
1.00-1.10	0	
1.10-1.20	0	
1.20-1.30	0	
1.30-1.40	0	
1.40-1.50	0	
1.50-1.60	0	
1.60-1.70	0	
1.70-1.80	0	
1.80-1.90	0	
1.90-2.00	0	
2.00-2.10	2	
2.10-2.20	2	
2.20-2.30	2	
2.30-2.40	2	
2.40-2.50	2	
2.50-2.60	2	
2.60-2.70	1	
2.70-2.80	2	
2.80-2.90	2	
2.90-3.00	0	
3.00-3.10	0	
3.10-3.20	0	
3.20-3.30	0	
3.30-3.40	3	
3.40-3.50	2	
3.50-3.60	2	
3.60-3.70	2	
3.70-3.80	2	
3.80-3.90	2	
3.90-4.00	1	
4.00-4.10	0	
4.10-4.20	0	
4.20-4.30	0	
4.30-4.40	0	
4.40-4.50	0	
4.50-4.60	0	
4.60-4.70	0	
4.70-4.80	0	
4.80-4.90	0	
4.90-5.00	3	

Level (mOD)	Depth (m)
40.51	0.00
40.01	0.50
39.51	1.00
39.01	1.50
38.51	2.00
38.01	2.50
37.51	3.00
37.01	3.50
36.51	4.00
36.01	4.50
35.51	5.00

Blows for Depth Increment

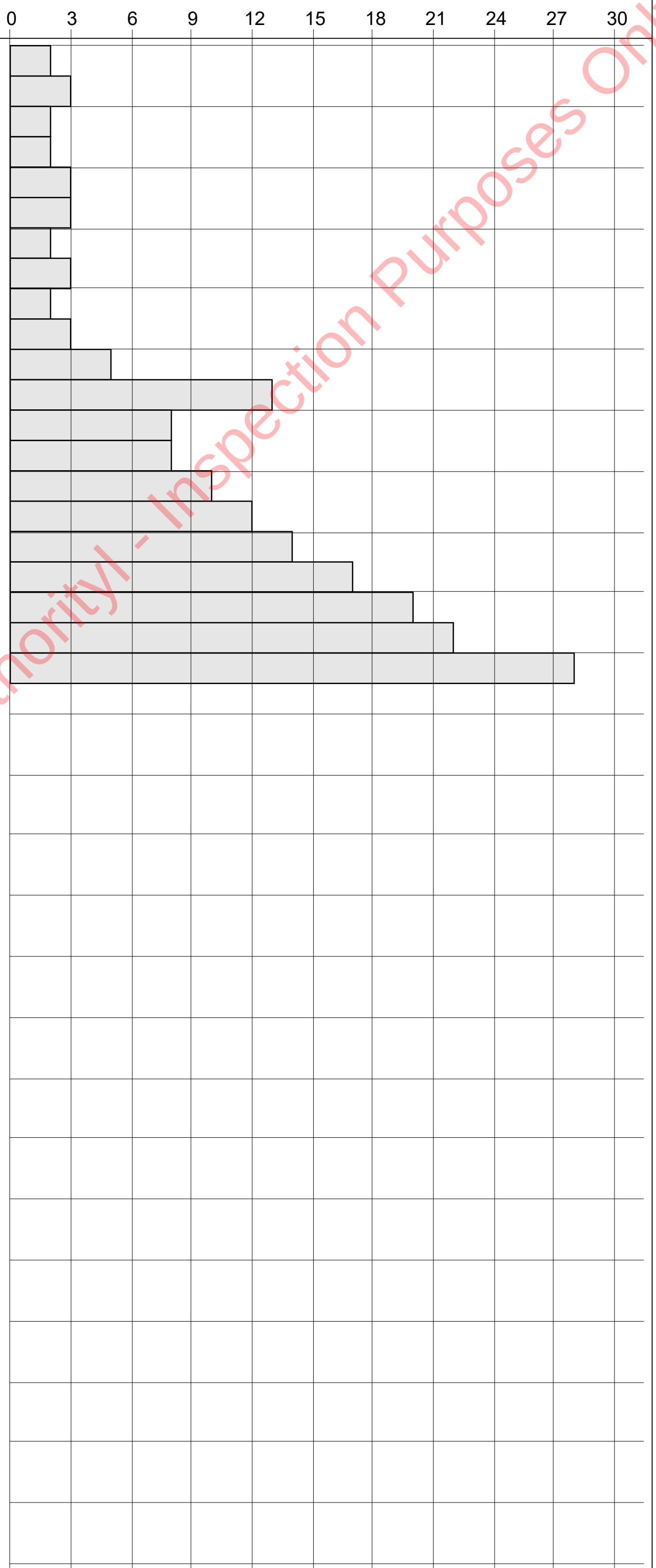


Remarks	Scale (approx)	Logged By
Refusal at 7.10m BGL	1:25	CMP
	Figure No. 12205-09-22.DP-09	

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Probe Number: DP-09
Method: Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions**: Diameter 43.70mm	**Ground Level (mOD)**: 40.51	**Client**: AKM Design	**Job Number**: 12205-09-22
	Location: 606157.7 E 743225.5 N	**Dates**: 21/10/2022	**Engineer**:	**Sheet**: 2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
5.00-5.10	2		35.51	5.00
5.10-5.20	3			
5.20-5.30	2			
5.30-5.40	2			
5.40-5.50	3			
5.50-5.60	3		35.01	5.50
5.60-5.70	2			
5.70-5.80	3			
5.80-5.90	2			
5.90-6.00	3			
6.00-6.10	5		34.51	6.00
6.10-6.20	13			
6.20-6.30	8			
6.30-6.40	8			
6.40-6.50	10			
6.50-6.60	12		34.01	6.50
6.60-6.70	14			
6.70-6.80	17			
6.80-6.90	20			
6.90-7.00	22			
7.00-7.10	28		33.51	7.00
			33.01	7.50
			32.51	8.00
			32.01	8.50
			31.51	9.00
			31.01	9.50
			30.51	10.00

Blows for Depth Increment

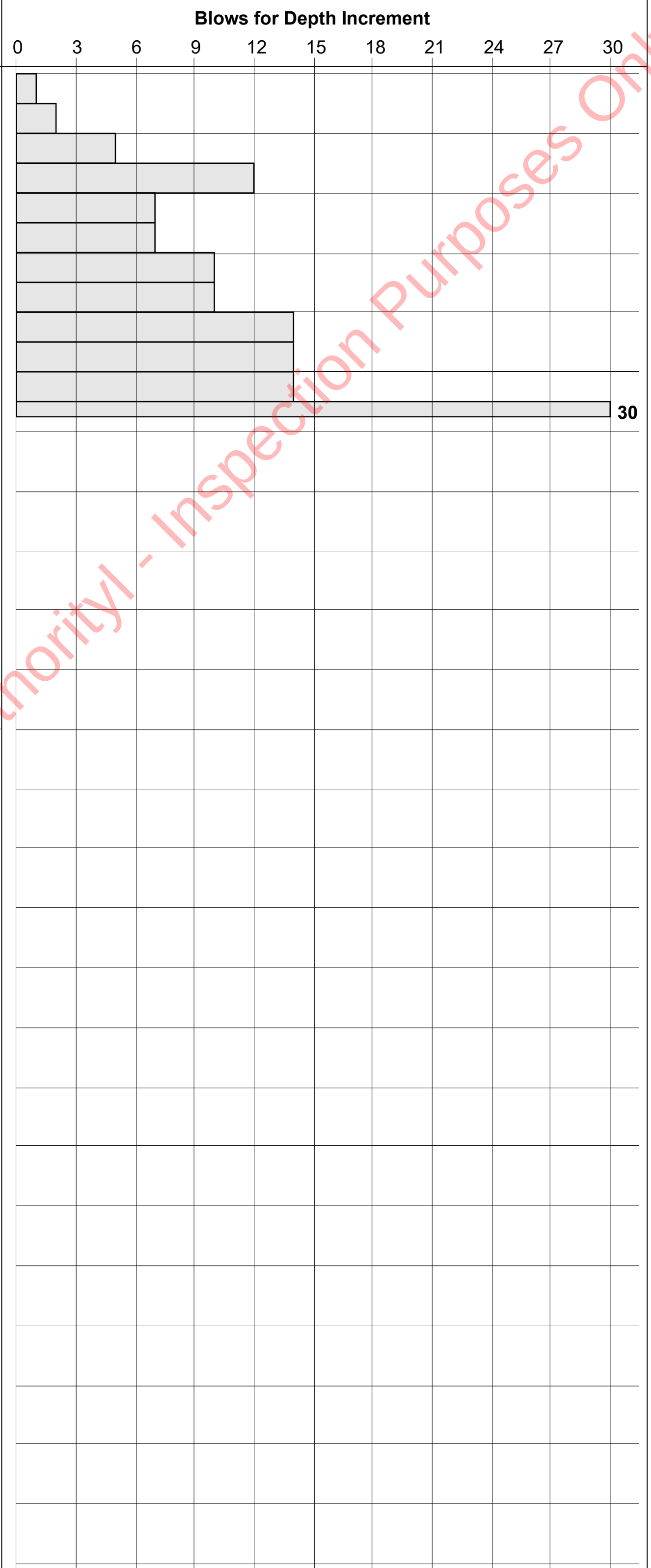


Remarks	Scale (approx): 1:25	Logged By: CMP
	Figure No.: 12205-09-22.DP-09	

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Probe Number: **DP-10**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 41.00	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606170.2 E 743198.4 N	**Dates** 21/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	1	
0.10-0.20	2	
0.20-0.30	5	
0.30-0.40	12	
0.40-0.50	7	
0.50-0.60	7	
0.60-0.70	10	
0.70-0.80	10	
0.80-0.90	14	
0.90-1.00	14	
1.00-1.10	14	
1.10-1.15	30	

Level (mOD)	Depth (m)
41.00	0.00
40.50	0.50
40.00	1.00
39.50	1.50
39.00	2.00
38.50	2.50
38.00	3.00
37.50	3.50
37.00	4.00
36.50	4.50
36.00	5.00



Remarks
Refusal at 1.15m BGL

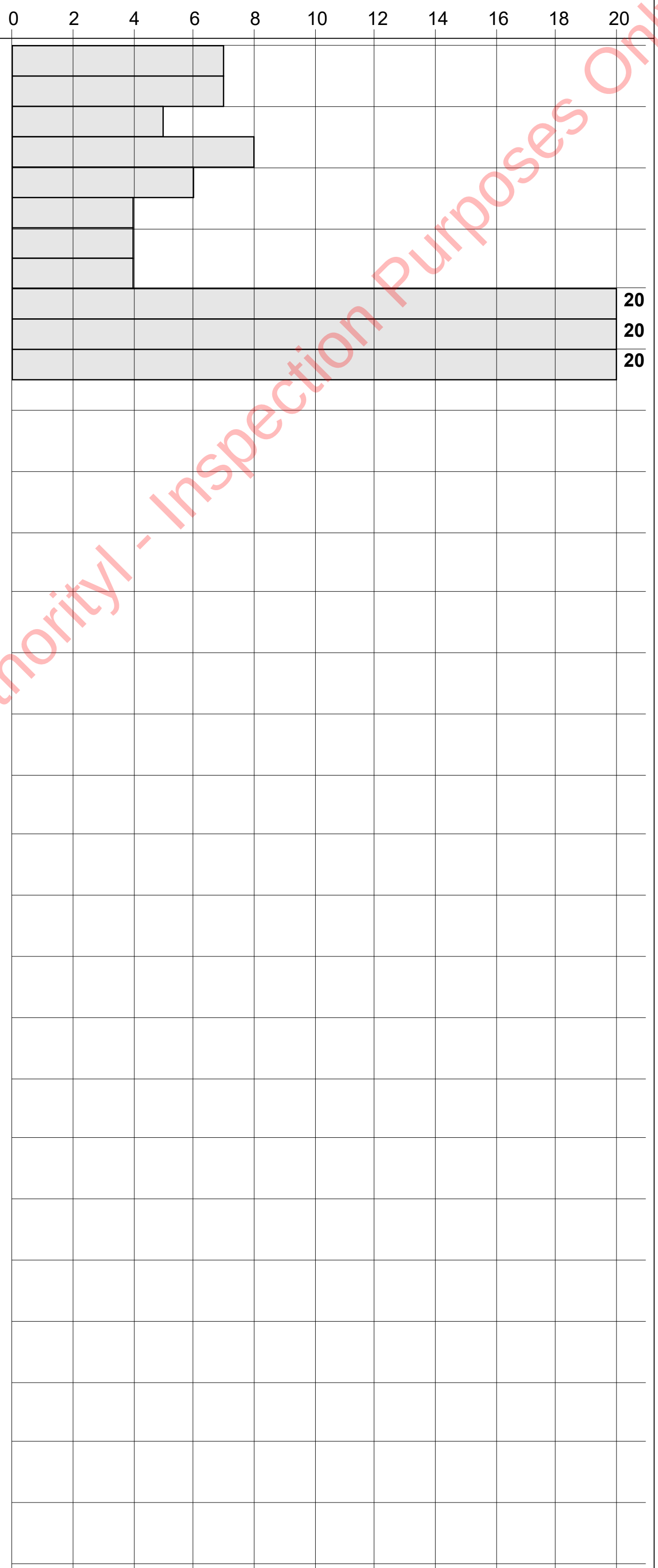
Scale (approx)	Logged By
1:25	CMP

Figure No. 12205-09-22.DP-10

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Probe Number: DP-11
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 42.92	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606352.4 E 742943.6 N	**Dates** 21/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	7		42.92	0.00
0.10-0.20	7			
0.20-0.30	5			
0.30-0.40	8			
0.40-0.50	6			
0.50-0.60	4		42.42	0.50
0.60-0.70	4			
0.70-0.80	4			
0.80-0.90	20			
0.90-1.00	20			
1.00-1.10	20		41.92	1.00
			41.42	1.50
			40.92	2.00
			40.42	2.50
			39.92	3.00
			39.42	3.50
			38.92	4.00
			38.42	4.50
			37.92	5.00

Blows for Depth Increment



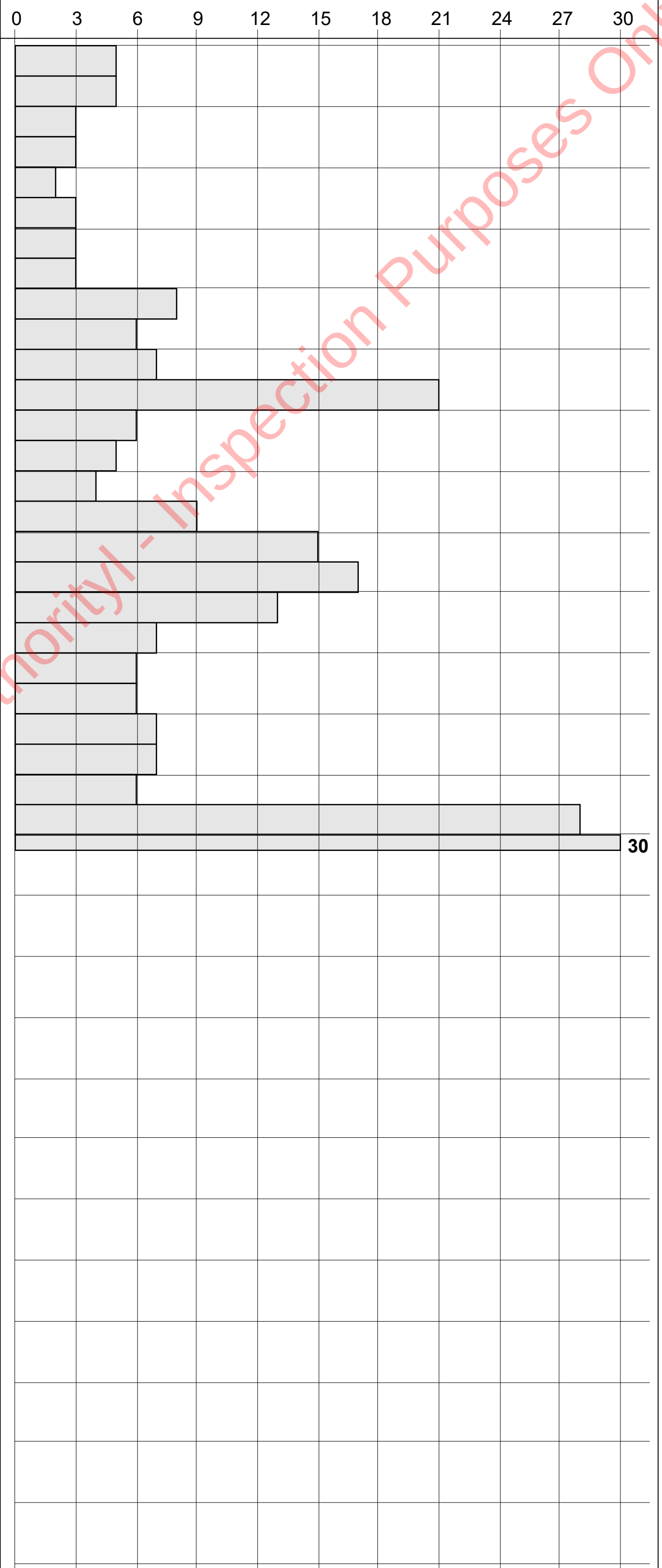
Remarks	Scale (approx)	Logged By
Refusal at 1.10m BGL	1:25	CMP
	Figure No. 12205-09-22.DP-11	

Ground Investigations Ireland Ltd www.gii.ie	Site Cornamaddy Athlone Northern Site	Probe Number **DP-12**

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	44.30	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606427.7 E 742916.5 N	21/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	5	
0.10-0.20	5	
0.20-0.30	3	
0.30-0.40	3	
0.40-0.50	2	
0.50-0.60	3	
0.60-0.70	3	
0.70-0.80	3	
0.80-0.90	8	
0.90-1.00	6	
1.00-1.10	7	
1.10-1.20	21	
1.20-1.30	6	
1.30-1.40	5	
1.40-1.50	4	
1.50-1.60	9	
1.60-1.70	15	
1.70-1.80	17	
1.80-1.90	13	
1.90-2.00	7	
2.00-2.10	6	
2.10-2.20	6	
2.20-2.30	7	
2.30-2.40	7	
2.40-2.50	6	
2.50-2.60	28	
2.60-2.65	30	

Level (mOD)	Depth (m)
44.30	0.00
43.80	0.50
43.30	1.00
42.80	1.50
42.30	2.00
41.80	2.50
41.30	3.00
40.80	3.50
40.30	4.00
39.80	4.50
39.30	5.00



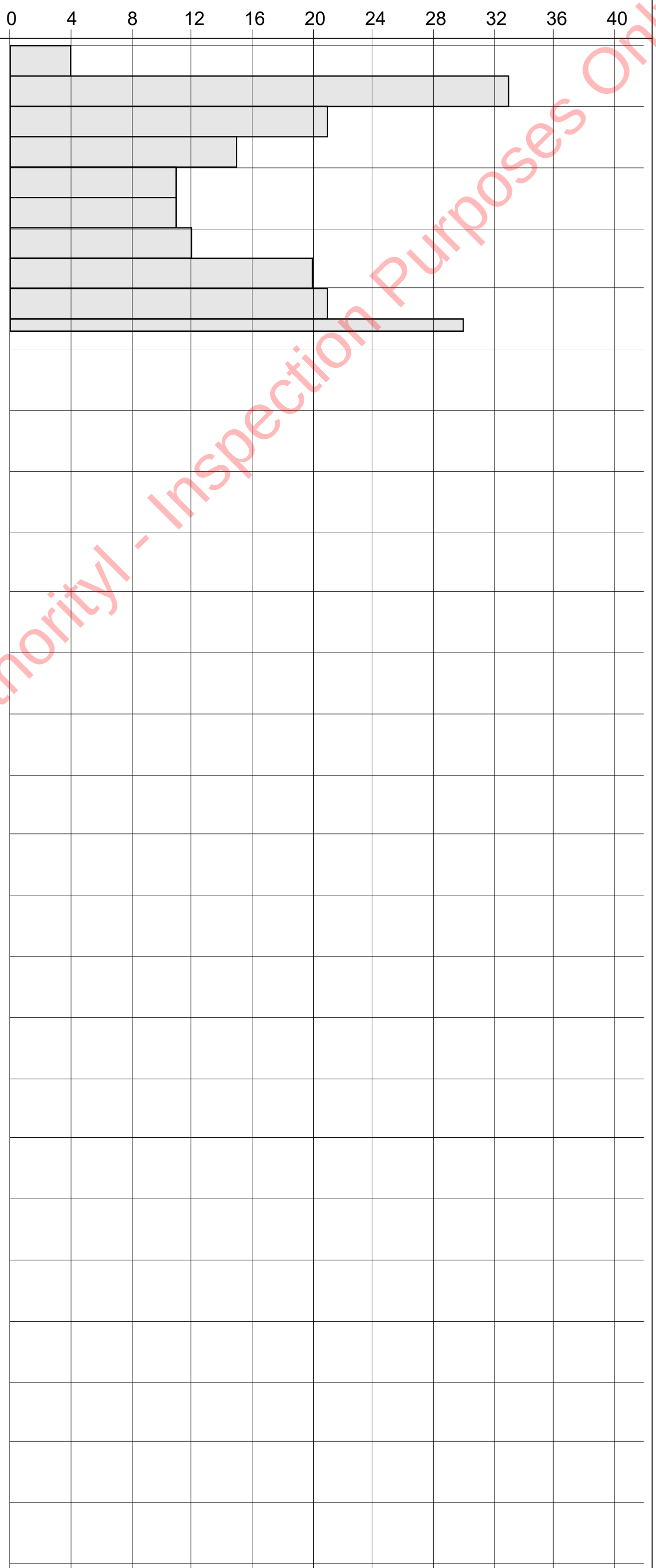
Remarks
Refusal at 2.65m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-12

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Probe Number: DP-13
Method: Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Cone Dimensions: Diameter 43.70mm	Ground Level (mOD): 42.87	Client: AKM Design	Job Number: 12205-09-22
	Location: 606118 E 743095.8 N	Dates: 19/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	4		42.87	0.00
0.10-0.20	33			
0.20-0.30	21			
0.30-0.40	15			
0.40-0.50	11			
0.50-0.60	11		42.37	0.50
0.60-0.70	12			
0.70-0.80	20			
0.80-0.90	21			
0.90-0.94	30			
			41.87	1.00
			41.37	1.50
			40.87	2.00
			40.37	2.50
			39.87	3.00
			39.37	3.50
			38.87	4.00
			38.37	4.50
			37.87	5.00



Remarks
Refusal at 0.94m BGL

Scale (approx)	Logged By
1:25	CMP

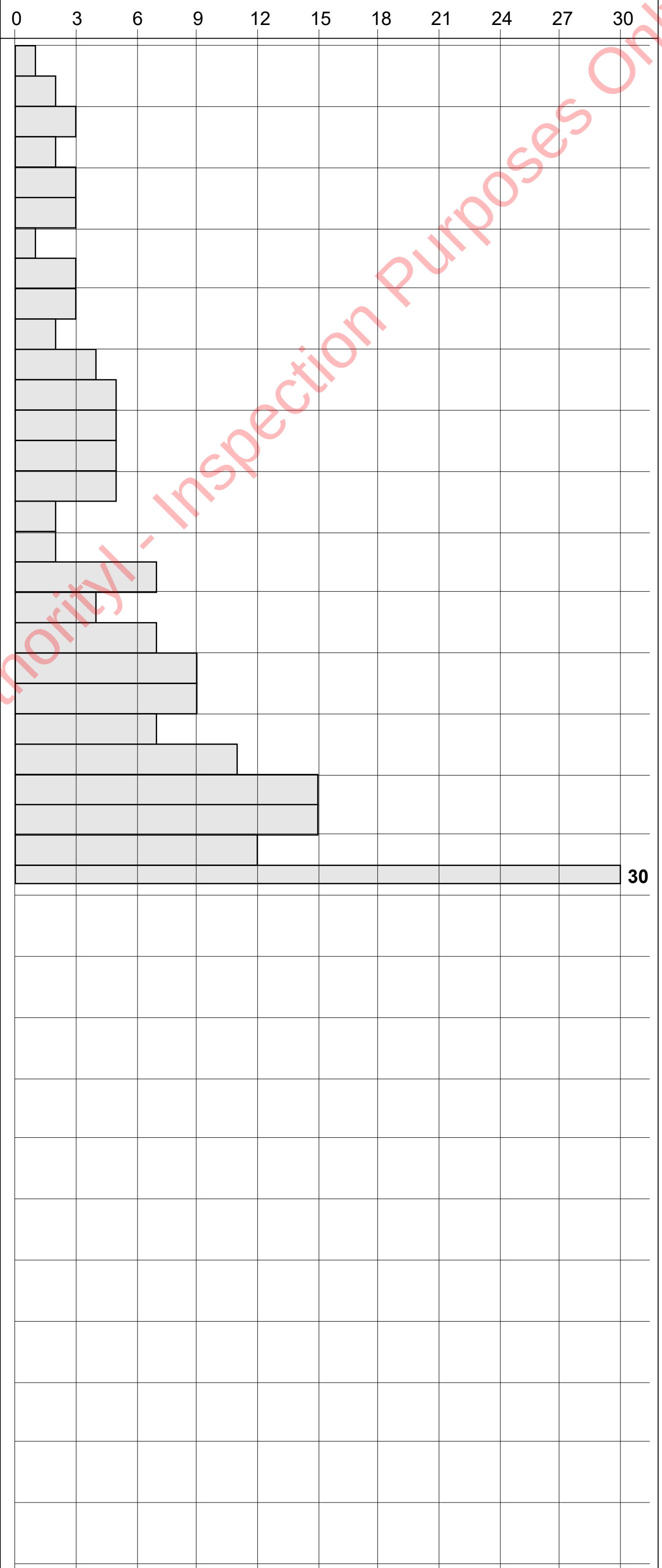
Figure No.
12205-09-22.DP-13

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Probe Number **DP-14**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 40.91	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606082.3 E 743089.4 N	**Dates** 19/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	1	
0.10-0.20	2	
0.20-0.30	3	
0.30-0.40	2	
0.40-0.50	3	
0.50-0.60	3	
0.60-0.70	1	
0.70-0.80	3	
0.80-0.90	3	
0.90-1.00	2	
1.00-1.10	4	
1.10-1.20	5	
1.20-1.30	5	
1.30-1.40	5	
1.40-1.50	5	
1.50-1.60	2	
1.60-1.70	2	
1.70-1.80	7	
1.80-1.90	4	
1.90-2.00	7	
2.00-2.10	9	
2.10-2.20	9	
2.20-2.30	7	
2.30-2.40	11	
2.40-2.50	15	
2.50-2.60	15	
2.60-2.70	12	
2.70-2.76	30	

Level (mOD)	Depth (m)
40.91	0.00
40.41	0.50
39.91	1.00
39.41	1.50
38.91	2.00
38.41	2.50
37.91	3.00
37.41	3.50
36.91	4.00
36.41	4.50
35.91	5.00

Blows for Depth Increment



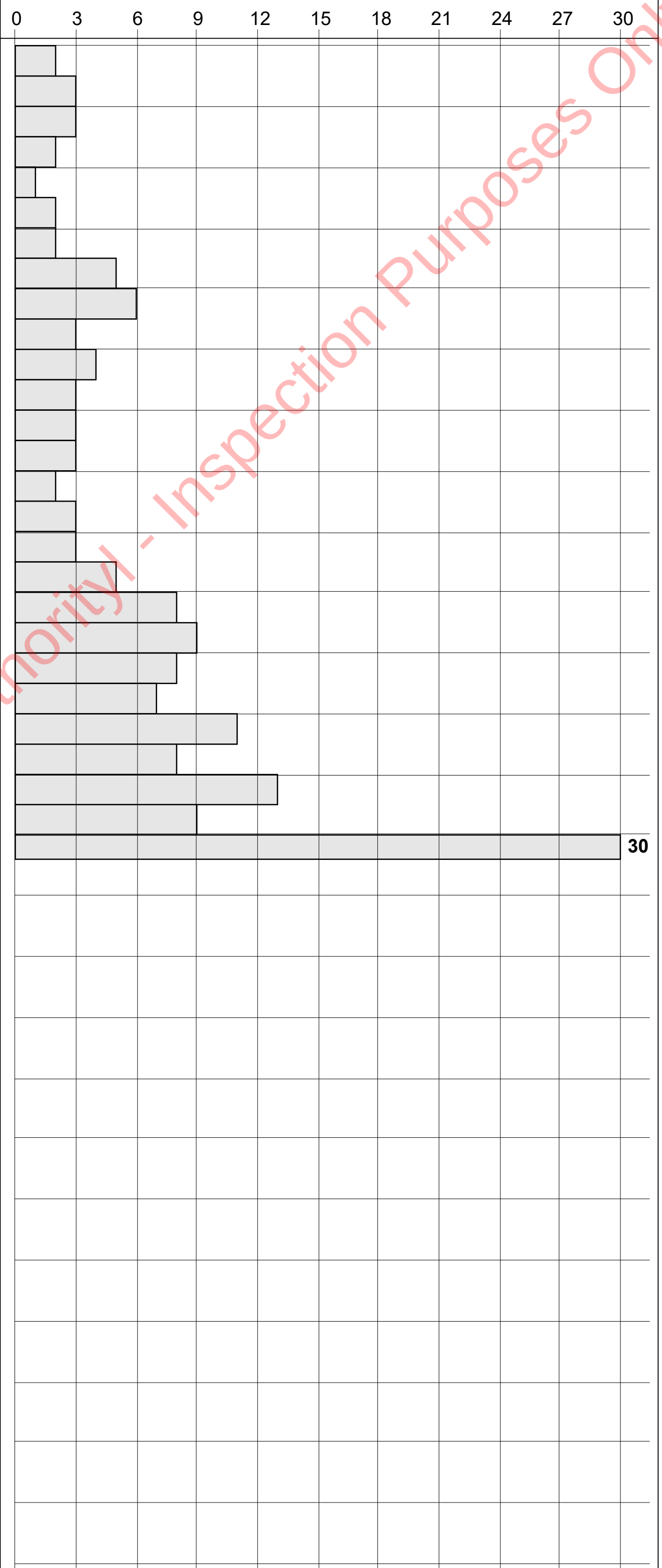
Remarks Refusal at 2.76m BGL	**Scale (approx)** 1:25	**Logged By** CMP
	Figure No. 12205-09-22.DP-14	

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Probe Number: **DP-15**

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.99	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606068.4 E 743118 N	19/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	2	
0.10-0.20	3	
0.20-0.30	3	
0.30-0.40	2	
0.40-0.50	1	
0.50-0.60	2	
0.60-0.70	2	
0.70-0.80	5	
0.80-0.90	6	
0.90-1.00	3	
1.00-1.10	4	
1.10-1.20	3	
1.20-1.30	3	
1.30-1.40	3	
1.40-1.50	2	
1.50-1.60	3	
1.60-1.70	3	
1.70-1.80	5	
1.80-1.90	8	
1.90-2.00	9	
2.00-2.10	8	
2.10-2.20	7	
2.20-2.30	11	
2.30-2.40	8	
2.40-2.50	13	
2.50-2.60	9	
2.60-2.68	30	

Level (mOD)	Depth (m)
40.99	0.00
40.49	0.50
39.99	1.00
39.49	1.50
38.99	2.00
38.49	2.50
37.99	3.00
37.49	3.50
36.99	4.00
36.49	4.50
35.99	5.00



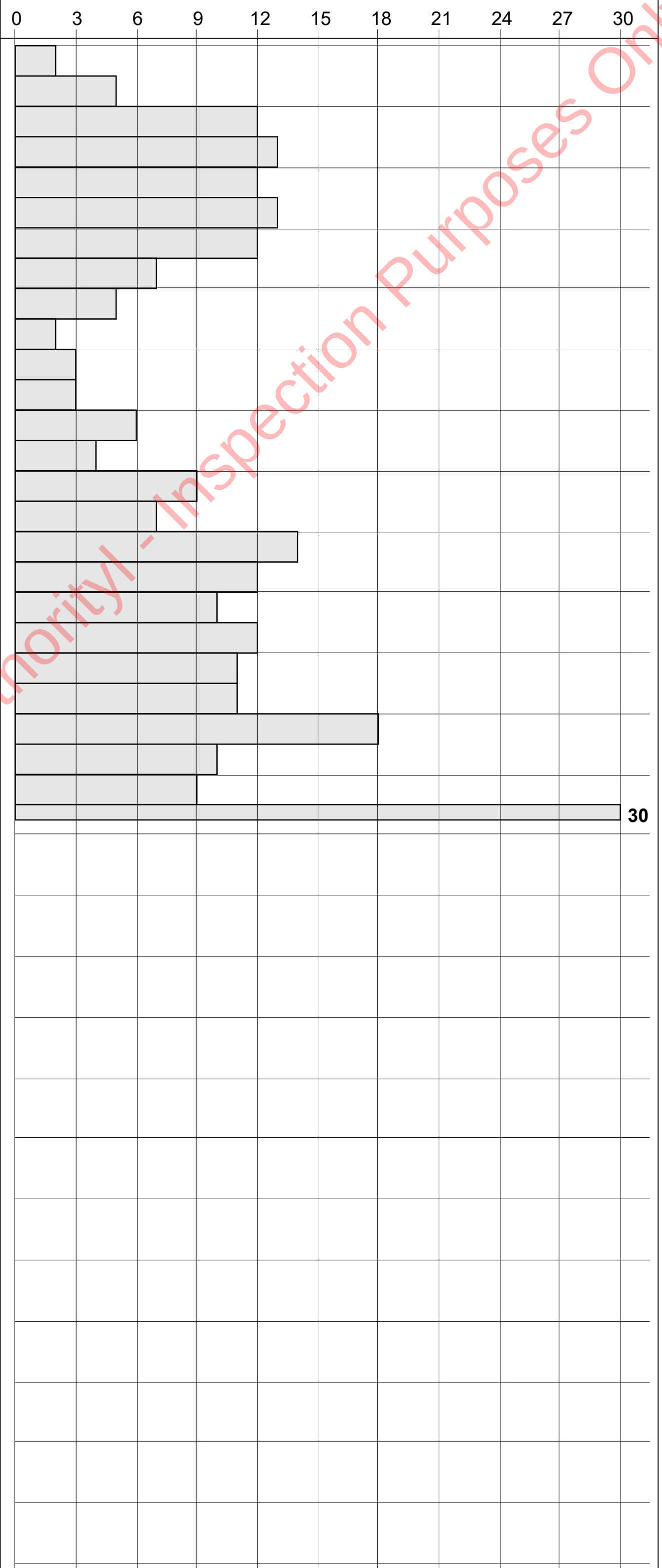
Remarks	Scale (approx)	Logged By
Refusal at 2.68m BGL	1:25	CMP
	Figure No. 12205-09-22.DP-15	

Ground Investigations Ireland Ltd www.gii.ie		**Site** Cornamaddy Athlone Northern Site	**Probe Number** DP-16
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 41.82	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606098.8 E 743121.5 N	**Dates** 19/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	2	
0.10-0.20	5	
0.20-0.30	12	
0.30-0.40	13	
0.40-0.50	12	
0.50-0.60	13	
0.60-0.70	12	
0.70-0.80	7	
0.80-0.90	5	
0.90-1.00	2	
1.00-1.10	3	
1.10-1.20	3	
1.20-1.30	6	
1.30-1.40	4	
1.40-1.50	9	
1.50-1.60	7	
1.60-1.70	14	
1.70-1.80	12	
1.80-1.90	10	
1.90-2.00	12	
2.00-2.10	11	
2.10-2.20	11	
2.20-2.30	18	
2.30-2.40	10	
2.40-2.50	9	
2.50-2.55	30	

Level (mOD)	Depth (m)
41.82	0.00
41.32	0.50
40.82	1.00
40.32	1.50
39.82	2.00
39.32	2.50
38.82	3.00
38.32	3.50
37.82	4.00
37.32	4.50
36.82	5.00

Blows for Depth Increment



Remarks
Refusal at 2.55m BGL

Scale (approx)	Logged By
1:25	CMP

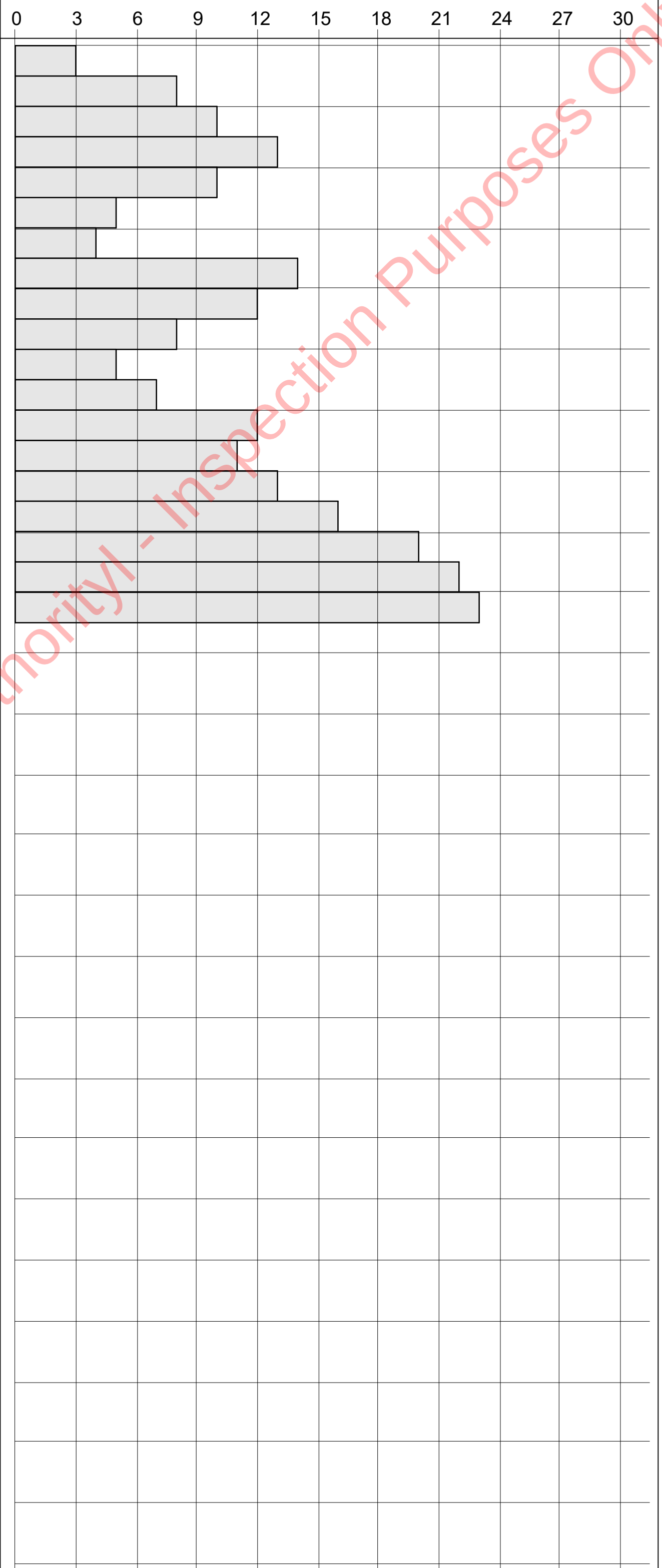
Figure No.
12205-09-22.DP-16

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Probe Number: **DP-17**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 43.65	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606131.4 E 743123.4 N	**Dates** 19/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	3	
0.10-0.20	8	
0.20-0.30	10	
0.30-0.40	13	
0.40-0.50	10	
0.50-0.60	5	
0.60-0.70	4	
0.70-0.80	14	
0.80-0.90	12	
0.90-1.00	8	
1.00-1.10	5	
1.10-1.20	7	
1.20-1.30	12	
1.30-1.40	11	
1.40-1.50	13	
1.50-1.60	16	
1.60-1.70	20	
1.70-1.80	22	
1.80-1.90	23	

Level (mOD)	Depth (m)
43.65	0.00
43.15	0.50
42.65	1.00
42.15	1.50
41.65	2.00
41.15	2.50
40.65	3.00
40.15	3.50
39.65	4.00
39.15	4.50
38.65	5.00

Blows for Depth Increment



Remarks
Refusal at 1.90m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No. 12205-09-22.DP-17

Ground Investigations Ireland Ltd
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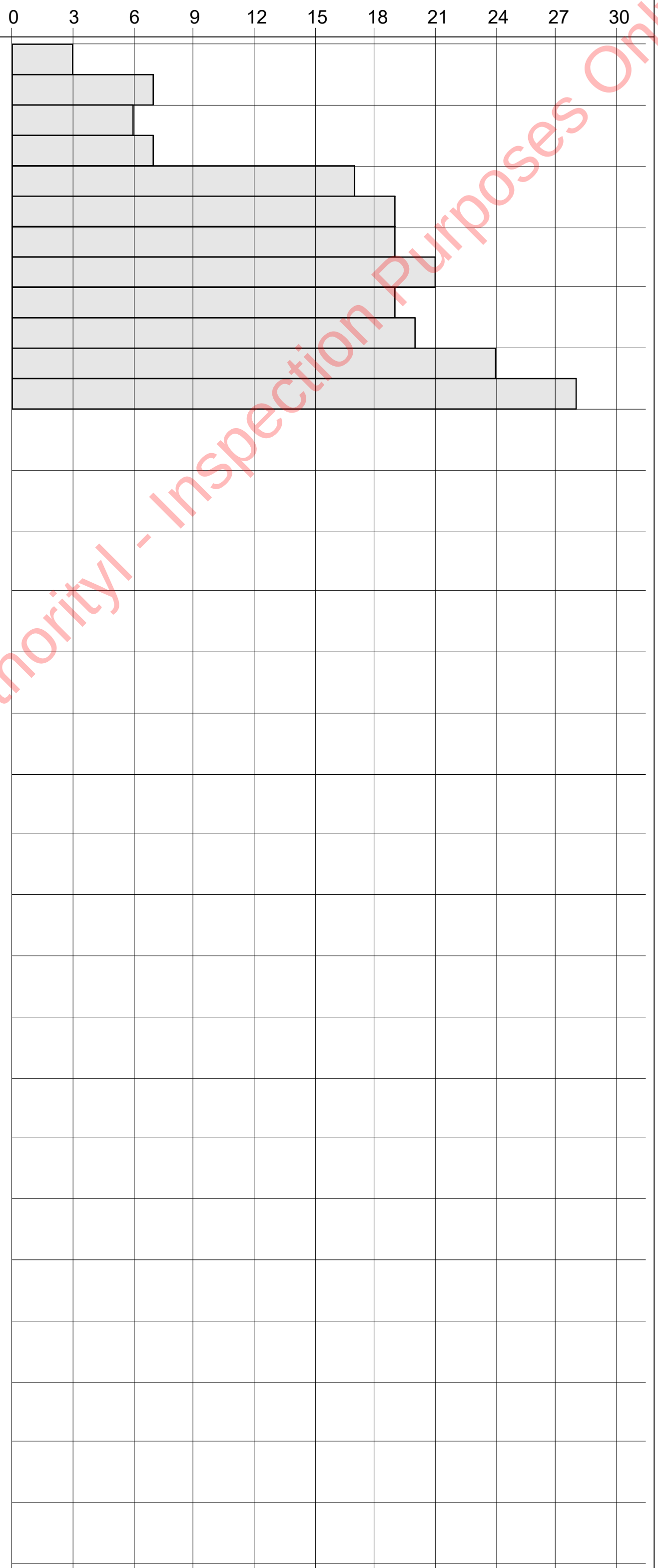
Method	Cone Dimensions	Ground Level (mOD)	Site	Probe Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	42.63	Cornamaddy Athlone Northern Site	DP-18
	Location	**Dates**	**Client**	**Job Number**
	606126.1 E 743157.6 N	19/10/2022	AKM Design	12205-09-22
			Engineer	**Sheet**
				1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		42.63	0.00
0.10-0.20	7			
0.20-0.30	6			
0.30-0.40	7			
0.40-0.50	17			
0.50-0.60	19		42.13	0.50
0.60-0.70	19			
0.70-0.80	21			
0.80-0.90	19			
0.90-1.00	20			
1.00-1.10	24		41.63	1.00
1.10-1.20	28			
			41.13	1.50
			40.63	2.00
			40.13	2.50
			39.63	3.00
			39.13	3.50
			38.63	4.00
			38.13	4.50
			37.63	5.00

Blows for Depth Increment



Remarks
Refusal at 1.20m BGL

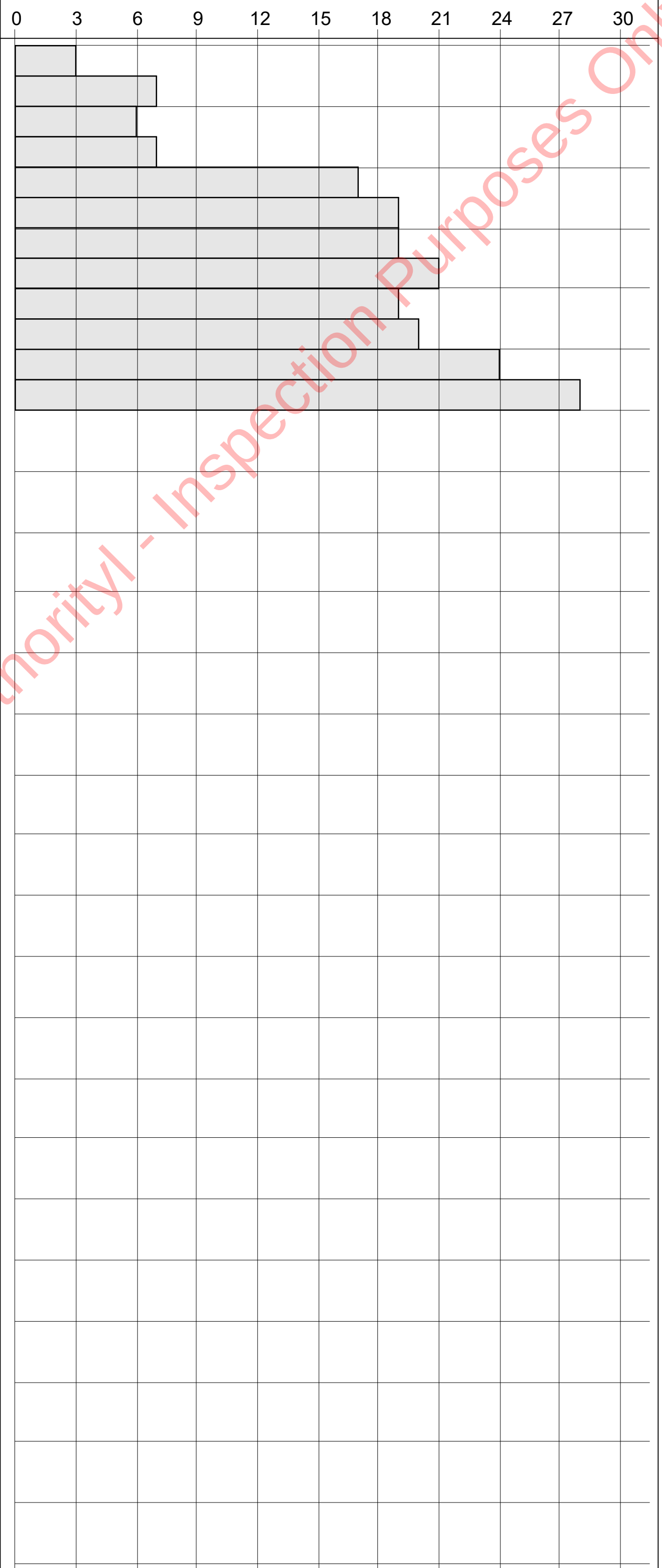
Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-18

Ground Investigations Ireland Ltd www.gii.ie		**Site** Cornamaddy Athlone Northern Site	**Probe Number** **DP-19**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 41.91	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606104.4 E 743164.5 N	**Dates** 19/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		41.91	0.00
0.10-0.20	7			
0.20-0.30	6			
0.30-0.40	7			
0.40-0.50	17			
0.50-0.60	19		41.41	0.50
0.60-0.70	19			
0.70-0.80	21			
0.80-0.90	19			
0.90-1.00	20			
1.00-1.10	24		40.91	1.00
1.10-1.20	28			
			40.41	1.50
			39.91	2.00
			39.41	2.50
			38.91	3.00
			38.41	3.50
			37.91	4.00
			37.41	4.50
			36.91	5.00

Blows for Depth Increment



Remarks
Refusal at 1.20m BGL

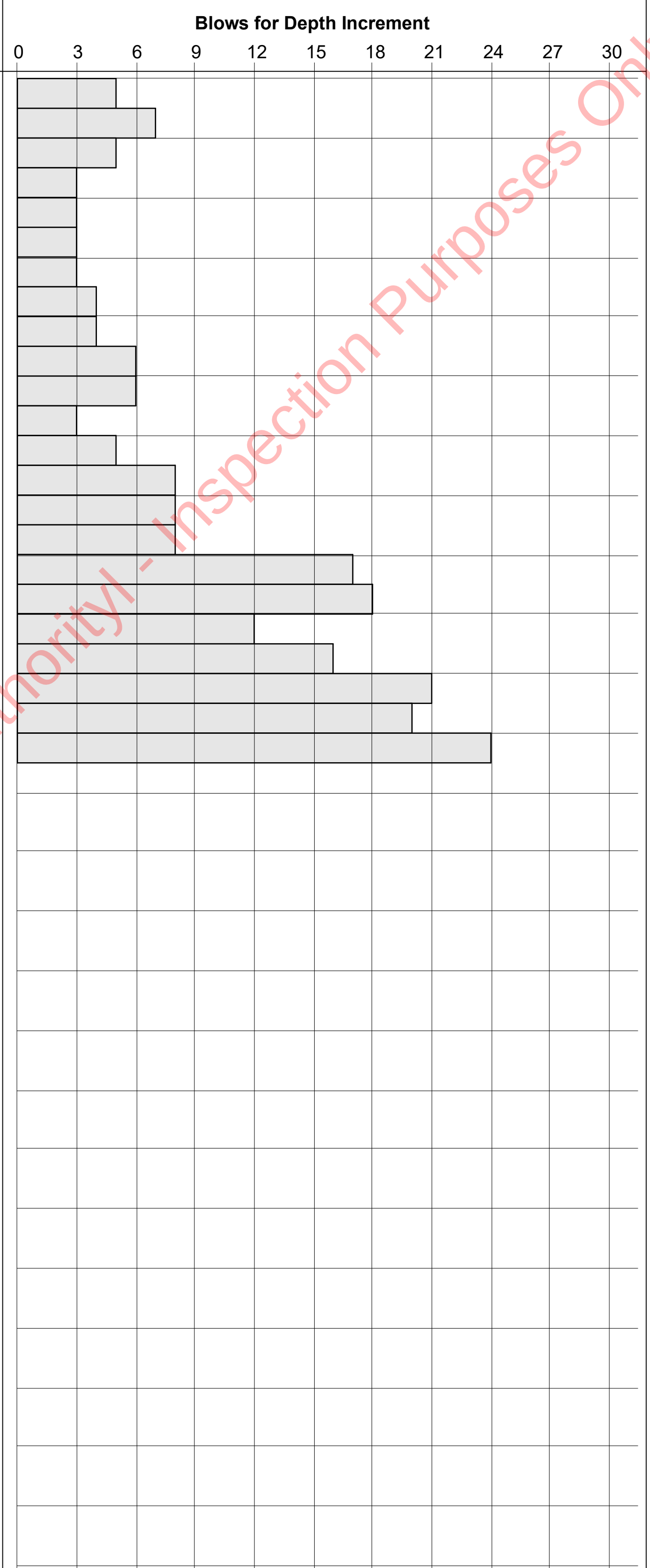
Scale (approx)	**Logged By**
1:25	CMP

Figure No.
12205-09-22.DP-19

Ground Investigations Ireland Ltd www.gii.ie		**Site** Cornamaddy Athlone Northern Site	**Probe Number** DP-20
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 41.22	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606118.2 E 743193.3 N	**Dates** 19/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	5	
0.10-0.20	7	
0.20-0.30	5	
0.30-0.40	3	
0.40-0.50	3	
0.50-0.60	3	
0.60-0.70	3	
0.70-0.80	4	
0.80-0.90	4	
0.90-1.00	6	
1.00-1.10	6	
1.10-1.20	3	
1.20-1.30	5	
1.30-1.40	8	
1.40-1.50	8	
1.50-1.60	8	
1.60-1.70	17	
1.70-1.80	18	
1.80-1.90	12	
1.90-2.00	16	
2.00-2.10	21	
2.10-2.20	20	
2.20-2.30	24	

Level (mOD)	Depth (m)
41.22	0.00
40.72	0.50
40.22	1.00
39.72	1.50
39.22	2.00
38.72	2.50
38.22	3.00
37.72	3.50
37.22	4.00
36.72	4.50
36.22	5.00



Remarks Refusal at 2.30m BGL	**Scale (approx)** 1:25	**Logged By** CMP
	Figure No. 12205-09-22.DP-20	

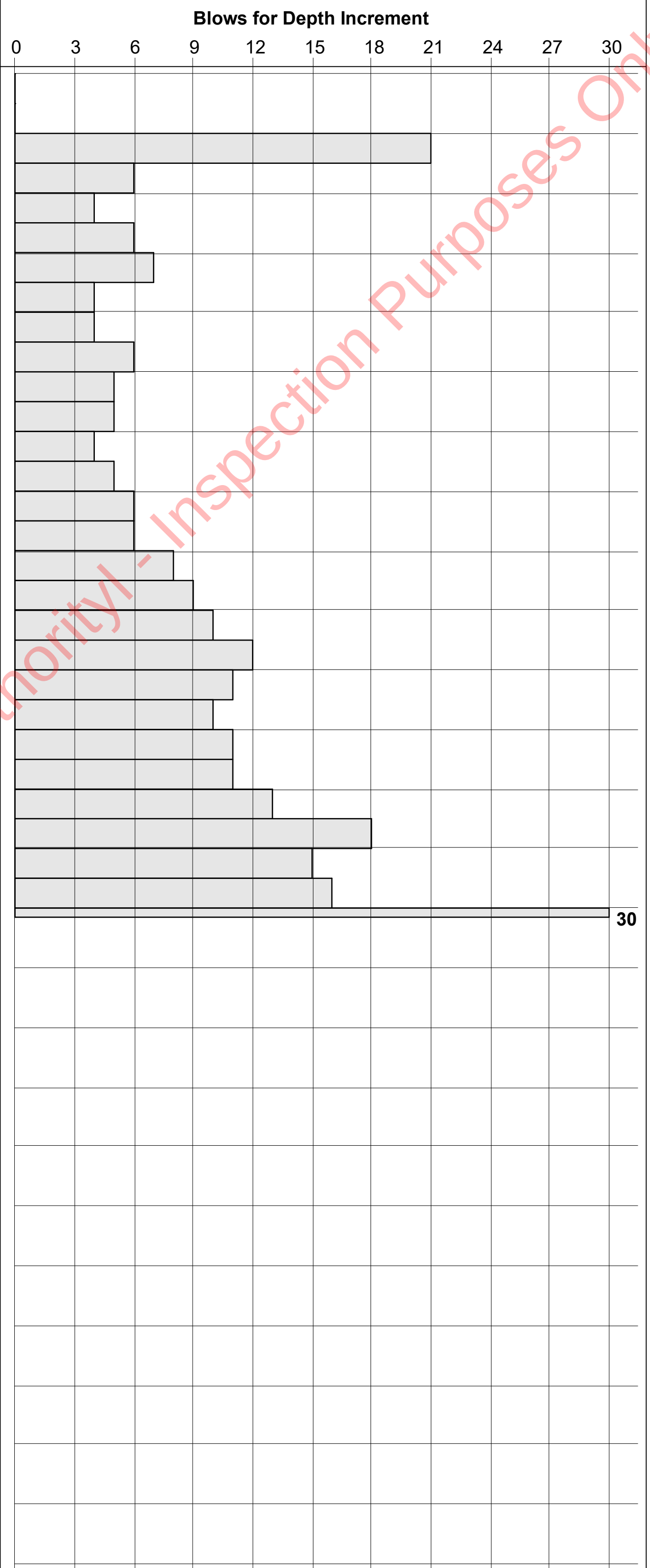
Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Cornamaddy Athlone Northern Site	DP-21

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.73	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606088.6 E 743199.6 N	19/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	21	
0.30-0.40	6	
0.40-0.50	4	
0.50-0.60	6	
0.60-0.70	7	
0.70-0.80	4	
0.80-0.90	4	
0.90-1.00	6	
1.00-1.10	5	
1.10-1.20	5	
1.20-1.30	4	
1.30-1.40	5	
1.40-1.50	6	
1.50-1.60	6	
1.60-1.70	8	
1.70-1.80	9	
1.80-1.90	10	
1.90-2.00	12	
2.00-2.10	11	
2.10-2.20	10	
2.20-2.30	11	
2.30-2.40	11	
2.40-2.50	13	
2.50-2.60	18	
2.60-2.70	15	
2.70-2.80	16	
2.80-2.83	30	

Level (mOD)	Depth (m)
40.73	0.00
40.23	0.50
39.73	1.00
39.23	1.50
38.73	2.00
38.23	2.50
37.73	3.00
37.23	3.50
36.73	4.00
36.23	4.50
35.73	5.00



Remarks
Refusal at 2.83m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-21

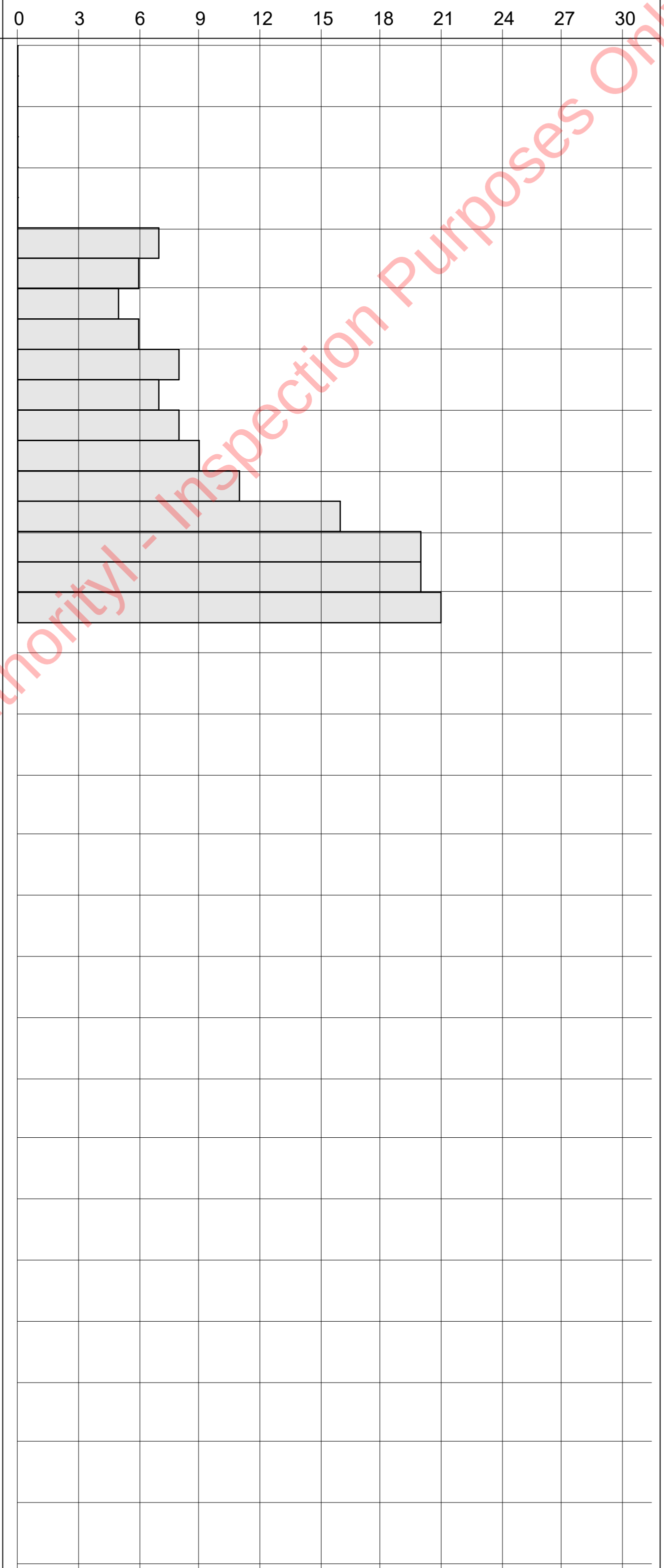
Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Cornamaddy Athlone Northern Site	DP-22

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.53	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606104.4 E 743223.1 N	19/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	0		40.53	0.00
0.10-0.20	0			
0.20-0.30	0			
0.30-0.40	0			
0.40-0.50	0			
0.50-0.60	0		40.03	0.50
0.60-0.70	7			
0.70-0.80	6			
0.80-0.90	5			
0.90-1.00	6			
1.00-1.10	8		39.53	1.00
1.10-1.20	7			
1.20-1.30	8			
1.30-1.40	9			
1.40-1.50	11			
1.50-1.60	16		39.03	1.50
1.60-1.70	20			
1.70-1.80	20			
1.80-1.90	21			
			38.53	2.00
			38.03	2.50
			37.53	3.00
			37.03	3.50
			36.53	4.00
			36.03	4.50
			35.53	5.00

Blows for Depth Increment



Remarks
Refusal at 1.90m BGL

Scale (approx)	Logged By
1:25	CMP

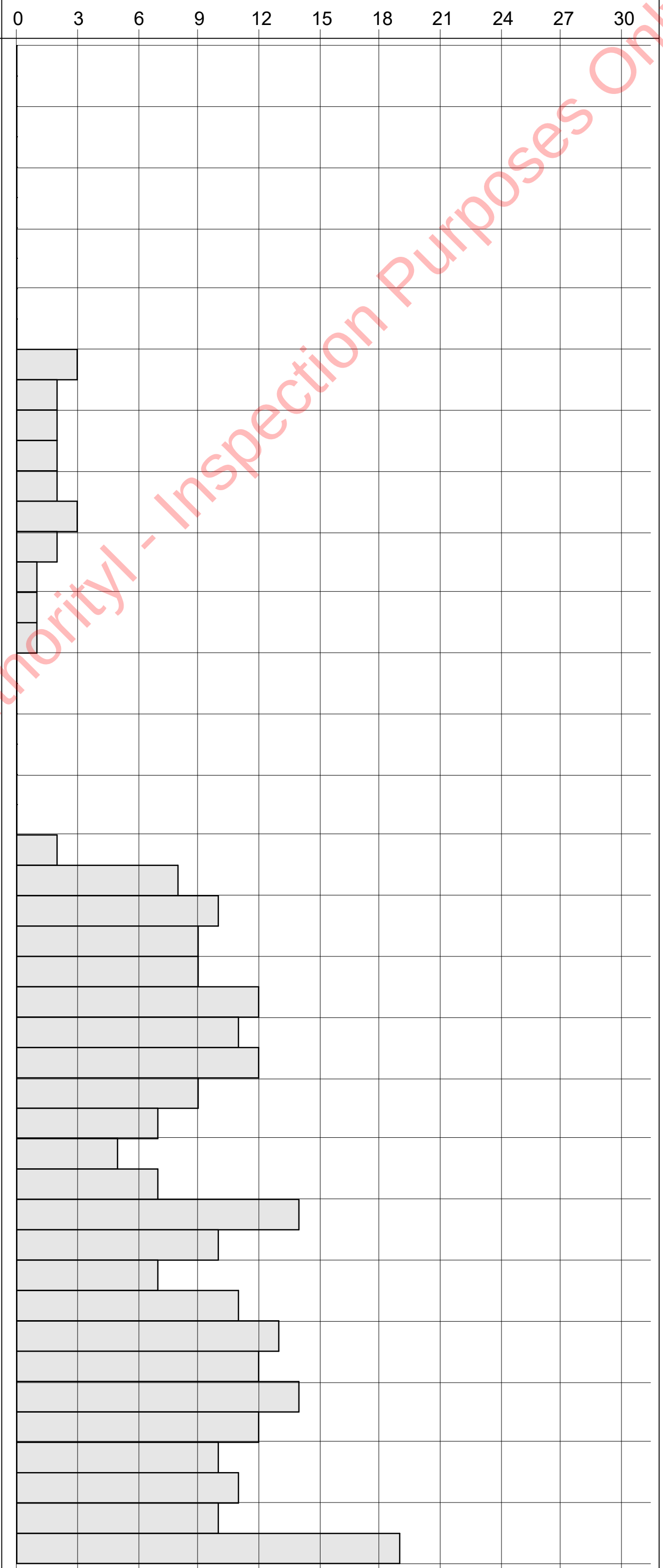
Figure No.
12205-09-22.DP-22

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Probe Number **DP-23**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 40.24	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606095.2 E 743265.5 N	**Dates** 19/10/2022	**Engineer**	**Sheet** 1/2

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	0	
0.70-0.80	0	
0.80-0.90	0	
0.90-1.00	0	
1.00-1.10	3	
1.10-1.20	2	
1.20-1.30	2	
1.30-1.40	2	
1.40-1.50	2	
1.50-1.60	3	
1.60-1.70	2	
1.70-1.80	1	
1.80-1.90	1	
1.90-2.00	1	
2.00-2.10	0	
2.10-2.20	0	
2.20-2.30	0	
2.30-2.40	0	
2.40-2.50	0	
2.50-2.60	0	
2.60-2.70	2	
2.70-2.80	8	
2.80-2.90	10	
2.90-3.00	9	
3.00-3.10	9	
3.10-3.20	12	
3.20-3.30	11	
3.30-3.40	12	
3.40-3.50	9	
3.50-3.60	7	
3.60-3.70	5	
3.70-3.80	7	
3.80-3.90	14	
3.90-4.00	10	
4.00-4.10	7	
4.10-4.20	11	
4.20-4.30	13	
4.30-4.40	12	
4.40-4.50	14	
4.50-4.60	12	
4.60-4.70	10	
4.70-4.80	11	
4.80-4.90	10	
4.90-5.00	19	

Level (mOD)	Depth (m)
40.24	0.00
39.74	0.50
39.24	1.00
38.74	1.50
38.24	2.00
37.74	2.50
37.24	3.00
36.74	3.50
36.24	4.00
35.74	4.50
35.24	5.00

Blows for Depth Increment



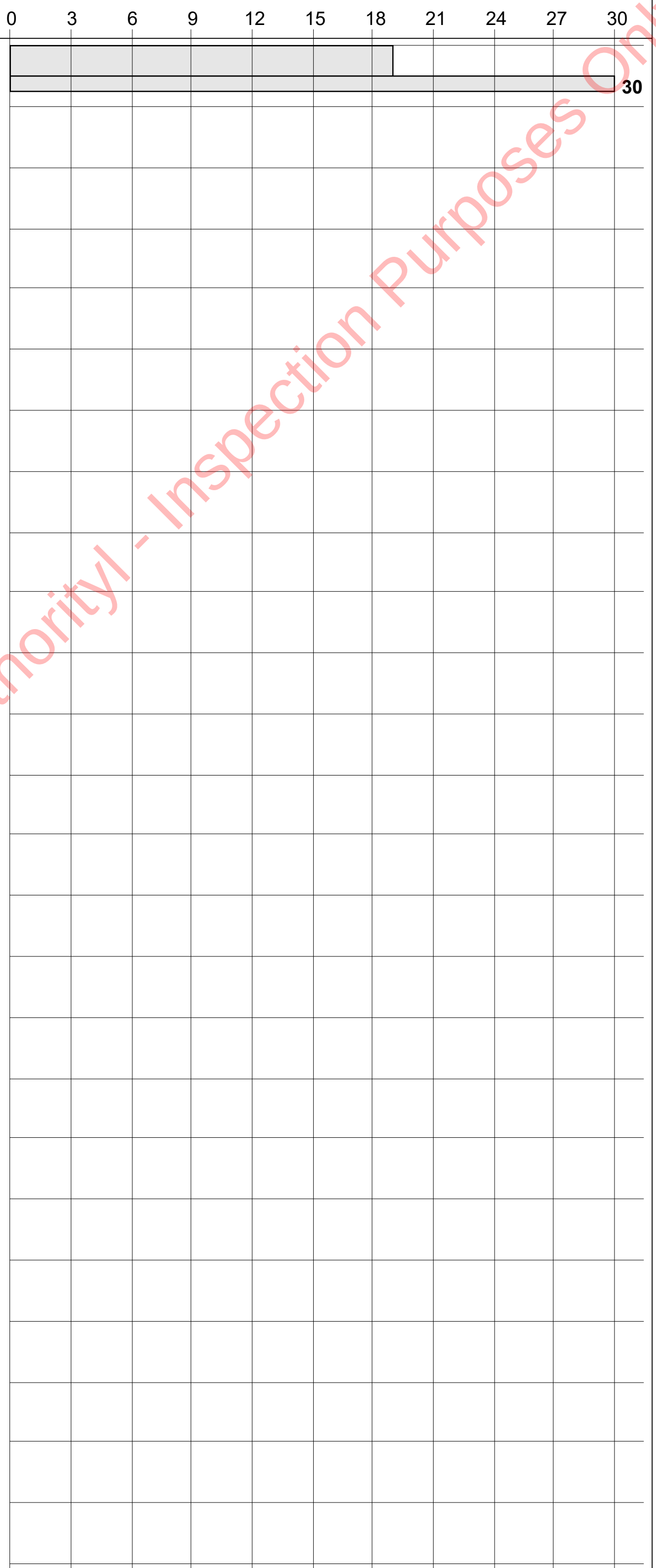
Remarks
Refusal at 5.15m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-23

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Probe Number: DP-23
Method: Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Cone Dimensions: Diameter 43.70mm	Ground Level (mOD): 40.24	Client: AKM Design	Job Number: 12205-09-22
	Location: 606095.2 E 743265.5 N	Dates: 19/10/2022	Engineer:	Sheet: 2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
5.00-5.10	19		35.24	5.00
5.10-5.15	30			
			34.74	5.50
			34.24	6.00
			33.74	6.50
			33.24	7.00
			32.74	7.50
			32.24	8.00
			31.74	8.50
			31.24	9.00
			30.74	9.50
			30.24	10.00

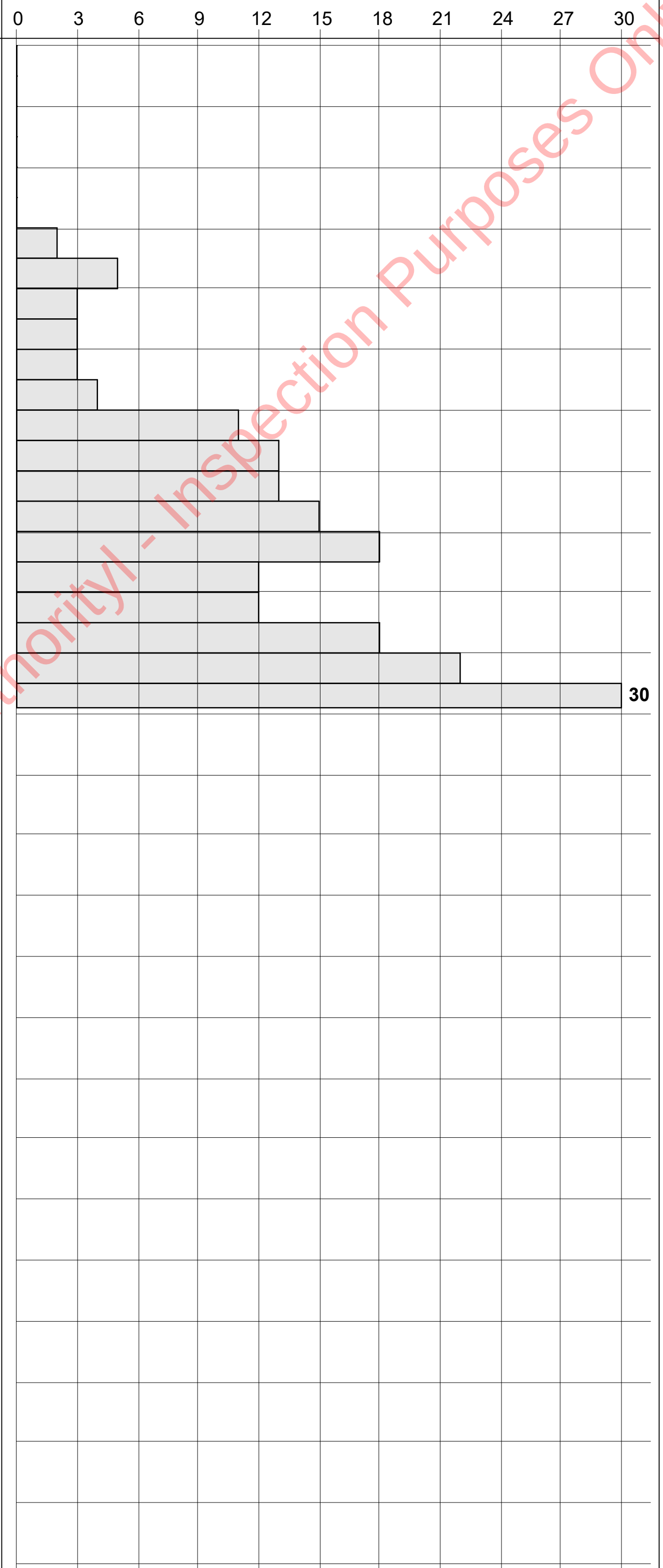


Remarks	Scale (approx): 1:25	Logged By: CMP
	Figure No.: 12205-09-22.DP-23	

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Probe Number: DP-24
Method: Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Cone Dimensions: Diameter 43.70mm	Ground Level (mOD): 40.45	Client: AKM Design	Job Number: 12205-09-22
	Location: 606072.1 E 743270.4 N	Dates: 19/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	0		40.45	0.00
0.10-0.20	0			
0.20-0.30	0			
0.30-0.40	0			
0.40-0.50	0			
0.50-0.60	0		39.95	0.50
0.60-0.70	2			
0.70-0.80	5			
0.80-0.90	3			
0.90-1.00	3			
1.00-1.10	3		39.45	1.00
1.10-1.20	4			
1.20-1.30	11			
1.30-1.40	13			
1.40-1.50	13			
1.50-1.60	15		38.95	1.50
1.60-1.70	18			
1.70-1.80	12			
1.80-1.90	12			
1.90-2.00	18			
2.00-2.10	22		38.45	2.00
2.10-2.18	30			
			37.95	2.50
			37.45	3.00
			36.95	3.50
			36.45	4.00
			35.95	4.50
			35.45	5.00

Blows for Depth Increment



Remarks
Refusal at 2.18m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No. 12205-09-22.DP-24

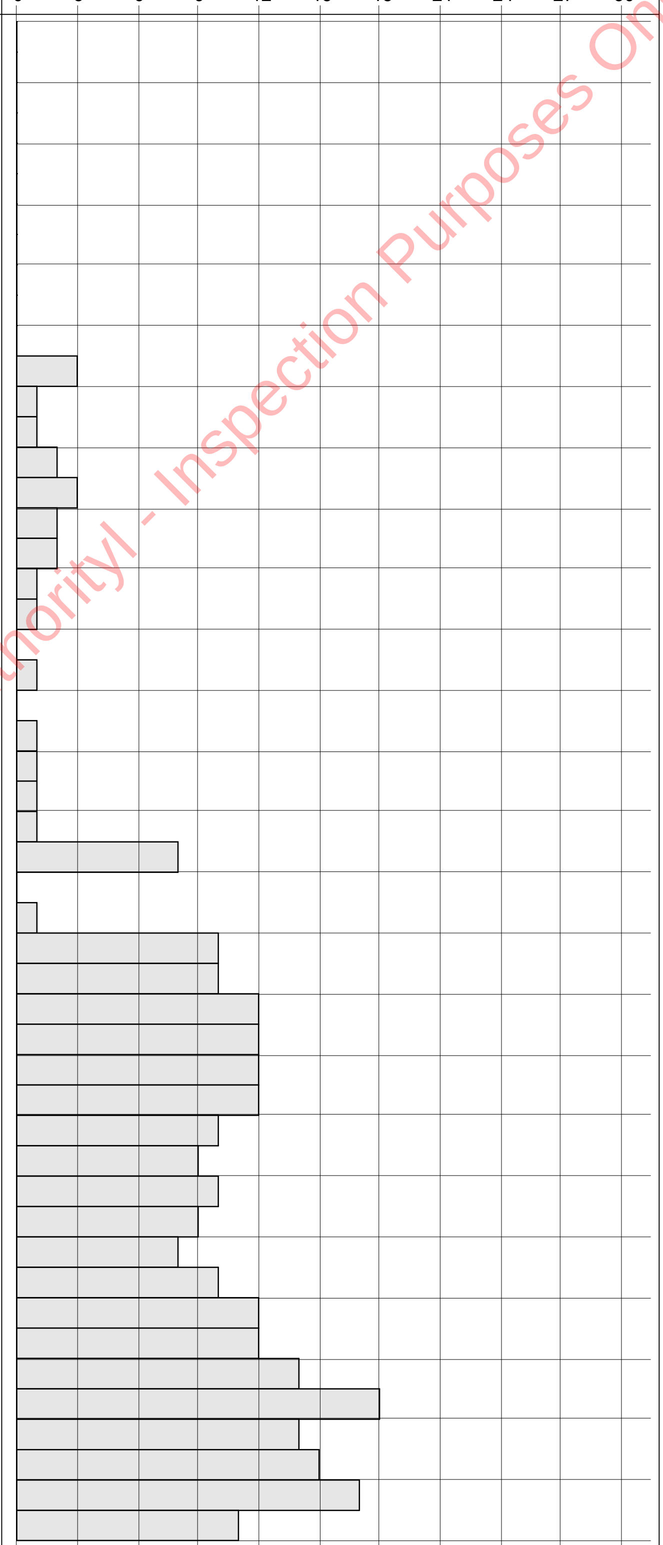
Ground Investigations Ireland Ltd www.gii.ie	Site Cornamaddy Athlone Northern Site	Probe Number **DP-25**

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.46	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606068.8 E 743242.3 N	19/10/2022		1/2

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	0	
0.70-0.80	0	
0.80-0.90	0	
0.90-1.00	0	
1.00-1.10	0	
1.10-1.20	3	
1.20-1.30	1	
1.30-1.40	1	
1.40-1.50	2	
1.50-1.60	3	
1.60-1.70	2	
1.70-1.80	2	
1.80-1.90	1	
1.90-2.00	1	
2.00-2.10	0	
2.10-2.20	1	
2.20-2.30	0	
2.30-2.40	1	
2.40-2.50	1	
2.50-2.60	1	
2.60-2.70	1	
2.70-2.80	8	
2.80-2.90	0	
2.90-3.00	1	
3.00-3.10	10	
3.10-3.20	10	
3.20-3.30	12	
3.30-3.40	12	
3.40-3.50	12	
3.50-3.60	12	
3.60-3.70	10	
3.70-3.80	9	
3.80-3.90	10	
3.90-4.00	9	
4.00-4.10	8	
4.10-4.20	10	
4.20-4.30	12	
4.30-4.40	12	
4.40-4.50	14	
4.50-4.60	18	
4.60-4.70	14	
4.70-4.80	15	
4.80-4.90	17	
4.90-5.00	11	

Level (mOD)	Depth (m)
40.46	0.00
39.96	0.50
39.46	1.00
38.96	1.50
38.46	2.00
37.96	2.50
37.46	3.00
36.96	3.50
36.46	4.00
35.96	4.50
35.46	5.00

Blows for Depth Increment

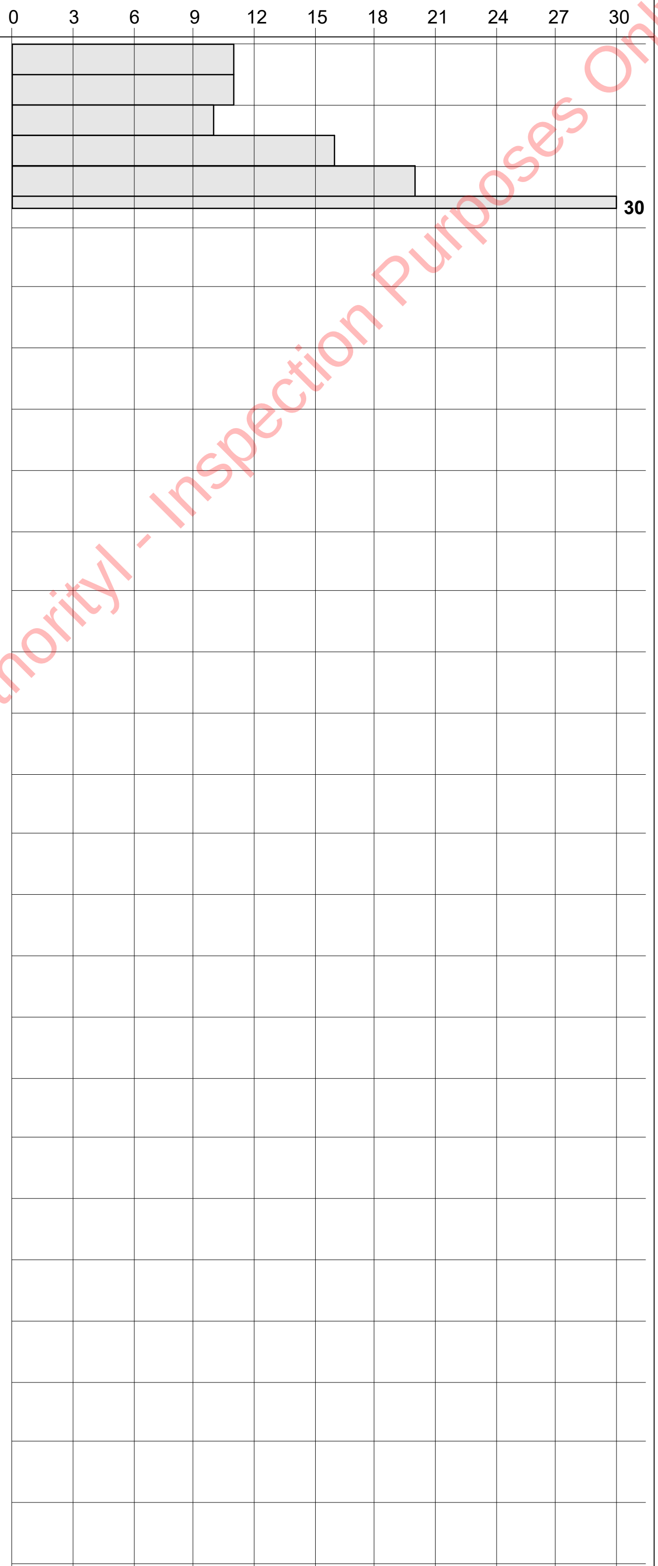


Remarks	Scale (approx)	Logged By
Refusal at 5.54m BGL	1:25	CMP
	Figure No.	
	12205-09-22.DP-25	

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Probe Number **DP-25**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 40.46	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606068.8 E 743242.3 N	**Dates** 19/10/2022	**Engineer**	**Sheet** 2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
5.00-5.10	11		35.46	5.00
5.10-5.20	11			
5.20-5.30	10			
5.30-5.40	16			
5.40-5.50	20		34.96	5.50
5.50-5.54	30			
			34.46	6.00
			33.96	6.50
			33.46	7.00
			32.96	7.50
			32.46	8.00
			31.96	8.50
			31.46	9.00
			30.96	9.50
			30.46	10.00

Blows for Depth Increment



Remarks	Scale (approx)	Logged By
	1:25	CMP
	Figure No. 12205-09-22.DP-25	

Ground Investigations Ireland Ltd
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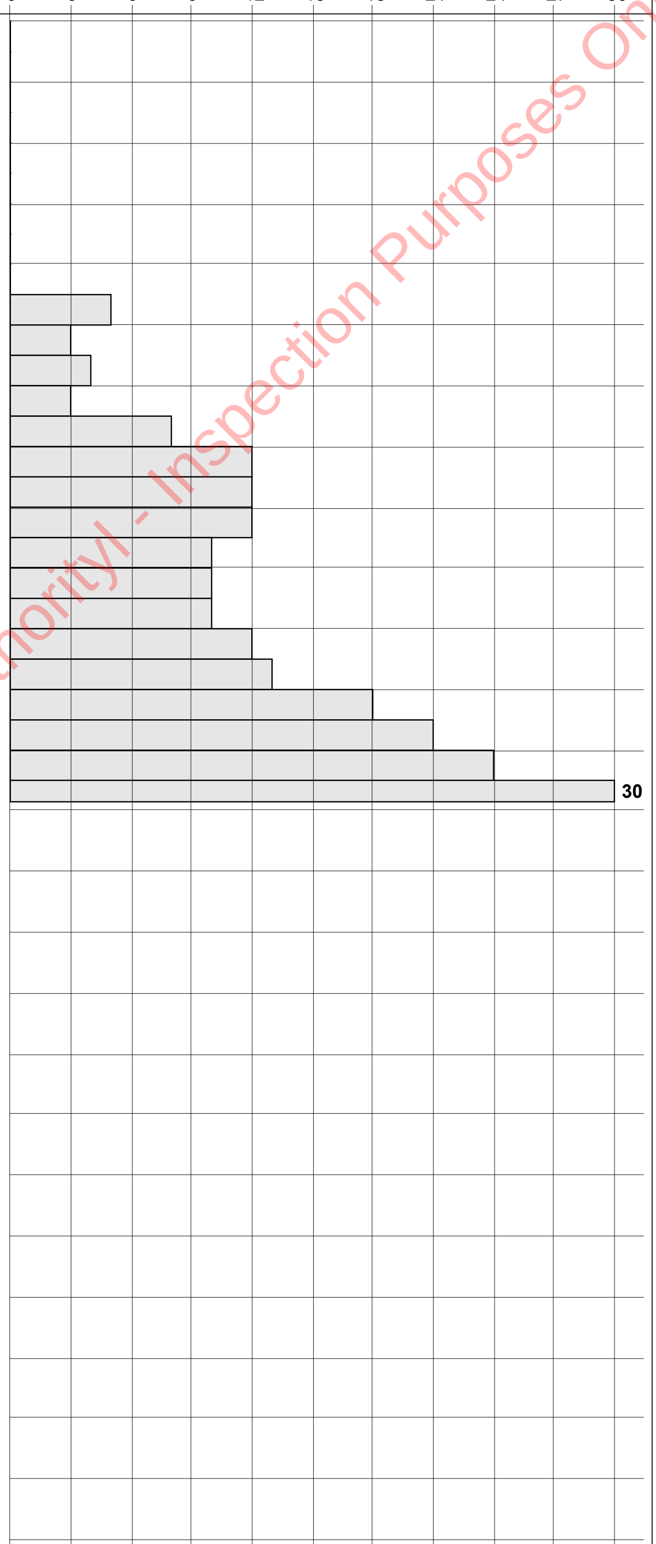
Site	Probe Number
Cornamaddy Athlone Northern Site	DP-26

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.60	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606048.9 E 743254.4 N	19/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	0	
0.70-0.80	0	
0.80-0.90	0	
0.90-1.00	5	
1.00-1.10	3	
1.10-1.20	4	
1.20-1.30	3	
1.30-1.40	8	
1.40-1.50	12	
1.50-1.60	12	
1.60-1.70	12	
1.70-1.80	10	
1.80-1.90	10	
1.90-2.00	10	
2.00-2.10	12	
2.10-2.20	13	
2.20-2.30	18	
2.30-2.40	21	
2.40-2.50	24	
2.50-2.57	30	

Level (mOD)	Depth (m)
40.60	0.00
40.10	0.50
39.60	1.00
39.10	1.50
38.60	2.00
38.10	2.50
37.60	3.00
37.10	3.50
36.60	4.00
36.10	4.50
35.60	5.00

Blows for Depth Increment



Remarks
Refusal at 2.57m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-26

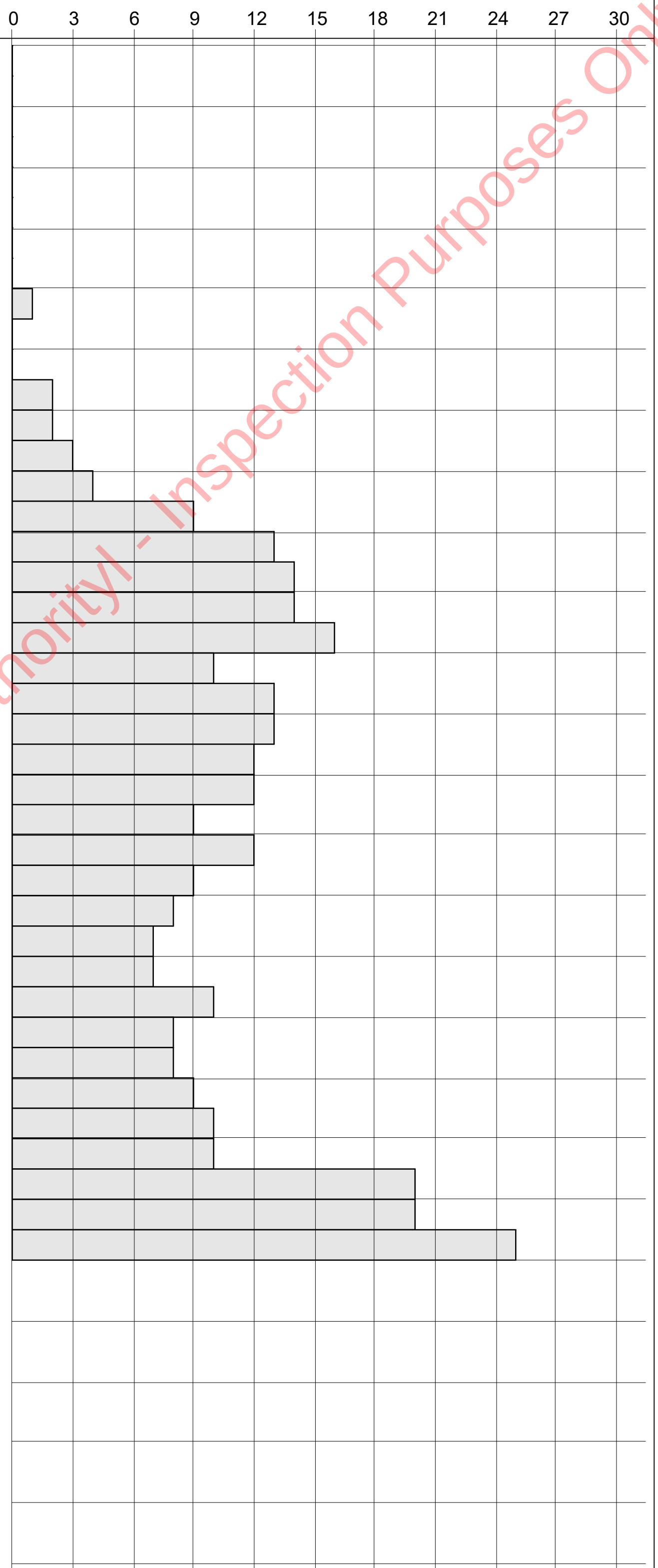
Ground Investigations Ireland Ltd
www.gii.ie

Method	Cone Dimensions	Ground Level (mOD)	Site	Probe Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.45	Cornamaddy Athlone Northern Site	DP-27
	Location	**Dates**	**Client**	**Job Number**
	606044.1 E 743223.3 N	19/10/2022	AKM Design	12205-09-22
			Engineer	**Sheet**
				1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	0	
0.70-0.80	0	
0.80-0.90	1	
0.90-1.00	0	
1.00-1.10	0	
1.10-1.20	2	
1.20-1.30	2	
1.30-1.40	3	
1.40-1.50	4	
1.50-1.60	9	
1.60-1.70	13	
1.70-1.80	14	
1.80-1.90	14	
1.90-2.00	16	
2.00-2.10	10	
2.10-2.20	13	
2.20-2.30	13	
2.30-2.40	12	
2.40-2.50	12	
2.50-2.60	9	
2.60-2.70	12	
2.70-2.80	9	
2.80-2.90	8	
2.90-3.00	7	
3.00-3.10	7	
3.10-3.20	10	
3.20-3.30	8	
3.30-3.40	8	
3.40-3.50	9	
3.50-3.60	10	
3.60-3.70	10	
3.70-3.80	20	
3.80-3.90	20	
3.90-4.00	25	

Level (mOD)	Depth (m)
40.45	0.00
39.95	0.50
39.45	1.00
38.95	1.50
38.45	2.00
37.95	2.50
37.45	3.00
36.95	3.50
36.45	4.00
35.95	4.50
35.45	5.00

Blows for Depth Increment



Remarks
Refusal at 4.00m BGL

Scale (approx)	Logged By
1:25	CMP

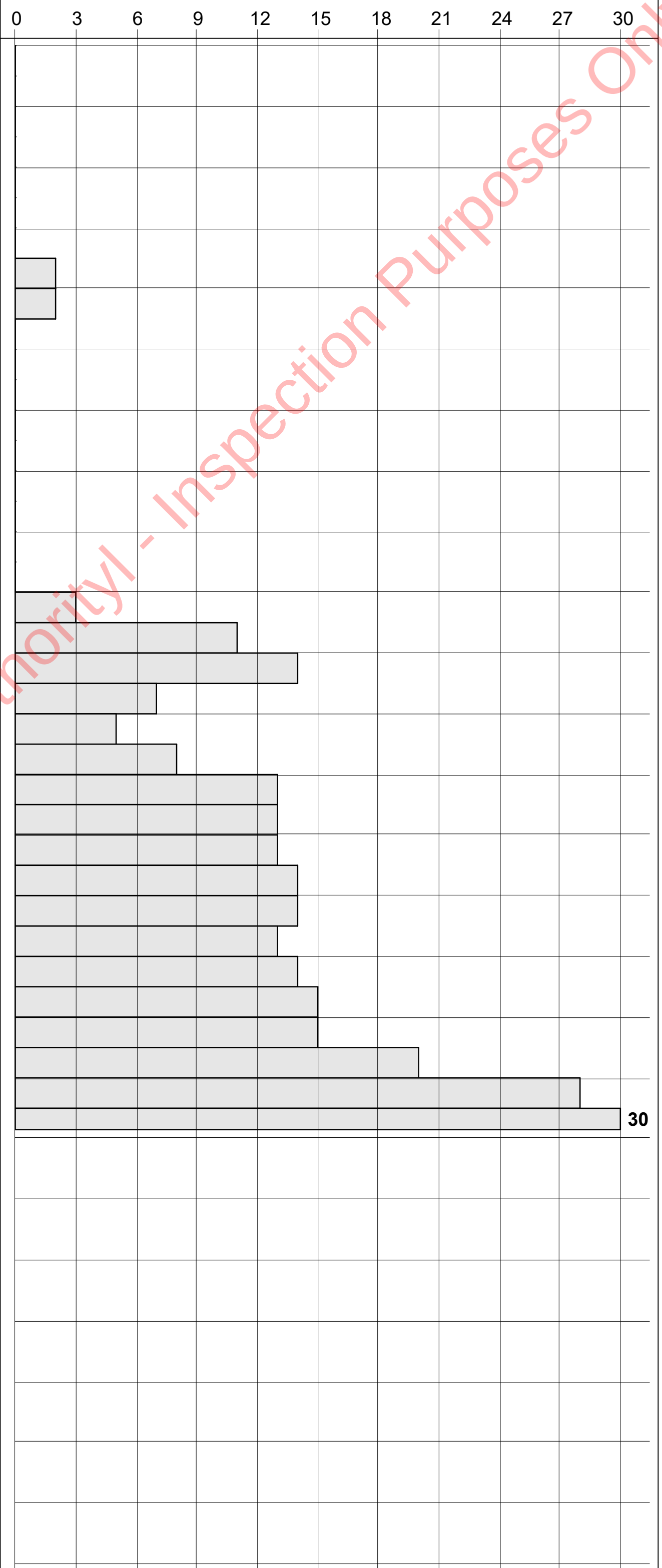
Figure No.
12205-09-22.DP-27

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Probe Number **DP-28**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 40.26	**Client** AKM Design	**Job Number** 12205-09-22
	Location 605983.7 E 743249.3 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	0	
0.70-0.80	2	
0.80-0.90	2	
0.90-1.00	0	
1.00-1.10	0	
1.10-1.20	0	
1.20-1.30	0	
1.30-1.40	0	
1.40-1.50	0	
1.50-1.60	0	
1.60-1.70	0	
1.70-1.80	0	
1.80-1.90	3	
1.90-2.00	11	
2.00-2.10	14	
2.10-2.20	7	
2.20-2.30	5	
2.30-2.40	8	
2.40-2.50	13	
2.50-2.60	13	
2.60-2.70	13	
2.70-2.80	14	
2.80-2.90	14	
2.90-3.00	13	
3.00-3.10	14	
3.10-3.20	15	
3.20-3.30	15	
3.30-3.40	20	
3.40-3.50	28	
3.50-3.57	30	

Level (mOD)	Depth (m)
40.26	0.00
39.76	0.50
39.26	1.00
38.76	1.50
38.26	2.00
37.76	2.50
37.26	3.00
36.76	3.50
36.26	4.00
35.76	4.50
35.26	5.00

Blows for Depth Increment



Remarks	Scale (approx)	Logged By
Refusal at 3.57m BGL	1:25	CMP
	Figure No. 12205-09-22.DP-28	

Ground Investigations Ireland Ltd
www.gii.ie

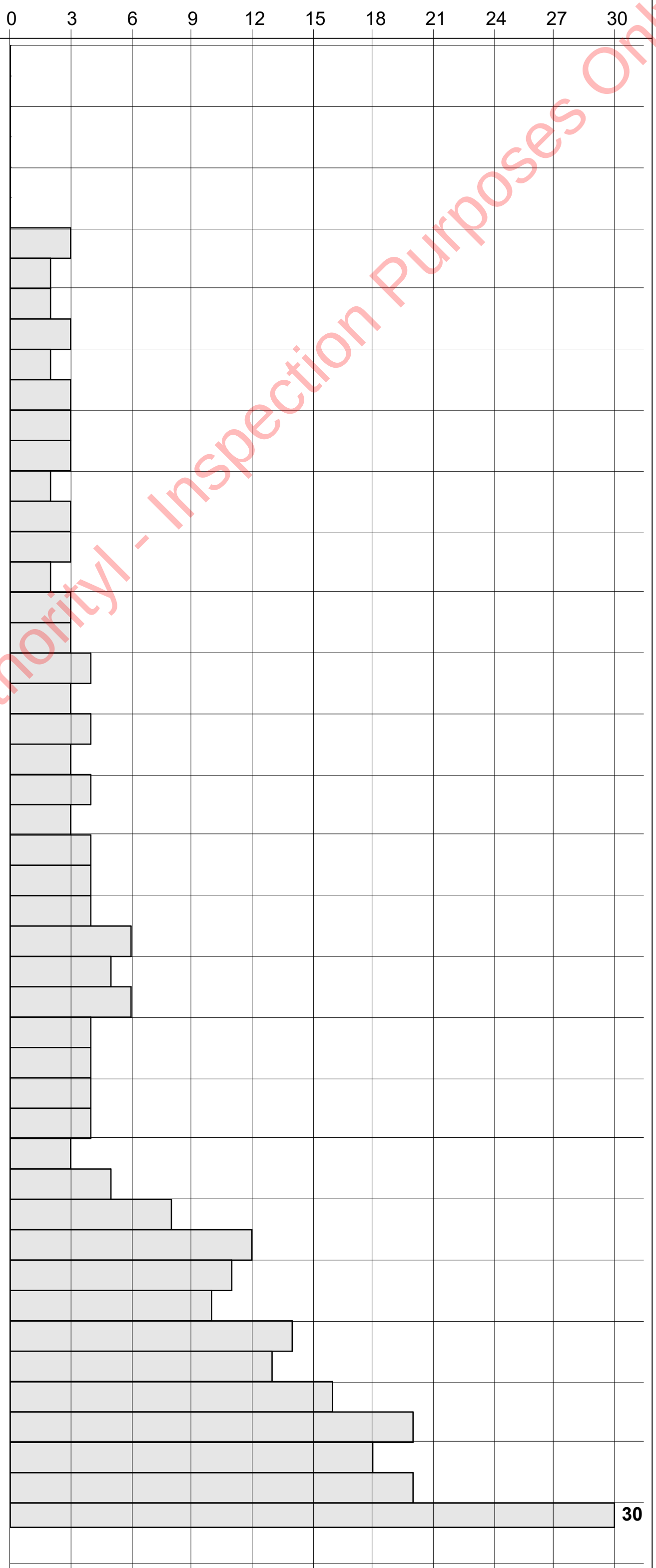
Site	Probe Number
Cornamaddy Athlone Northern Site	DP-29

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.24	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	605980 E 743207.8 N	20/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	3	
0.70-0.80	2	
0.80-0.90	2	
0.90-1.00	3	
1.00-1.10	2	
1.10-1.20	3	
1.20-1.30	3	
1.30-1.40	3	
1.40-1.50	2	
1.50-1.60	3	
1.60-1.70	3	
1.70-1.80	2	
1.80-1.90	3	
1.90-2.00	3	
2.00-2.10	4	
2.10-2.20	3	
2.20-2.30	4	
2.30-2.40	3	
2.40-2.50	4	
2.50-2.60	3	
2.60-2.70	4	
2.70-2.80	4	
2.80-2.90	4	
2.90-3.00	6	
3.00-3.10	5	
3.10-3.20	6	
3.20-3.30	4	
3.30-3.40	4	
3.40-3.50	4	
3.50-3.60	4	
3.60-3.70	3	
3.70-3.80	5	
3.80-3.90	8	
3.90-4.00	12	
4.00-4.10	11	
4.10-4.20	10	
4.20-4.30	14	
4.30-4.40	13	
4.40-4.50	16	
4.50-4.60	20	
4.60-4.70	18	
4.70-4.80	20	
4.80-4.88	30	

Level (mOD)	Depth (m)
40.24	0.00
39.74	0.50
39.24	1.00
38.74	1.50
38.24	2.00
37.74	2.50
37.24	3.00
36.74	3.50
36.24	4.00
35.74	4.50
35.24	5.00

Blows for Depth Increment



Remarks
Refusal at 4.88m BGL

Scale (approx)	Logged By
1:25	CMP

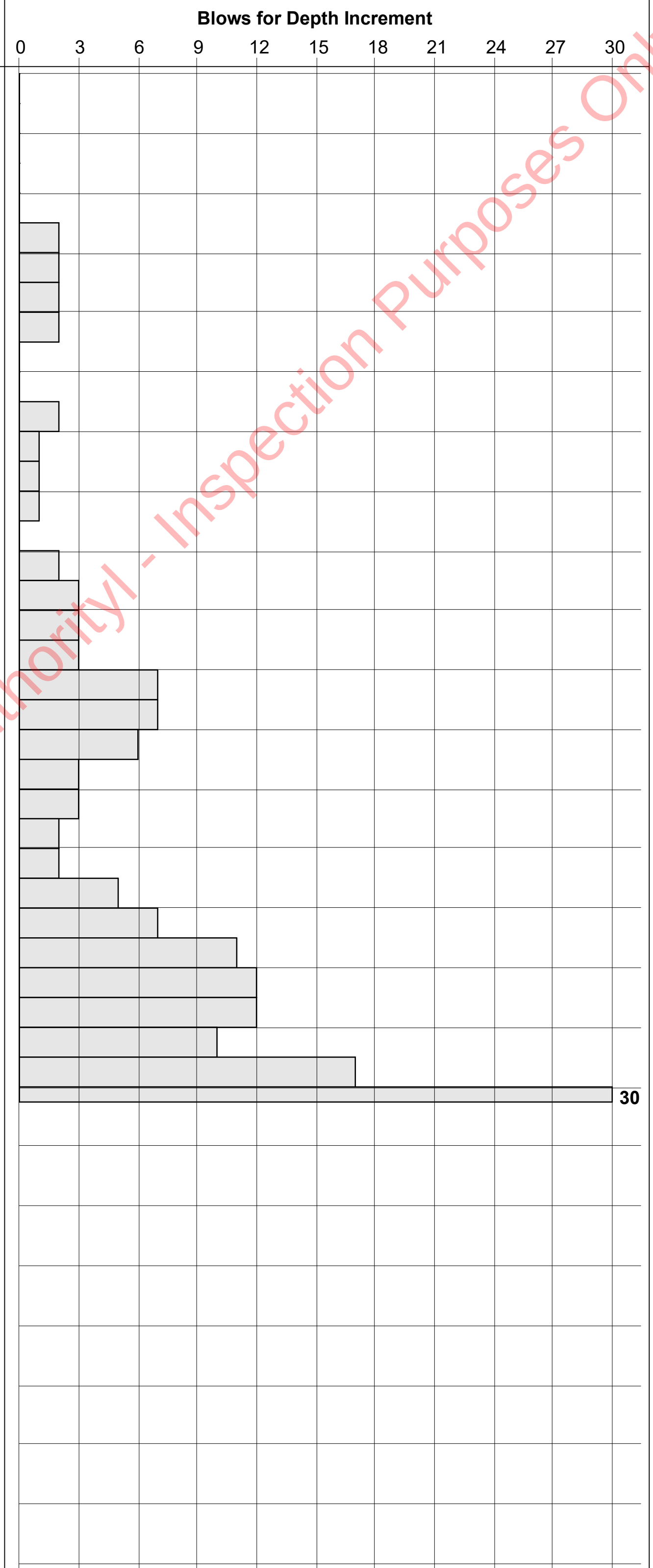
Figure No.
12205-09-22.DP-29

Ground Investigations Ireland Ltd
www.gii.ie

Site Cornamaddy Athlone Northern Site				**Probe Number** DP-30
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 40.58	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606006.2 E 743202.2 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	2	
0.60-0.70	2	
0.70-0.80	2	
0.80-0.90	2	
0.90-1.00	0	
1.00-1.10	0	
1.10-1.20	2	
1.20-1.30	1	
1.30-1.40	1	
1.40-1.50	1	
1.50-1.60	0	
1.60-1.70	2	
1.70-1.80	3	
1.80-1.90	3	
1.90-2.00	3	
2.00-2.10	7	
2.10-2.20	7	
2.20-2.30	6	
2.30-2.40	3	
2.40-2.50	3	
2.50-2.60	2	
2.60-2.70	2	
2.70-2.80	5	
2.80-2.90	7	
2.90-3.00	11	
3.00-3.10	12	
3.10-3.20	12	
3.20-3.30	10	
3.30-3.40	17	
3.40-3.45	30	

Level (mOD)	Depth (m)
40.58	0.00
40.08	0.50
39.58	1.00
39.08	1.50
38.58	2.00
38.08	2.50
37.58	3.00
37.08	3.50
36.58	4.00
36.08	4.50
35.58	5.00



Remarks
Refusal at 3.45m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No. 12205-09-22.DP-30

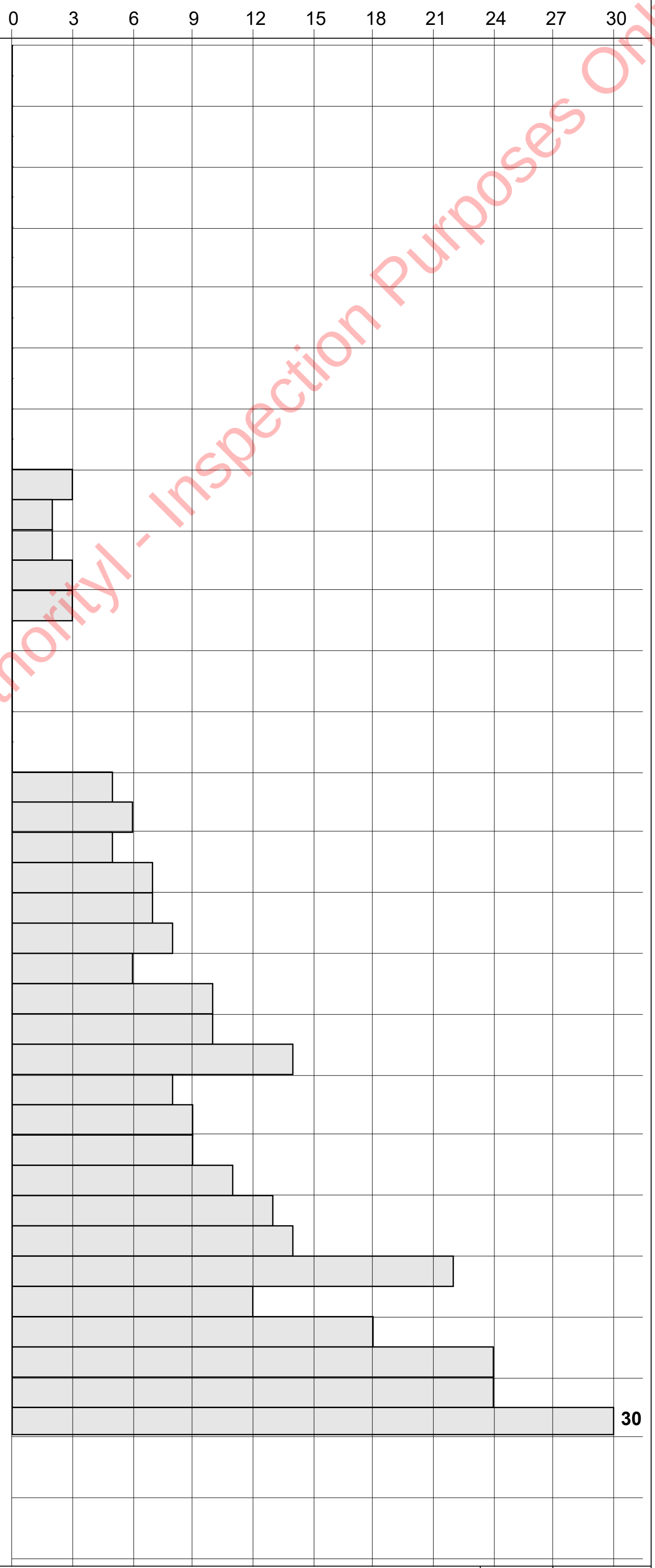
Ground Investigations Ireland Ltd
www.gii.ie

Site Cornamaddy Athlone Northern Site				**Probe Number** DP-31
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 41.15	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606013.6 E 743174.9 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	0	
0.70-0.80	0	
0.80-0.90	0	
0.90-1.00	0	
1.00-1.10	0	
1.10-1.20	0	
1.20-1.30	0	
1.30-1.40	0	
1.40-1.50	3	
1.50-1.60	2	
1.60-1.70	2	
1.70-1.80	3	
1.80-1.90	3	
1.90-2.00	0	
2.00-2.10	0	
2.10-2.20	0	
2.20-2.30	0	
2.30-2.40	0	
2.40-2.50	5	
2.50-2.60	6	
2.60-2.70	5	
2.70-2.80	7	
2.80-2.90	7	
2.90-3.00	8	
3.00-3.10	6	
3.10-3.20	10	
3.20-3.30	10	
3.30-3.40	14	
3.40-3.50	8	
3.50-3.60	9	
3.60-3.70	9	
3.70-3.80	11	
3.80-3.90	13	
3.90-4.00	14	
4.00-4.10	22	
4.10-4.20	12	
4.20-4.30	18	
4.30-4.40	24	
4.40-4.50	24	
4.50-4.59	30	

Level (mOD)	Depth (m)
41.15	0.00
40.65	0.50
40.15	1.00
39.65	1.50
39.15	2.00
38.65	2.50
38.15	3.00
37.65	3.50
37.15	4.00
36.65	4.50
36.15	5.00

Blows for Depth Increment



Remarks
Refusal at 4.59m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No. 12205-09-22.DP-31

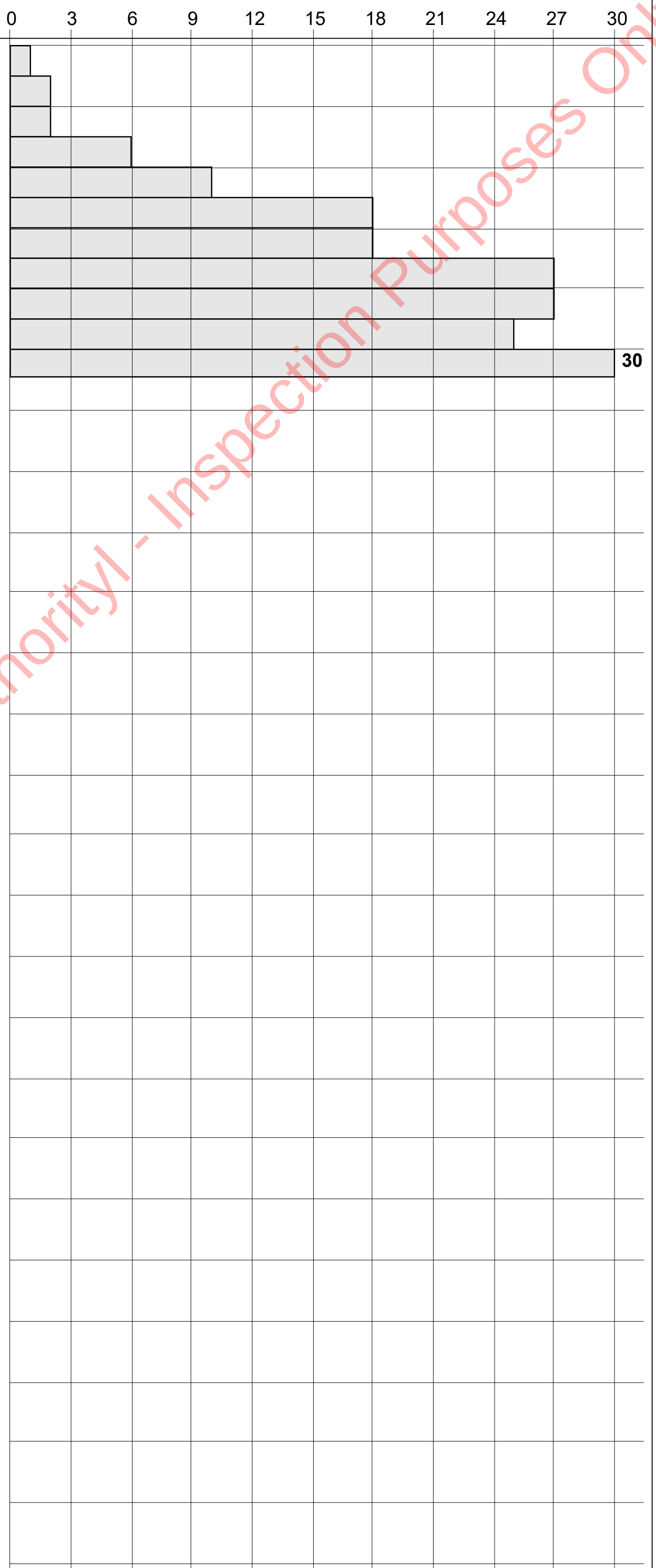
Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Cornamaddy Athlone Northern Site	DP-32

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	42.76	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	605986.2 E 743168.1 N	20/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		42.76	0.00
0.10-0.20	2			
0.20-0.30	2			
0.30-0.40	6			
0.40-0.50	10			
0.50-0.60	18		42.26	0.50
0.60-0.70	18			
0.70-0.80	27			
0.80-0.90	27			
0.90-1.00	25			
1.00-1.09	30		41.76	1.00
			41.26	1.50
			40.76	2.00
			40.26	2.50
			39.76	3.00
			39.26	3.50
			38.76	4.00
			38.26	4.50
			37.76	5.00

Blows for Depth Increment



Remarks
Refusal at 1.09m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-32

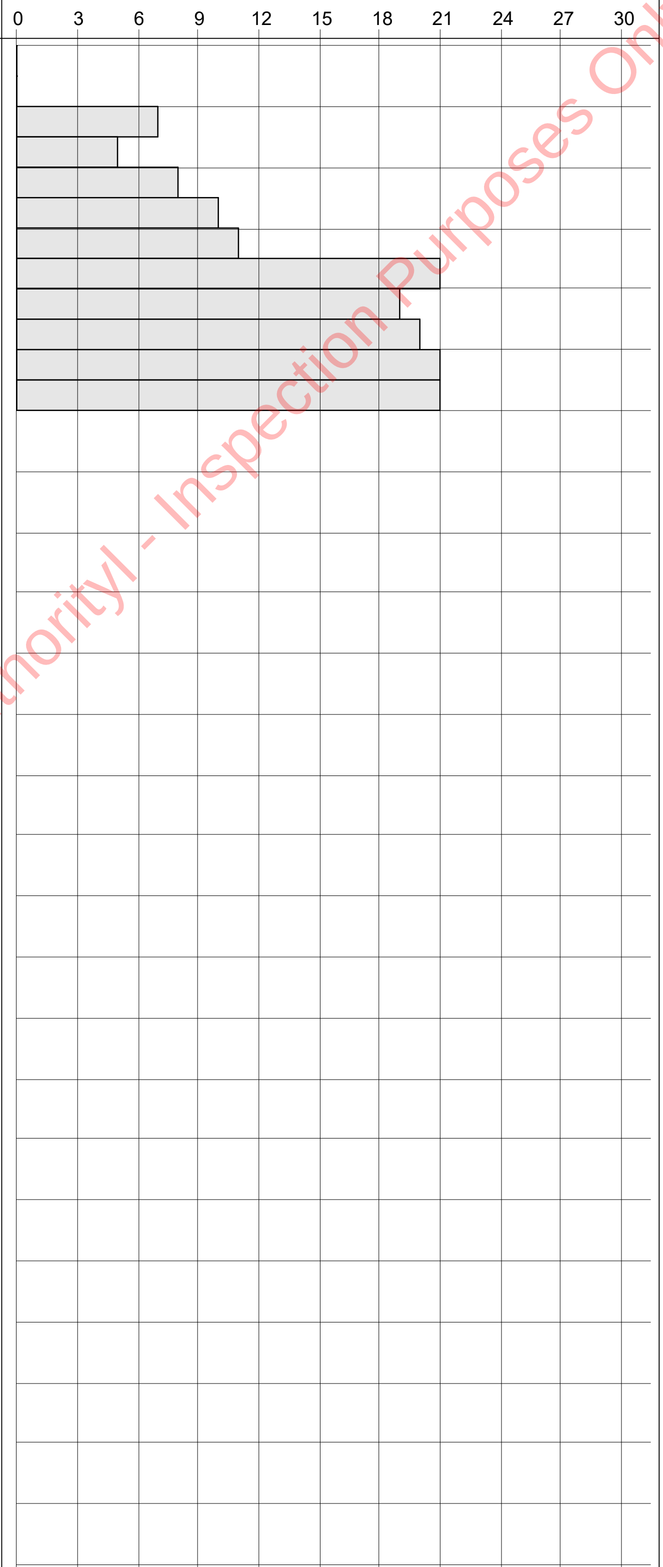
Ground Investigations Ireland Ltd www.gii.ie	Site Cornamaddy Athlone Northern Site	Probe Number **DP-33**

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.99	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	606014.1 E 743128.2 N	20/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	7	
0.30-0.40	5	
0.40-0.50	8	
0.50-0.60	10	
0.60-0.70	11	
0.70-0.80	21	
0.80-0.90	19	
0.90-1.00	20	
1.00-1.10	21	
1.10-1.20	21	

Level (mOD)	Depth (m)
40.99	0.00
40.49	0.50
39.99	1.00
39.49	1.50
38.99	2.00
38.49	2.50
37.99	3.00
37.49	3.50
36.99	4.00
36.49	4.50
35.99	5.00

Blows for Depth Increment



Remarks
Refusal at 1.20m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-33

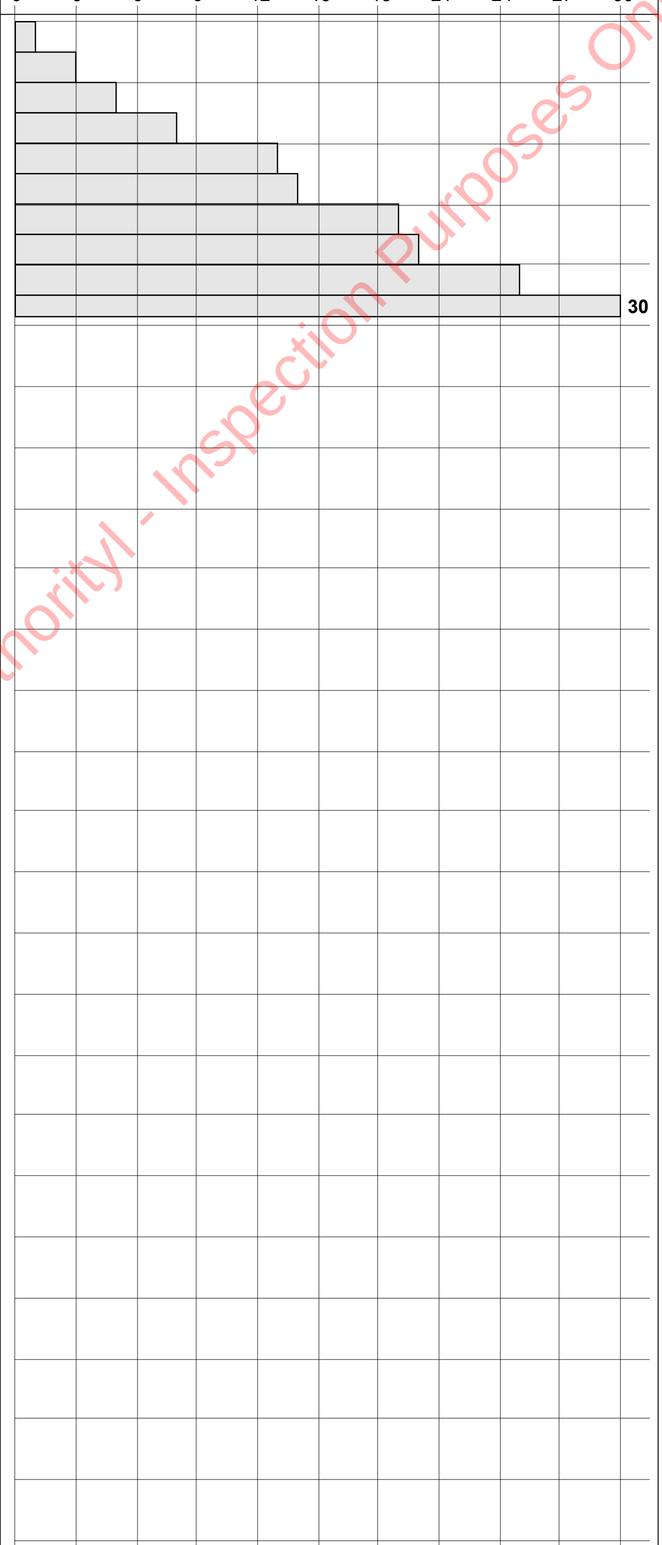
Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Probe Number: **DP-34**

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	43.16	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	605986.8 E 743123.6 N	20/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	1	
0.10-0.20	3	
0.20-0.30	5	
0.30-0.40	8	
0.40-0.50	13	
0.50-0.60	14	
0.60-0.70	19	
0.70-0.80	20	
0.80-0.90	25	
0.90-0.97	30	

Level (mOD)	Depth (m)
43.16	0.00
42.66	0.50
42.16	1.00
41.66	1.50
41.16	2.00
40.66	2.50
40.16	3.00
39.66	3.50
39.16	4.00
38.66	4.50
38.16	5.00

Blows for Depth Increment



Remarks
Refusal at 0.97m BGL

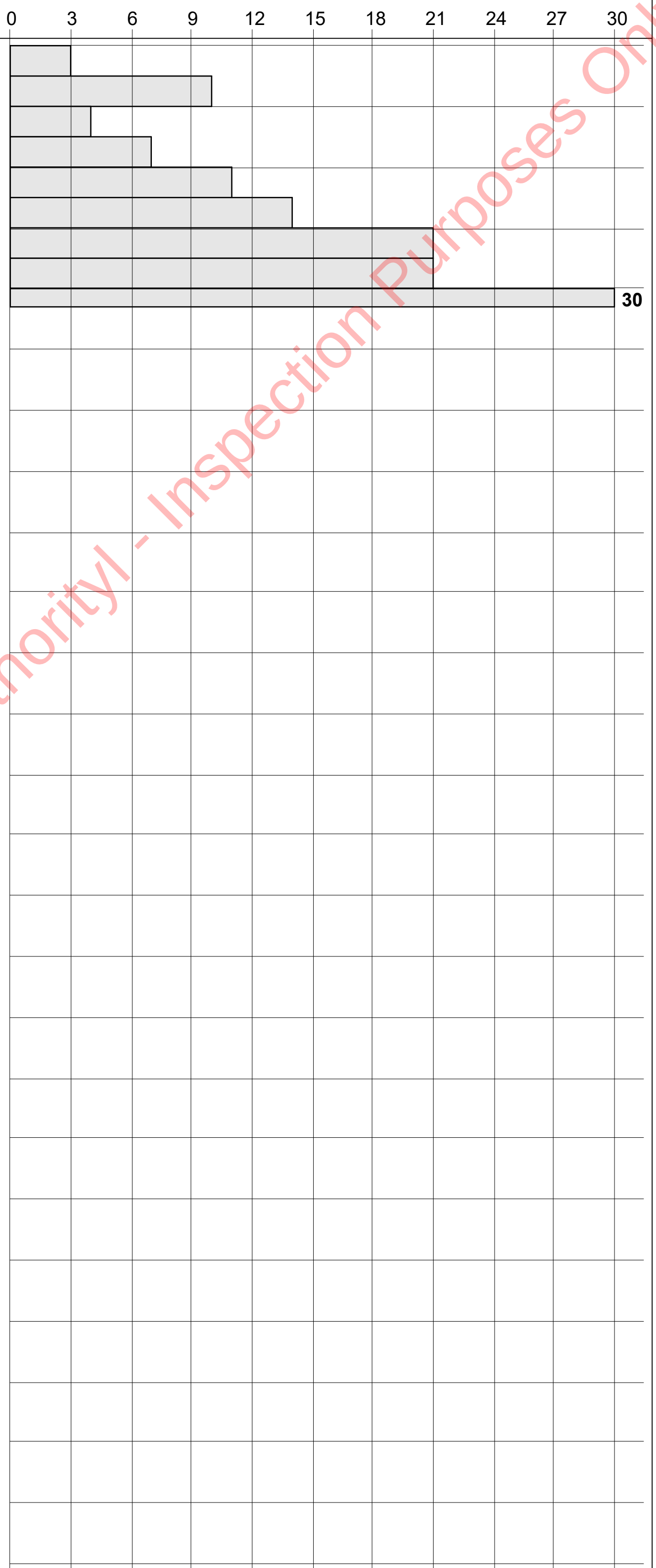
Scale (approx)	Logged By
1:25	CMP

Figure No. 12205-09-22.DP-34

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Probe Number **DP-35**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 41.97	**Client** AKM Design	**Job Number** 12205-09-22
	Location 605993 E 743102.2 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	3		41.97	0.00
0.10-0.20	10			
0.20-0.30	4			
0.30-0.40	7			
0.40-0.50	11			
0.50-0.60	14		41.47	0.50
0.60-0.70	21			
0.70-0.80	21			
0.80-0.86	30			
			40.97	1.00
			40.47	1.50
			39.97	2.00
			39.47	2.50
			38.97	3.00
			38.47	3.50
			37.97	4.00
			37.47	4.50
			36.97	5.00

Blows for Depth Increment



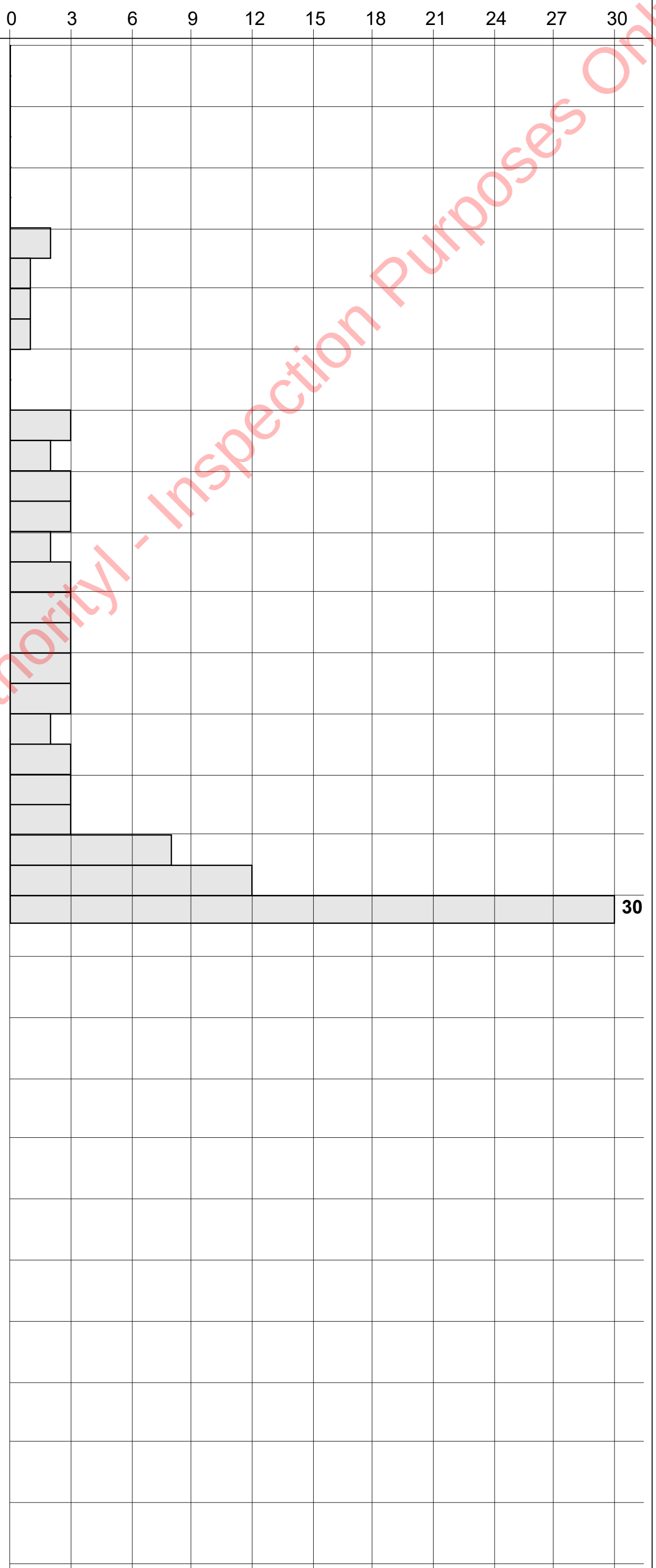
Remarks Refusal at 0.86m BGL	**Scale (approx)** 1:25	**Logged By** CMP
	Figure No. 12205-09-22.DP-35	

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Probe Number **DP-36**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 40.42	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606020.9 E 743096.4 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	2	
0.70-0.80	1	
0.80-0.90	1	
0.90-1.00	1	
1.00-1.10	0	
1.10-1.20	0	
1.20-1.30	3	
1.30-1.40	2	
1.40-1.50	3	
1.50-1.60	3	
1.60-1.70	2	
1.70-1.80	3	
1.80-1.90	3	
1.90-2.00	3	
2.00-2.10	3	
2.10-2.20	3	
2.20-2.30	2	
2.30-2.40	3	
2.40-2.50	3	
2.50-2.60	3	
2.60-2.70	8	
2.70-2.80	12	
2.80-2.89	30	

Level (mOD)	Depth (m)
40.42	0.00
39.92	0.50
39.42	1.00
38.92	1.50
38.42	2.00
37.92	2.50
37.42	3.00
36.92	3.50
36.42	4.00
35.92	4.50
35.42	5.00

Blows for Depth Increment



Remarks
Refusal at 2.89m BGL

Scale (approx)	Logged By
1:25	CMP

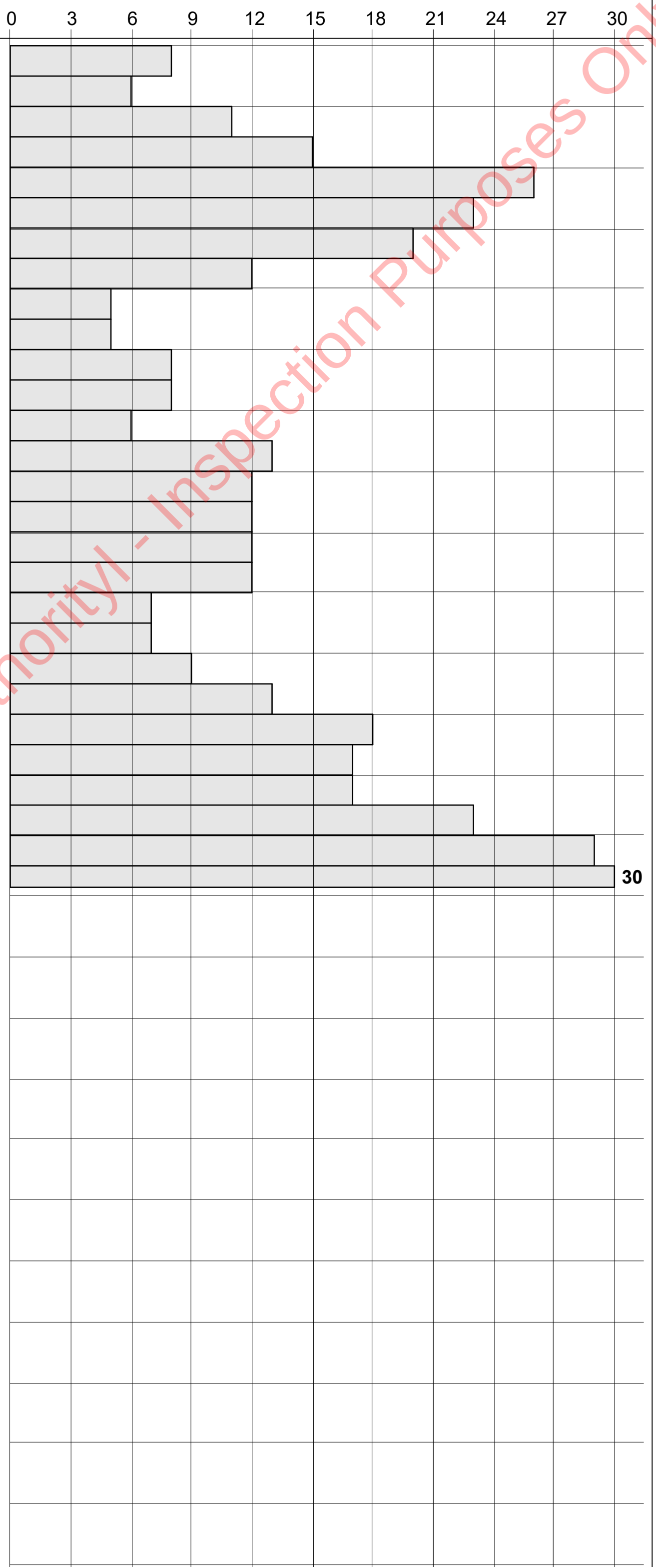
Figure No.
12205-09-22.DP-36

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Probe Number **DP-37**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 41.06	**Client** AKM Design	**Job Number** 12205-09-22
	Location 605994.2 E 743076.8 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	8	
0.10-0.20	6	
0.20-0.30	11	
0.30-0.40	15	
0.40-0.50	26	
0.50-0.60	23	
0.60-0.70	20	
0.70-0.80	12	
0.80-0.90	5	
0.90-1.00	5	
1.00-1.10	8	
1.10-1.20	8	
1.20-1.30	6	
1.30-1.40	13	
1.40-1.50	12	
1.50-1.60	12	
1.60-1.70	12	
1.70-1.80	12	
1.80-1.90	7	
1.90-2.00	7	
2.00-2.10	9	
2.10-2.20	13	
2.20-2.30	18	
2.30-2.40	17	
2.40-2.50	17	
2.50-2.60	23	
2.60-2.70	29	
2.70-2.77	30	

Level (mOD)	Depth (m)
41.06	0.00
40.56	0.50
40.06	1.00
39.56	1.50
39.06	2.00
38.56	2.50
38.06	3.00
37.56	3.50
37.06	4.00
36.56	4.50
36.06	5.00

Blows for Depth Increment



Remarks
Refusal at 2.77m BGL

Scale (approx)	Logged By
1:25	CMP

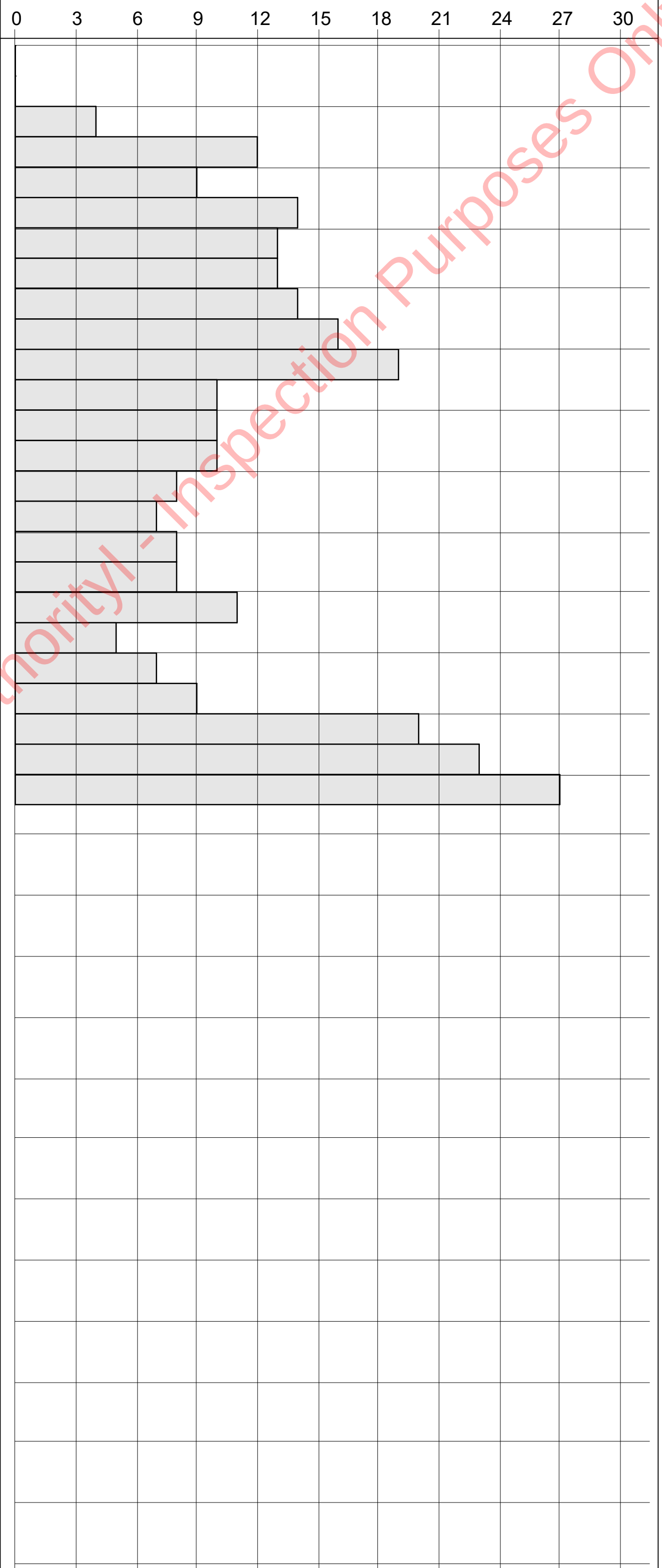
Figure No.
12205-09-22.DP-37

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Probe Number **DP-38**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 40.90	**Client** AKM Design	**Job Number** 12205-09-22
	Location 605942.5 E 743184.8 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	4	
0.30-0.40	12	
0.40-0.50	9	
0.50-0.60	14	
0.60-0.70	13	
0.70-0.80	13	
0.80-0.90	14	
0.90-1.00	16	
1.00-1.10	19	
1.10-1.20	10	
1.20-1.30	10	
1.30-1.40	10	
1.40-1.50	8	
1.50-1.60	7	
1.60-1.70	8	
1.70-1.80	8	
1.80-1.90	11	
1.90-2.00	5	
2.00-2.10	7	
2.10-2.20	9	
2.20-2.30	20	
2.30-2.40	23	
2.40-2.50	27	

Level (mOD)	Depth (m)
40.90	0.00
40.40	0.50
39.90	1.00
39.40	1.50
38.90	2.00
38.40	2.50
37.90	3.00
37.40	3.50
36.90	4.00
36.40	4.50
35.90	5.00

Blows for Depth Increment



Remarks	Scale (approx)	Logged By
Refusal at 2.50m BGL	1:25	CMP
	Figure No. 12205-09-22.DP-38	

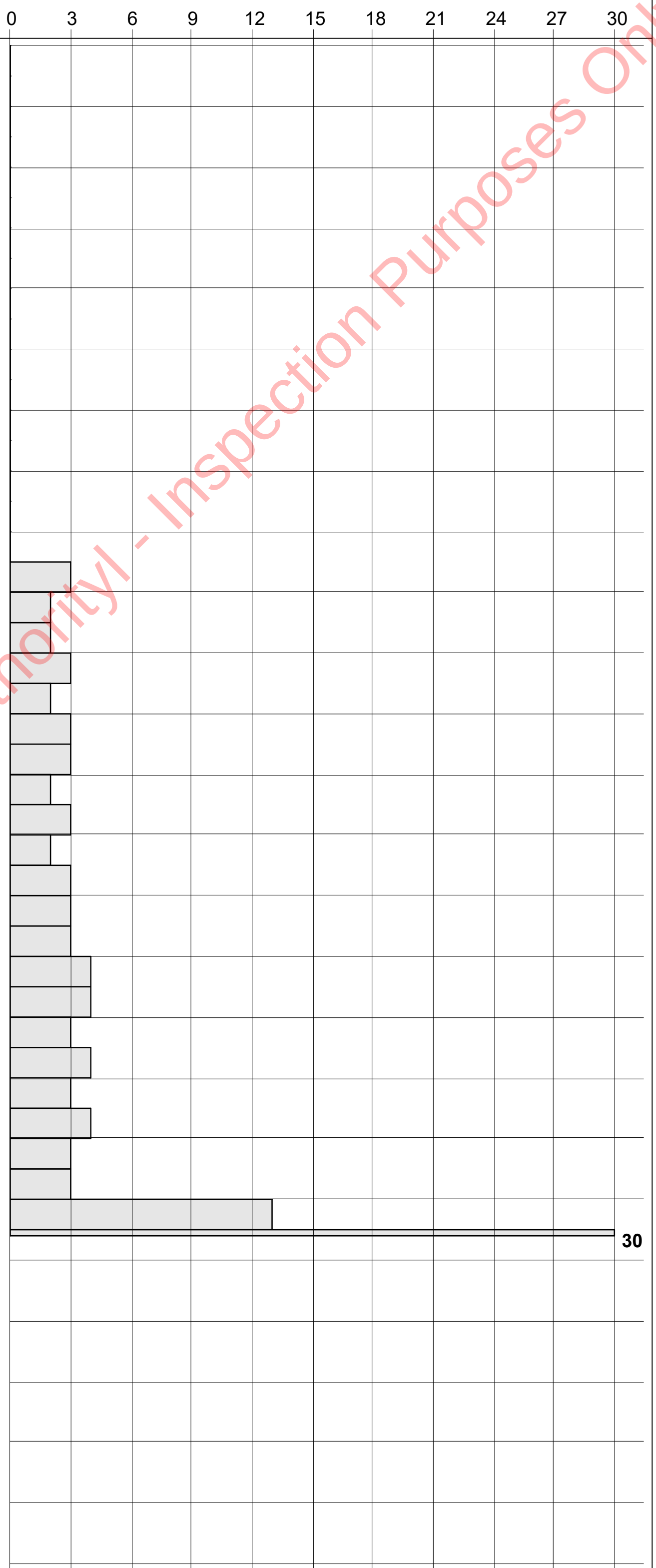
Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Probe Number: DP-39

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.42	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	605918.7 E 743168.4 N	20/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	0	
0.70-0.80	0	
0.80-0.90	0	
0.90-1.00	0	
1.00-1.10	0	
1.10-1.20	0	
1.20-1.30	0	
1.30-1.40	0	
1.40-1.50	0	
1.50-1.60	0	
1.60-1.70	0	
1.70-1.80	3	
1.80-1.90	2	
1.90-2.00	2	
2.00-2.10	3	
2.10-2.20	2	
2.20-2.30	3	
2.30-2.40	3	
2.40-2.50	2	
2.50-2.60	3	
2.60-2.70	2	
2.70-2.80	3	
2.80-2.90	3	
2.90-3.00	3	
3.00-3.10	4	
3.10-3.20	4	
3.20-3.30	3	
3.30-3.40	4	
3.40-3.50	3	
3.50-3.60	4	
3.60-3.70	3	
3.70-3.80	3	
3.80-3.90	13	
3.90-3.92	30	

Level (mOD)	Depth (m)
40.42	0.00
39.92	0.50
39.42	1.00
38.92	1.50
38.42	2.00
37.92	2.50
37.42	3.00
36.92	3.50
36.42	4.00
35.92	4.50
35.42	5.00

Blows for Depth Increment



Remarks	Scale (approx)	Logged By
Refusal at 3.92m BGL	1:25	CMP
	Figure No. 12205-09-22.DP-39	

Ground Investigations Ireland Ltd
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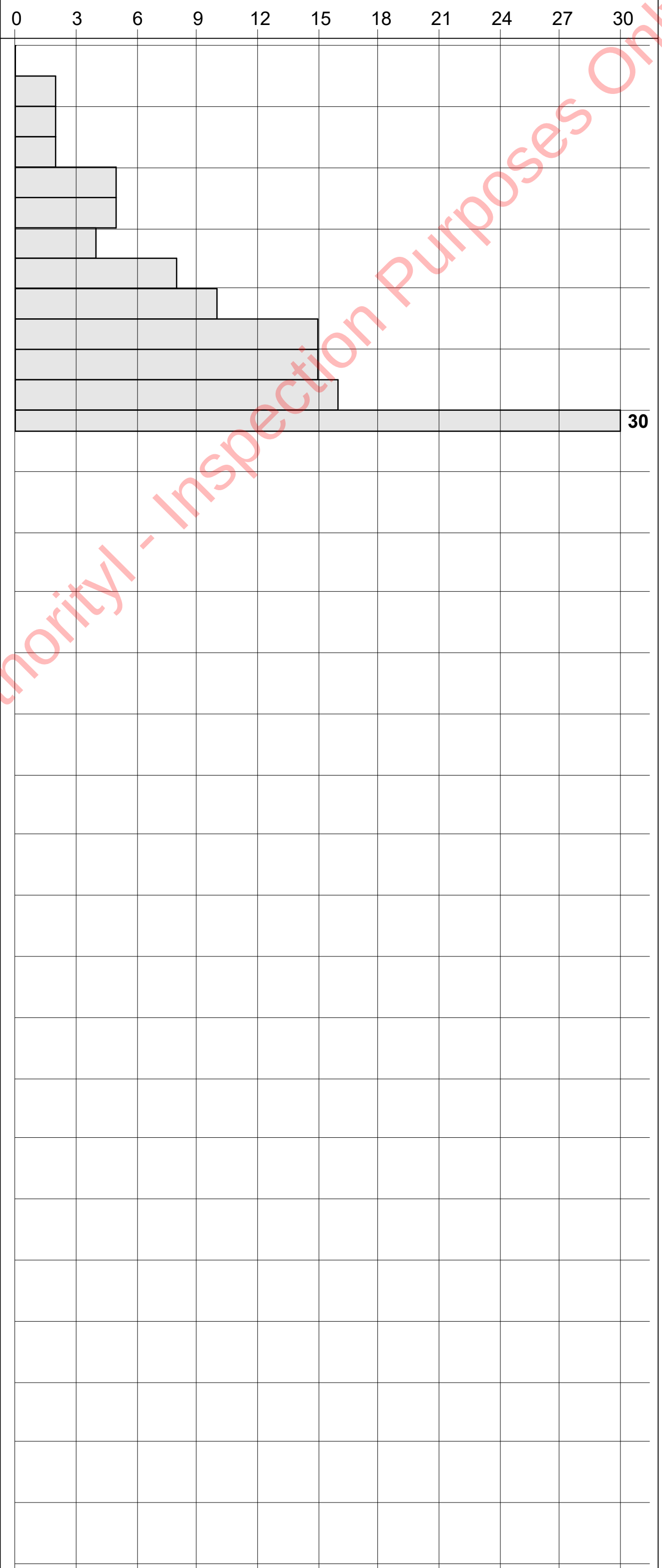
Site	Probe Number
Cornamaddy Athlone Northern Site	DP-40

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	42.86	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	605942.5 E 743153.4 N	20/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	2	
0.20-0.30	2	
0.30-0.40	2	
0.40-0.50	5	
0.50-0.60	5	
0.60-0.70	4	
0.70-0.80	8	
0.80-0.90	10	
0.90-1.00	15	
1.00-1.10	15	
1.10-1.20	16	
1.20-1.27	30	

Level (mOD)	Depth (m)
42.86	0.00
42.36	0.50
41.86	1.00
41.36	1.50
40.86	2.00
40.36	2.50
39.86	3.00
39.36	3.50
38.86	4.00
38.36	4.50
37.86	5.00

Blows for Depth Increment



Remarks
Refusal at 1.27m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-40

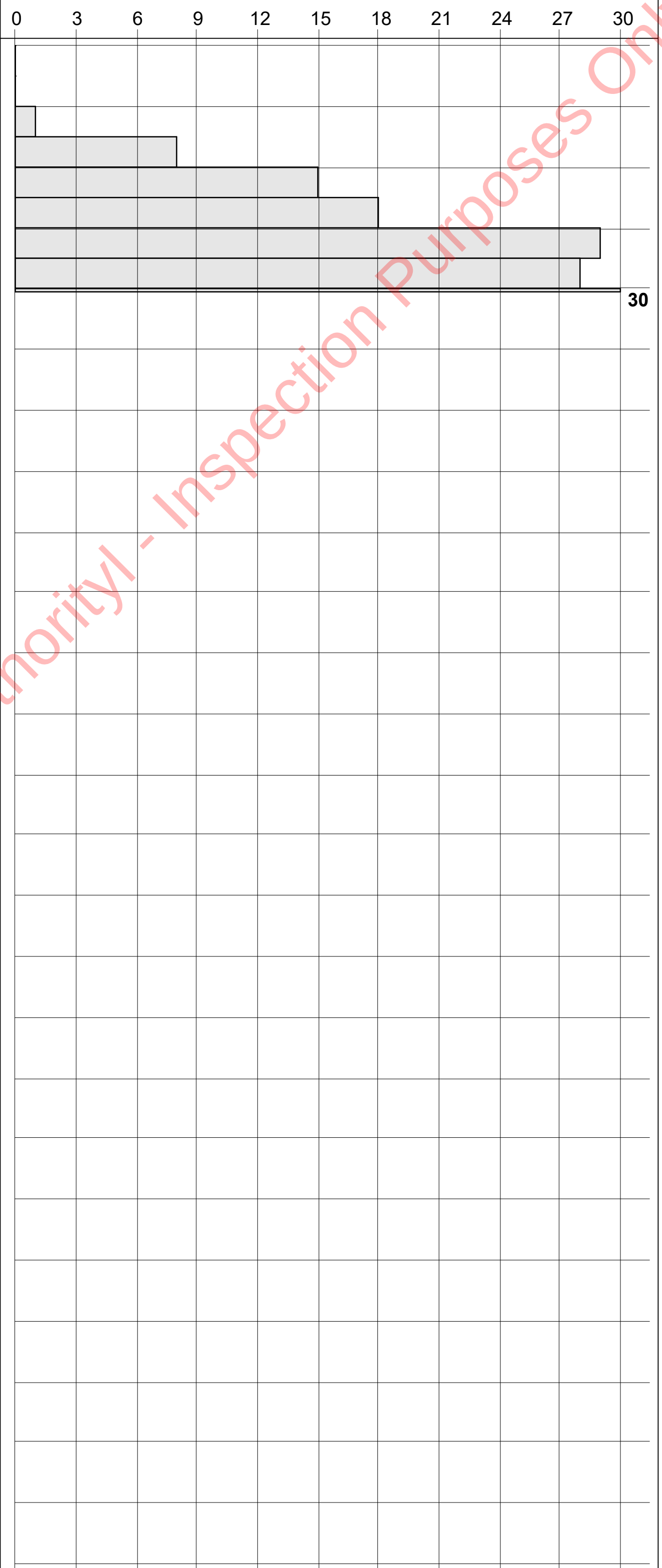
Ground Investigations Ireland Ltd
www.gii.ie

			Site Cornamaddy Athlone Northern Site	**Probe Number** **DP-41**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 41.40	**Client** AKM Design	**Job Number** 12205-09-22
	Location 605921.4 E 743130.7 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	1	
0.30-0.40	8	
0.40-0.50	15	
0.50-0.60	18	
0.60-0.70	29	
0.70-0.80	28	
0.80-0.81	30	

Level (mOD)	Depth (m)
41.40	0.00
40.90	0.50
40.40	1.00
39.90	1.50
39.40	2.00
38.90	2.50
38.40	3.00
37.90	3.50
37.40	4.00
36.90	4.50
36.40	5.00

Blows for Depth Increment



Remarks
Refusal at 0.81m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-41

Ground Investigations Ireland Ltd
www.gii.ie

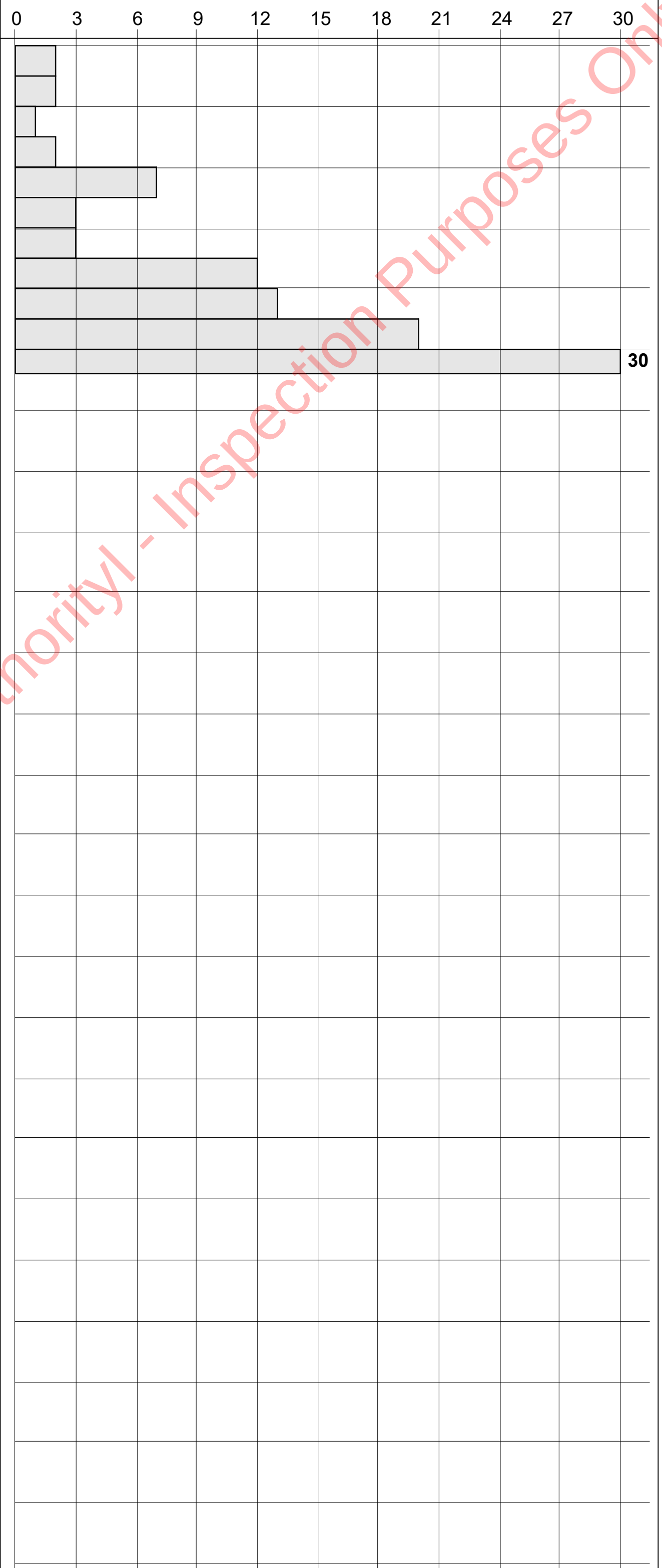
Site	Probe Number
Cornamaddy Athlone Northern Site	DP-42

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	43.33	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	605946.8 E 743122.9 N	20/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	2	
0.10-0.20	2	
0.20-0.30	1	
0.30-0.40	2	
0.40-0.50	7	
0.50-0.60	3	
0.60-0.70	3	
0.70-0.80	12	
0.80-0.90	13	
0.90-1.00	20	
1.00-1.08	30	

Level (mOD)	Depth (m)
43.33	0.00
42.83	0.50
42.33	1.00
41.83	1.50
41.33	2.00
40.83	2.50
40.33	3.00
39.83	3.50
39.33	4.00
38.83	4.50
38.33	5.00

Blows for Depth Increment



Remarks
Refusal at 1.08m BGL

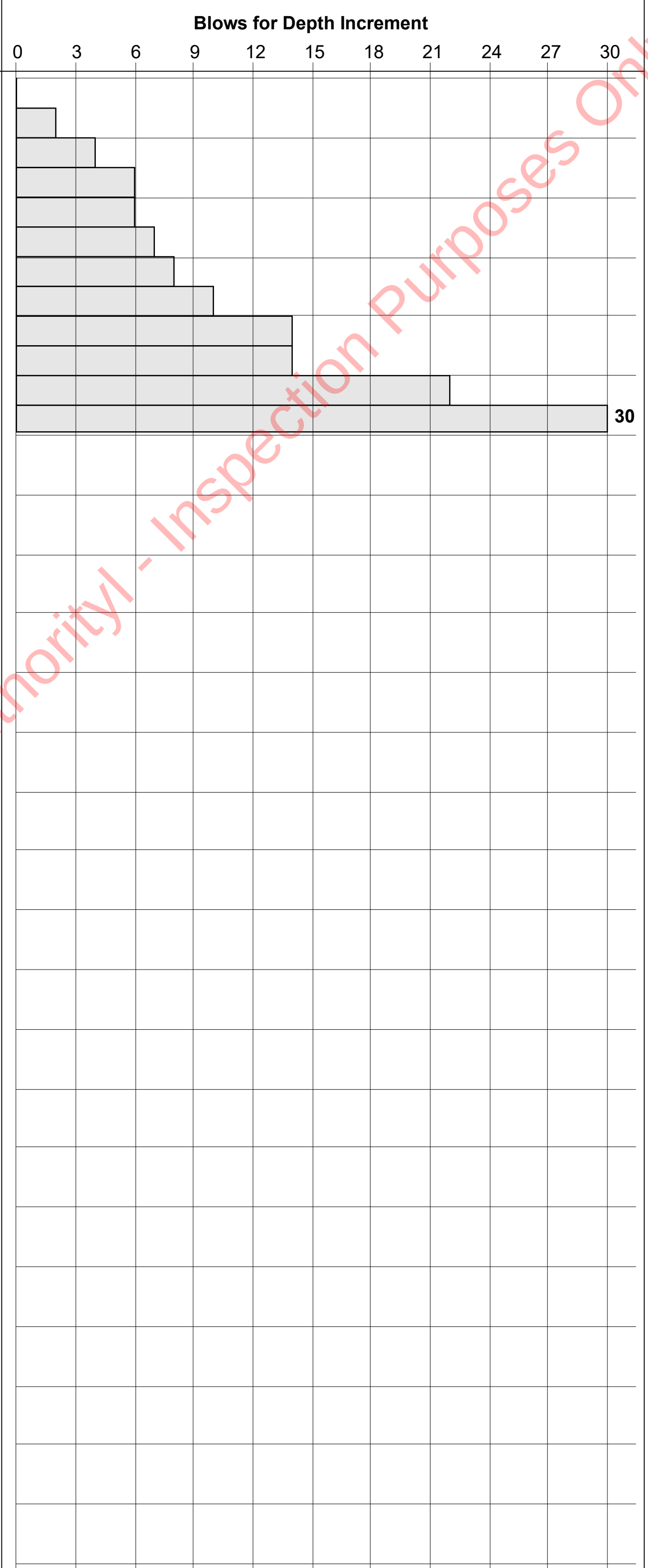
Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-42

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Probe Number **DP-43**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 42.69	**Client** AKM Design	**Job Number** 12205-09-22
	Location 605926.1 E 743100.8 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	2	
0.20-0.30	4	
0.30-0.40	6	
0.40-0.50	6	
0.50-0.60	7	
0.60-0.70	8	
0.70-0.80	10	
0.80-0.90	14	
0.90-1.00	14	
1.00-1.10	22	
1.10-1.19	30	

Level (mOD)	Depth (m)
42.69	0.00
42.19	0.50
41.69	1.00
41.19	1.50
40.69	2.00
40.19	2.50
39.69	3.00
39.19	3.50
38.69	4.00
38.19	4.50
37.69	5.00



Remarks	Scale (approx)	Logged By
Refusal at 1.19m BGL	1:25	CMP
	Figure No. 12205-09-22.DP-43	

Ground Investigations Ireland Ltd
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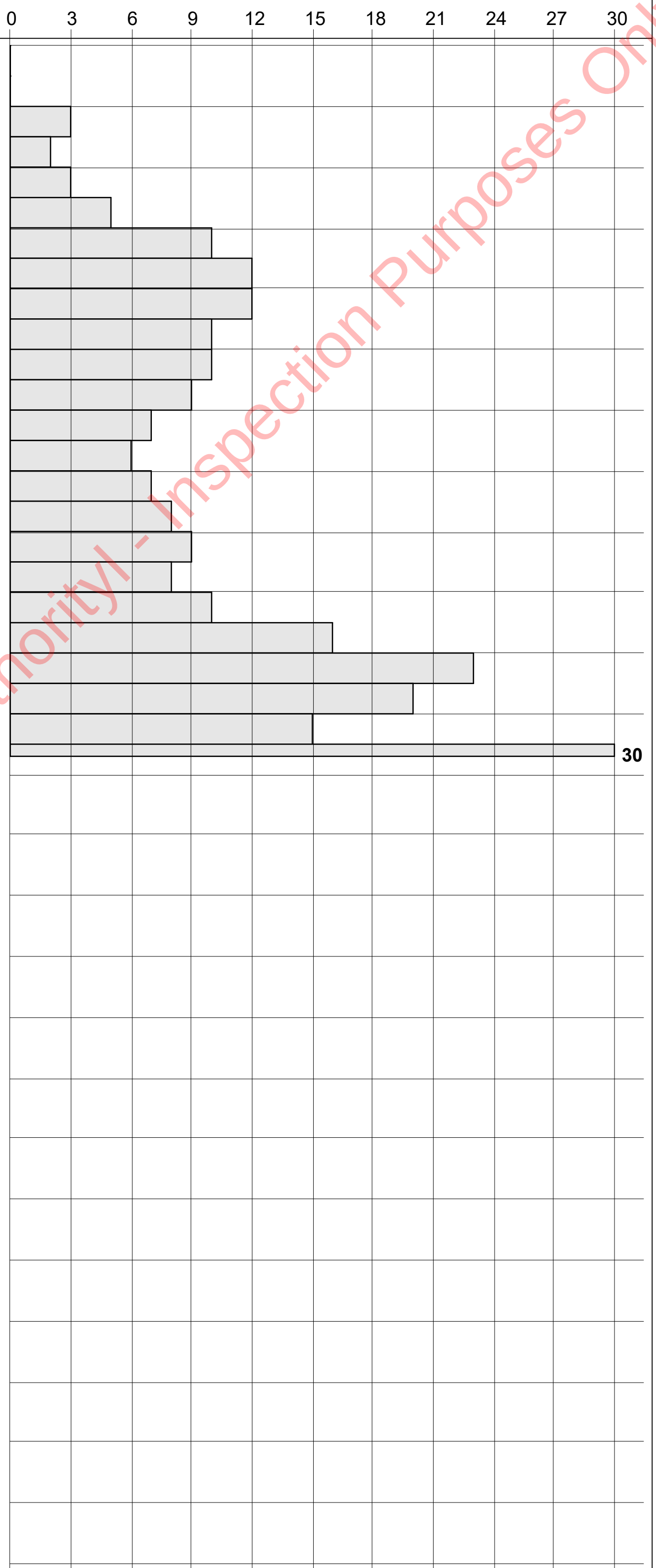
Site	Probe Number
Cornamaddy Athlone Northern Site	**DP-44**

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	42.20	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	605949.9 E 743085.1 N	20/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	3	
0.30-0.40	2	
0.40-0.50	3	
0.50-0.60	5	
0.60-0.70	10	
0.70-0.80	12	
0.80-0.90	12	
0.90-1.00	10	
1.00-1.10	10	
1.10-1.20	9	
1.20-1.30	7	
1.30-1.40	6	
1.40-1.50	7	
1.50-1.60	8	
1.60-1.70	9	
1.70-1.80	8	
1.80-1.90	10	
1.90-2.00	16	
2.00-2.10	23	
2.10-2.20	20	
2.20-2.30	15	
2.30-2.34	30	

Level (mOD)	Depth (m)
42.20	0.00
41.70	0.50
41.20	1.00
40.70	1.50
40.20	2.00
39.70	2.50
39.20	3.00
38.70	3.50
38.20	4.00
37.70	4.50
37.20	5.00

Blows for Depth Increment



Remarks
Refusal at 2.34m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No. 12205-09-22.DP-44

Ground Investigations Ireland Ltd
www.gii.ie

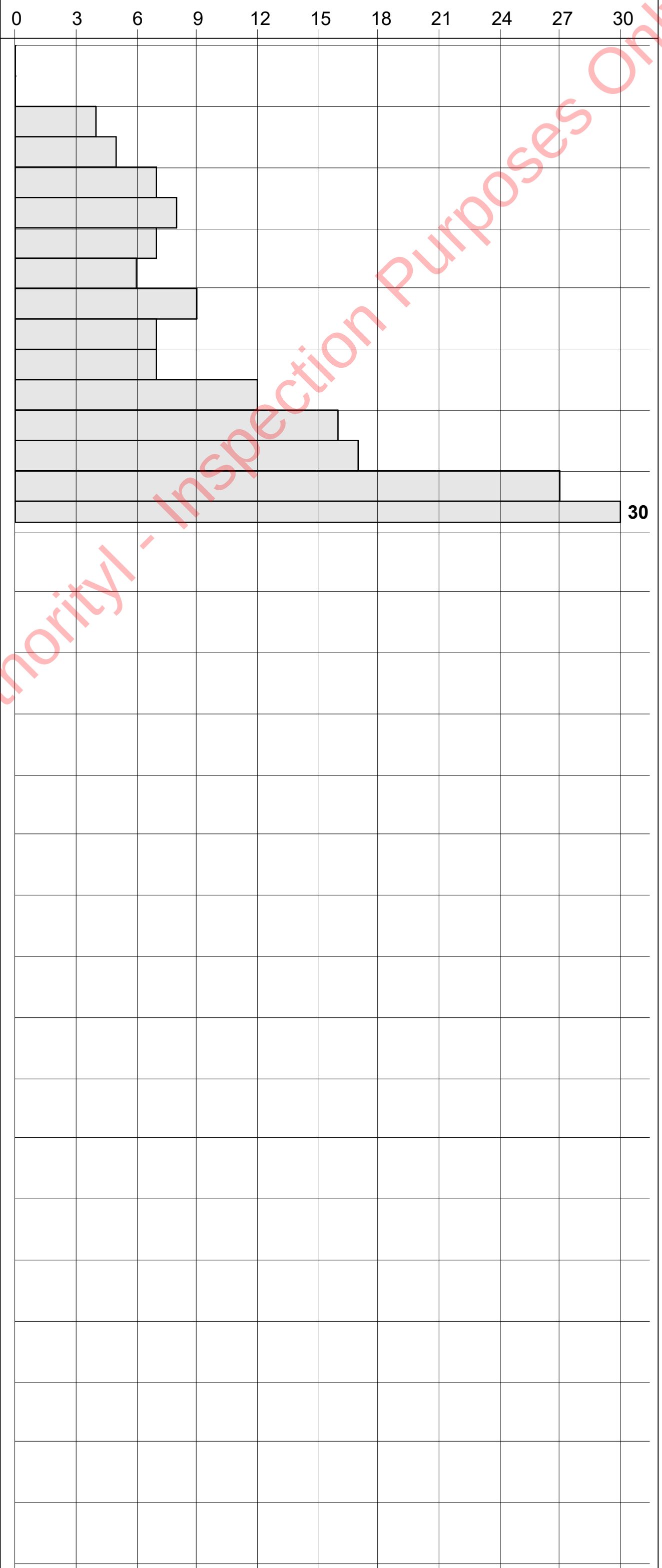
Site	Probe Number
Cornamaddy Athlone Northern Site	**DP-45**

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	41.30	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	605930.6 E 743067.1 N	20/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	4	
0.30-0.40	5	
0.40-0.50	7	
0.50-0.60	8	
0.60-0.70	7	
0.70-0.80	6	
0.80-0.90	9	
0.90-1.00	7	
1.00-1.10	7	
1.10-1.20	12	
1.20-1.30	16	
1.30-1.40	17	
1.40-1.50	27	
1.50-1.57	30	

Level (mOD)	Depth (m)
41.30	0.00
40.80	0.50
40.30	1.00
39.80	1.50
39.30	2.00
38.80	2.50
38.30	3.00
37.80	3.50
37.30	4.00
36.80	4.50
36.30	5.00

Blows for Depth Increment



Remarks
Refusal at 1.57m BGL

Scale (approx)	Logged By
1:25	CMP

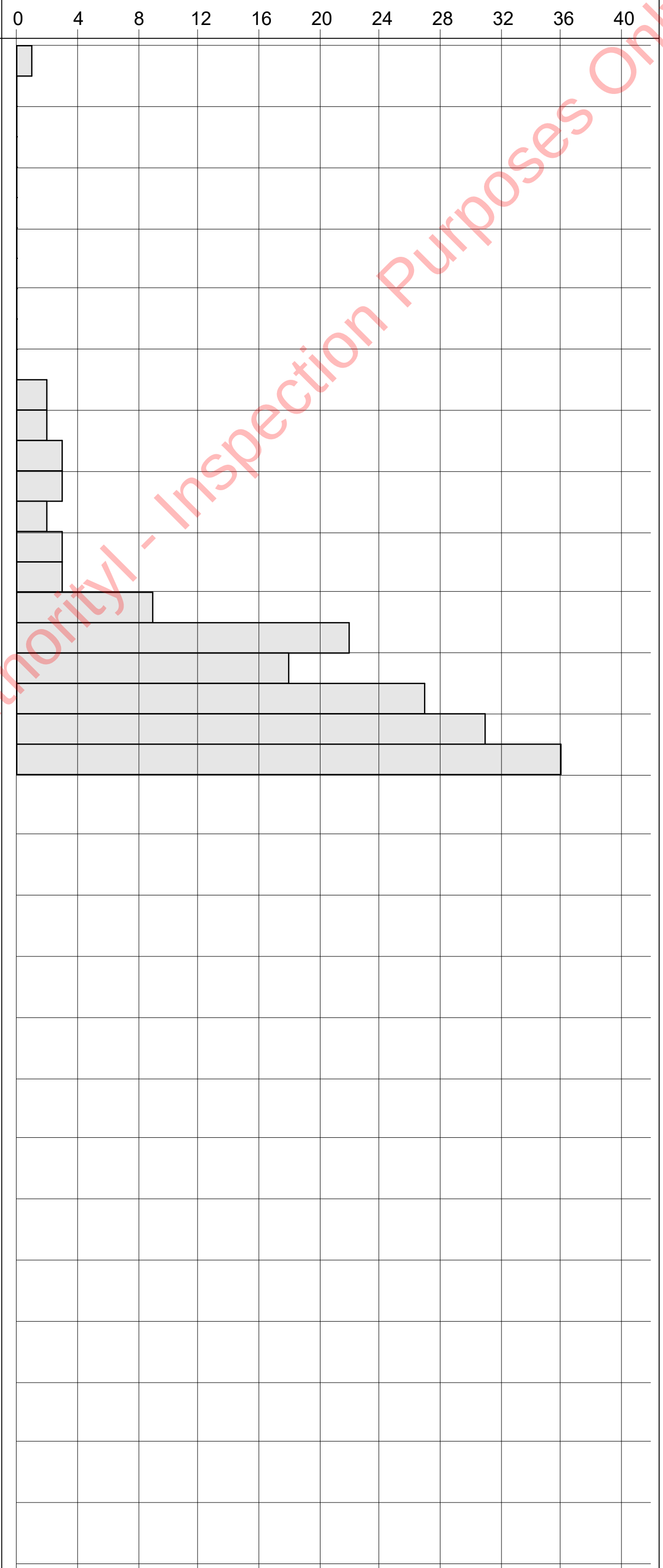
Figure No.
12205-09-22.DP-45

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Probe Number: DP-46

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.54	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	605879.1 E 743119.4 N	20/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	1		40.54	0.00
0.10-0.20	0			
0.20-0.30	0			
0.30-0.40	0			
0.40-0.50	0			
0.50-0.60	0		40.04	0.50
0.60-0.70	0			
0.70-0.80	0			
0.80-0.90	0			
0.90-1.00	0			
1.00-1.10	0		39.54	1.00
1.10-1.20	2			
1.20-1.30	2			
1.30-1.40	3			
1.40-1.50	3			
1.50-1.60	2		39.04	1.50
1.60-1.70	3			
1.70-1.80	3			
1.80-1.90	9			
1.90-2.00	22			
2.00-2.10	18		38.54	2.00
2.10-2.20	27			
2.20-2.30	31			
2.30-2.40	36			
			38.04	2.50
			37.54	3.00
			37.04	3.50
			36.54	4.00
			36.04	4.50
			35.54	5.00

Blows for Depth Increment



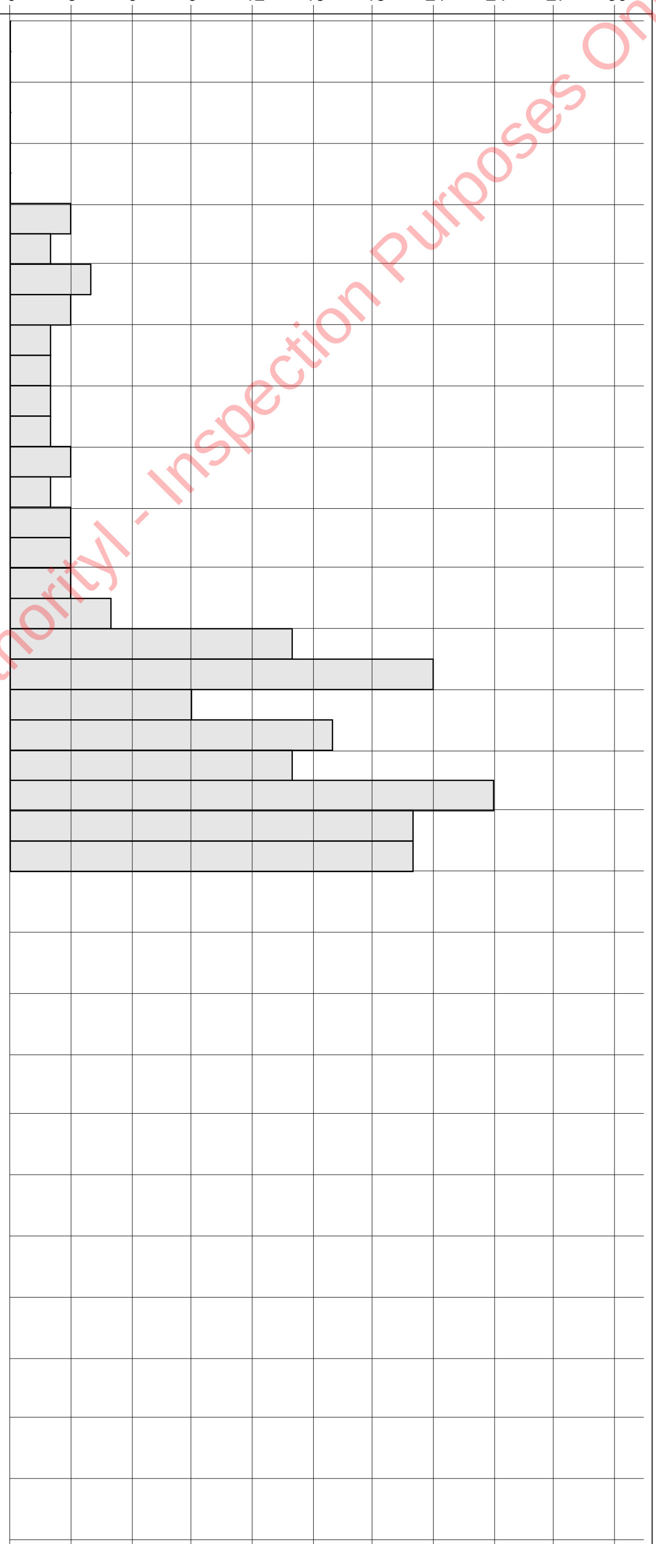
Remarks	Scale (approx)	Logged By
Refusal at 2.40m BGL	1:25	CMP
	Figure No. 12205-09-22.DP-46	

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Probe Number **DP-47**
Method Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.70mm	**Ground Level (mOD)** 40.74	**Client** AKM Design	**Job Number** 12205-09-22
	Location 605883.2 E 743096.4 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	0	
0.20-0.30	0	
0.30-0.40	0	
0.40-0.50	0	
0.50-0.60	0	
0.60-0.70	3	
0.70-0.80	2	
0.80-0.90	4	
0.90-1.00	3	
1.00-1.10	2	
1.10-1.20	2	
1.20-1.30	2	
1.30-1.40	2	
1.40-1.50	3	
1.50-1.60	2	
1.60-1.70	3	
1.70-1.80	3	
1.80-1.90	3	
1.90-2.00	5	
2.00-2.10	14	
2.10-2.20	21	
2.20-2.30	9	
2.30-2.40	16	
2.40-2.50	14	
2.50-2.60	24	
2.60-2.70	20	
2.70-2.80	20	

Level (mOD)	Depth (m)
40.74	0.00
40.24	0.50
39.74	1.00
39.24	1.50
38.74	2.00
38.24	2.50
37.74	3.00
37.24	3.50
36.74	4.00
36.24	4.50
35.74	5.00

Blows for Depth Increment



Remarks
Refusal at 2.80m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-47

Ground Investigations Ireland Ltd
www.gii.ie

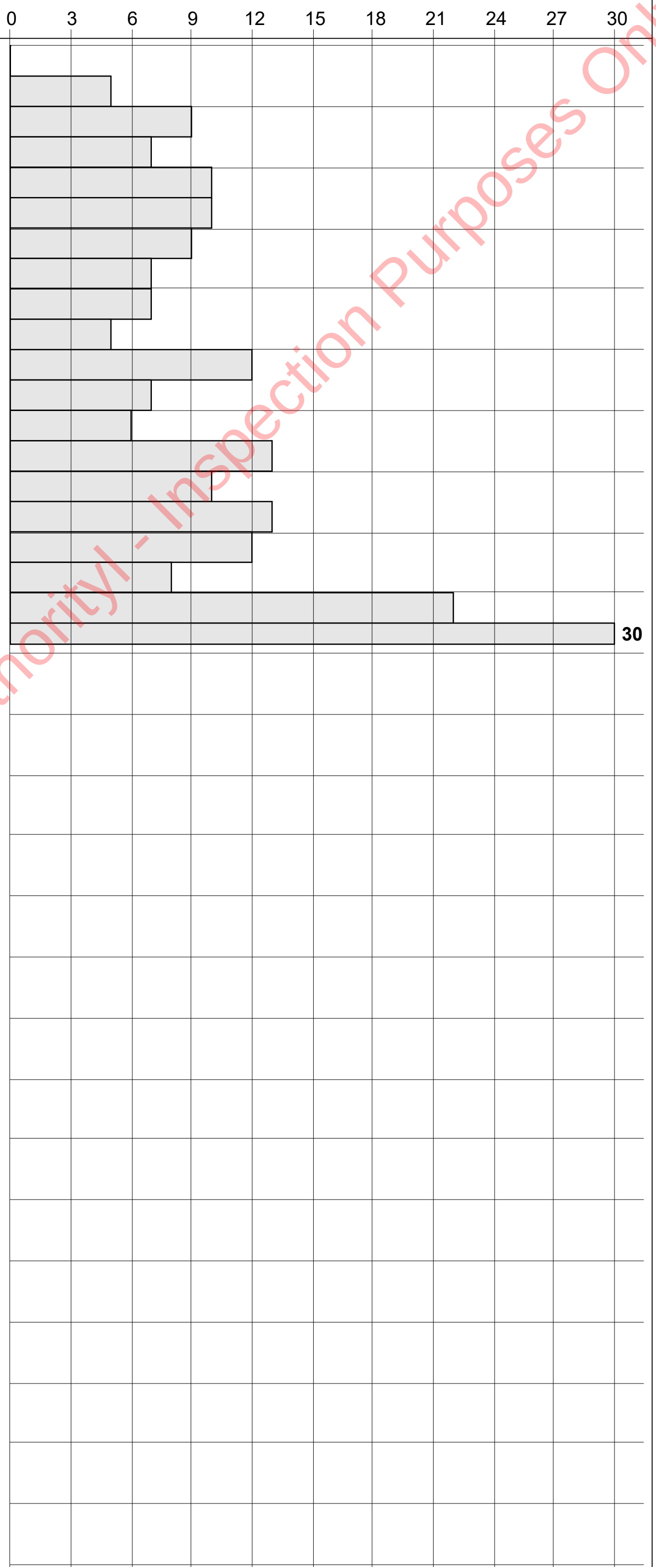
Site	Probe Number
Cornamaddy Athlone Northern Site	**DP-48**

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), Hammer Drop Height 500mm, Hammer Weight 50Kg	Diameter 43.70mm	40.58	AKM Design	12205-09-22
	Location	**Dates**	**Engineer**	**Sheet**
	605859 E 743101.4 N	20/10/2022		1/1

Depth (m)	Blows for Depth Increment	Field Records
0.00-0.10	0	
0.10-0.20	5	
0.20-0.30	9	
0.30-0.40	7	
0.40-0.50	10	
0.50-0.60	10	
0.60-0.70	9	
0.70-0.80	7	
0.80-0.90	7	
0.90-1.00	5	
1.00-1.10	12	
1.10-1.20	7	
1.20-1.30	6	
1.30-1.40	13	
1.40-1.50	10	
1.50-1.60	13	
1.60-1.70	12	
1.70-1.80	8	
1.80-1.90	22	
1.90-1.97	30	

Level (mOD)	Depth (m)
40.58	0.00
40.08	0.50
39.58	1.00
39.08	1.50
38.58	2.00
38.08	2.50
37.58	3.00
37.08	3.50
36.58	4.00
36.08	4.50
35.58	5.00

Blows for Depth Increment



Remarks
Refusal at 1.97m BGL

Scale (approx)	Logged By
1:25	CMP

Figure No.
12205-09-22.DP-48

APPENDIX 5 – Percussive Borehole Records

www.gii.ie

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Number: **BH-01**
Excavation Method: Percussive Borehole	**Dimensions**: 88mm to 2.70m	**Ground Level (mOD)**: 40.44	**Client**: AKM Design	**Job Number**: 12205-09-22
	Location (dGPS): 605882.6 E 743151.4 N	**Dates**: 20/10/2022	**Engineer**:	**Sheet**: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						Driller notes very soft PEAT		
1.00-1.45	SPT(C) N=0		1,0/0,0,0,0					
					(2.70)			
2.00-2.45	SPT(C) N=0		0,0/0,0,0,0					
				37.74	2.70			
2.70-2.70	SPT(C) 25*/0 50/0		25/50			Complete at 2.70m		

Remarks
No groundwater encountered

Scale (approx)	Logged By
1:50	RH

Figure No.
12205-09-22.BH-01

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Number: **BH-02**
Excavation Method: Percussive Borehole	**Dimensions**: 88mm to 3.00m, 66mm to 4.60m	**Ground Level (mOD)**: 40.46	**Client**: AKM Design	**Job Number**: 12205-09-22
	Location (dGPS): 606144.4 E 743252.6 N	**Dates**: 20/10/2022	**Engineer**:	**Sheet**: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.10	B			40.36	0.10	Very soft dark brown Peaty TOPSOIL with rootlets		
0.10-1.00	B					Very soft dark brown mottled grey slightly clayey slightly gravelly pseudo fibrous spongy PEAT		
1.00-1.45	SPT(C) N=2		0,0/0,0,0,2		(2.10)			
1.00-2.00	B							
2.00-2.45	SPT(C) N=0		0,0/0,0,0,0	38.26	2.20	Very soft black slightly gravelly pseudo fibrous spongy PEAT		
3.00-3.45	SPT(C) N=0		0,0/0,0,0,0		(2.10)			
3.00-3.60	B							
3.60-4.00	B							
4.00-4.45	SPT(C) N=0		0,0/0,0,0,0					
4.00-4.30	B			36.16	4.30	Very soft grey slightly clayey SILT		
4.30-4.60	B				(0.30)			
4.60-4.60	SPT(C) 25*/0 50/0		25/50	35.86	4.60	Complete at 4.60m		

Remarks
No groundwater encountered

Scale (approx)	Logged By
1:50	RH

Figure No. 12205-09-22.BH-02

Cornamaddy Athlone Northern Site – Percussive Borehole Photographs

BH-02

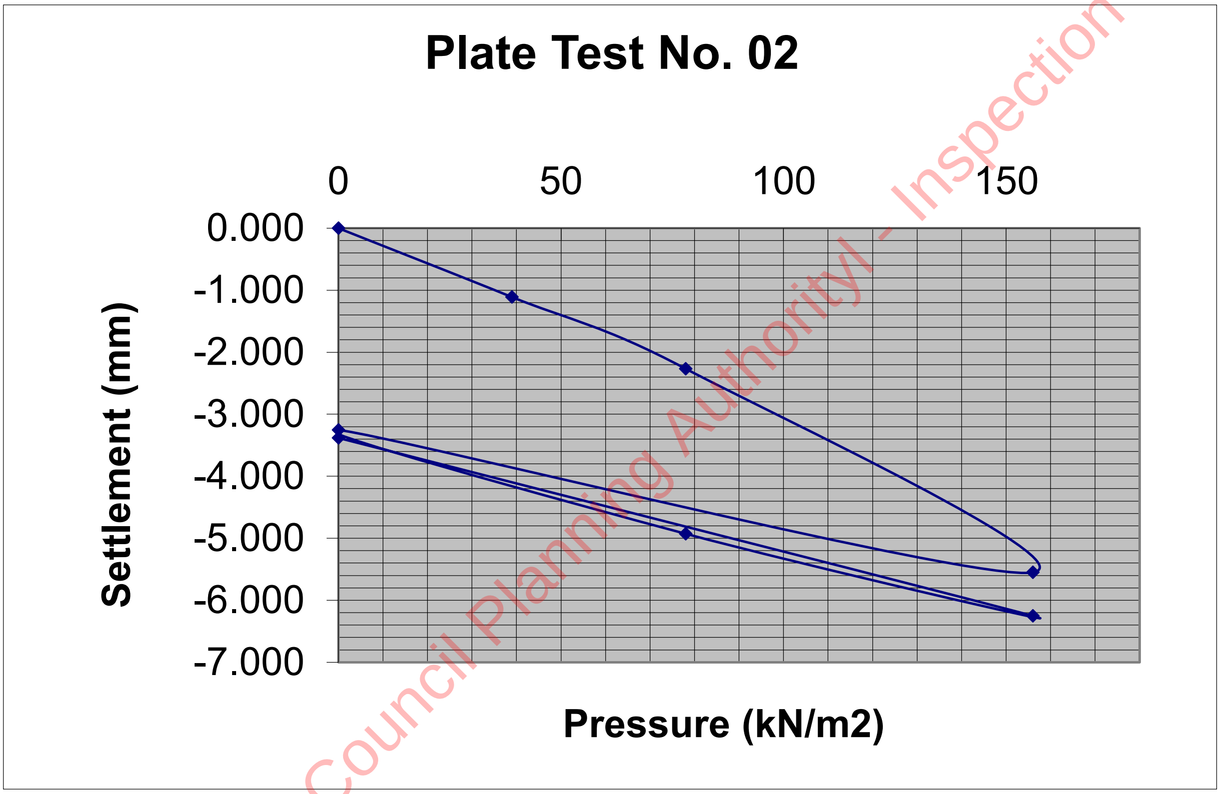
BH-02

APPENDIX 6 – Plate Testing Records

Applied Load	Gauge settlement
0	**0.000**
39	-1.111
78	-2.266
156	-5.551
0	-3.254
78	-4.9275
156	-6.252
0	-3.382

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Cornamaddy	**MATERIAL**	Possible MADE GROUND: Greyish brown slightly sandy gravelly silty CLAY with occasional cobbles and boulders
CONTRACT NO.	12205-09-22		
DATE	24/10/2022		
CLIENT	AKM Design	**DEPTH**	0.50m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-02	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **20.58 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **27.86 MN/m2/m**

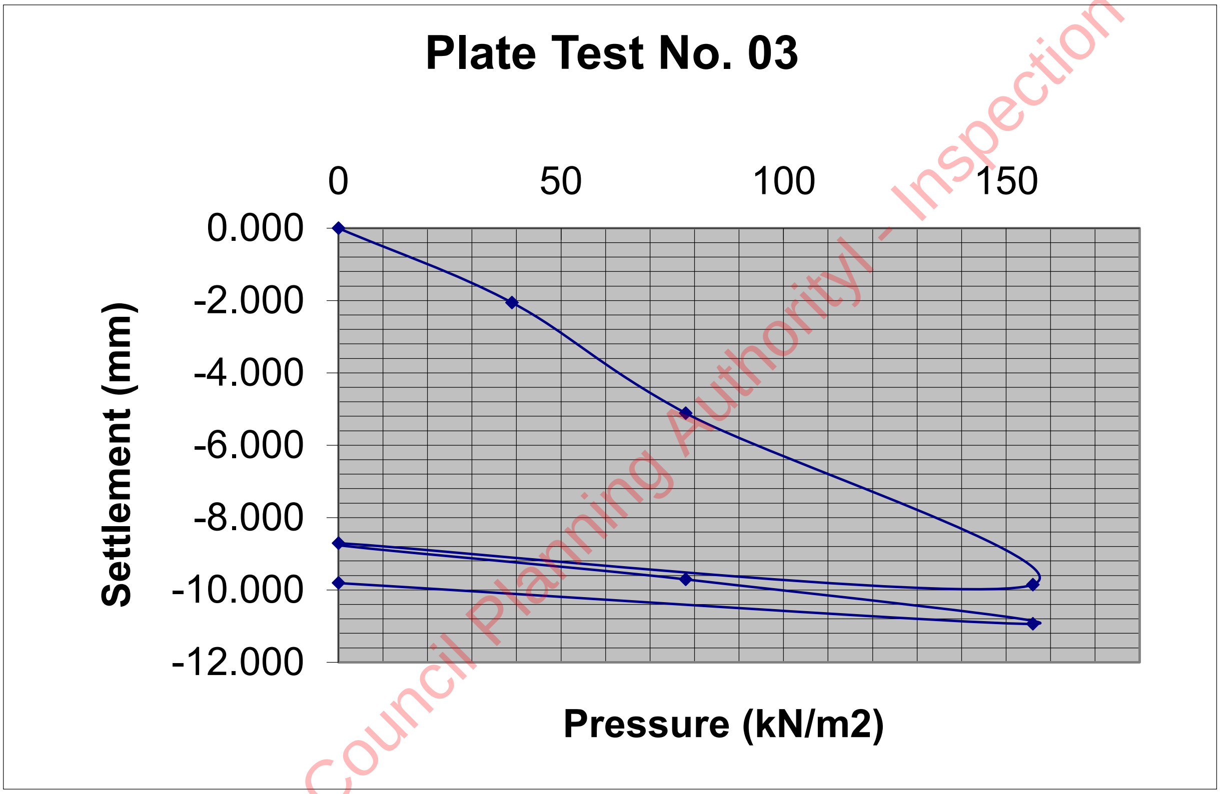
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **1.82 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **3.08 %**

Applied Load	Gauge settlement
0	**0.000**
39	-2.058
78	-5.111
156	-9.8525
0	-8.7125
78	-9.7075
156	-10.939
0	-9.81

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Cornamaddy	**MATERIAL**	Soft to firm grey slightly sandy gravelly silty CLAY with occasional cobbles
CONTRACT NO.	12205-09-22		
DATE	18/10/2022		
CLIENT	AKM Design	**DEPTH**	0.50m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-03	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **9.12 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **46.86 MN/m2/m**

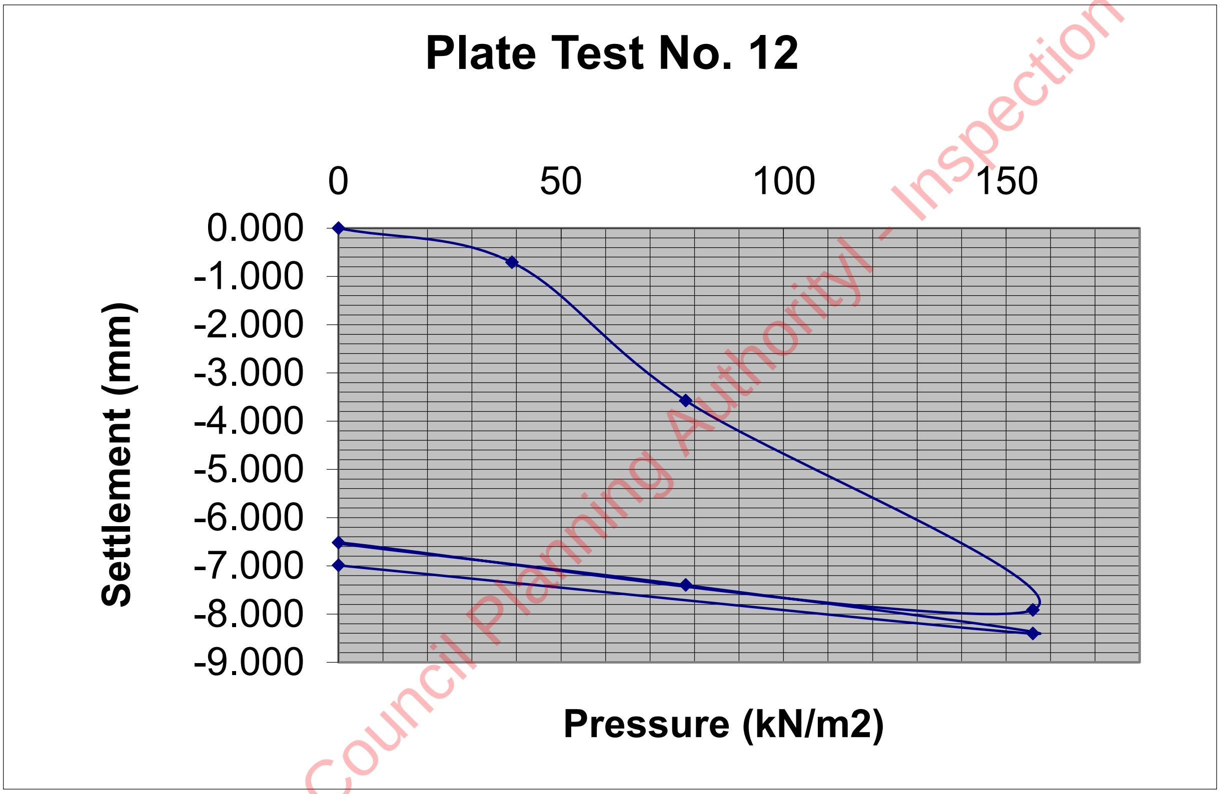
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.44 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **7.58 %**

Applied Load	Gauge settlement
0	**0.000**
39	-0.709
78	-3.5725
156	-7.915
0	-6.5165
78	-7.4
156	-8.4055
0	-6.99

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Cornamaddy	**MATERIAL**	Firm light brown slightly sandy slightly gravelly CLAY with occasional cobbles and boulders
CONTRACT NO.	12205-09-22		
DATE	18/10/2022		
CLIENT	AKM Design	**DEPTH**	0.50m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-12	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **13.05 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **52.77 MN/m2/m**

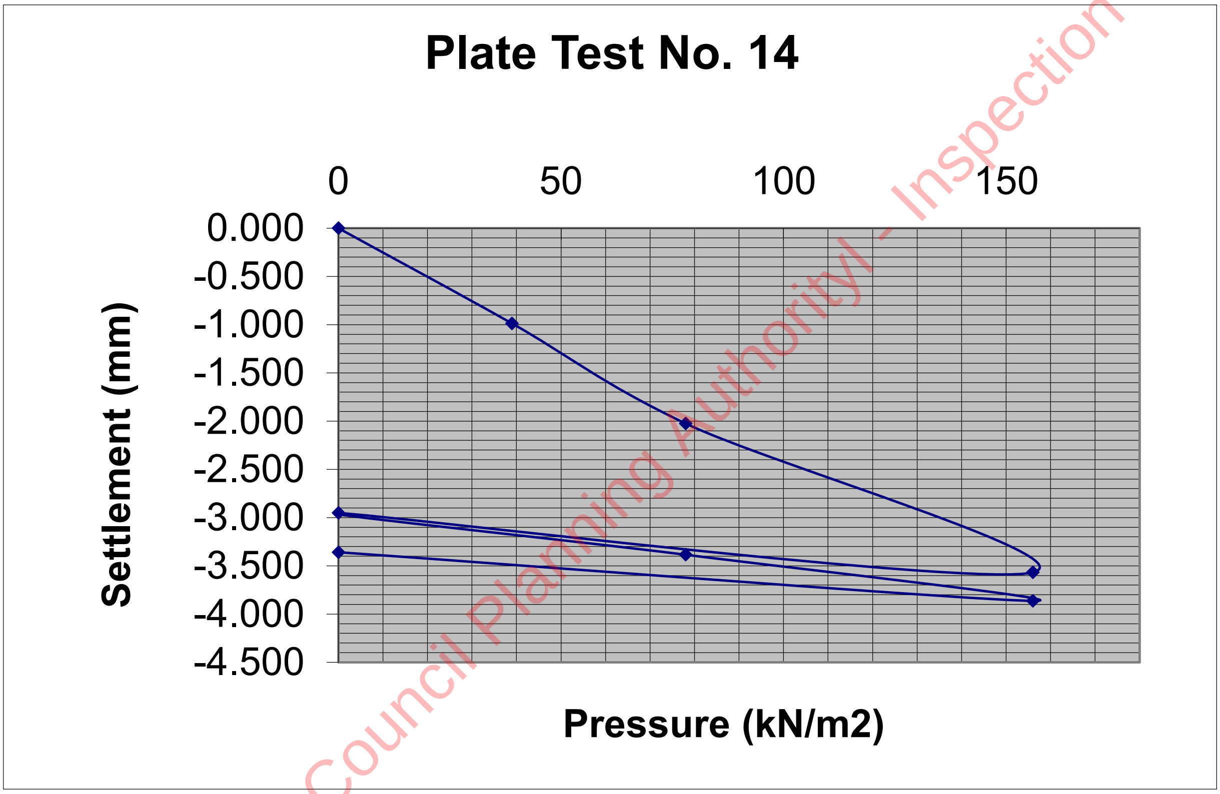
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.83 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **9.32 %**

Applied Load	Gauge settlement
0	**0.000**
39	-0.9875
78	-2.0245
156	-3.568
0	-2.9525
78	-3.385
156	-3.863
0	-3.359

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Cornamaddy	**MATERIAL**	Soft to firm grey mottled brown slightly sandy slightly gravelly CLAY with occasional cobbles
CONTRACT NO.	12205-09-22		
DATE	18/10/2022		
CLIENT	AKM Design	**DEPTH**	0.50m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-14	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **23.03 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **107.80 MN/m2/m**

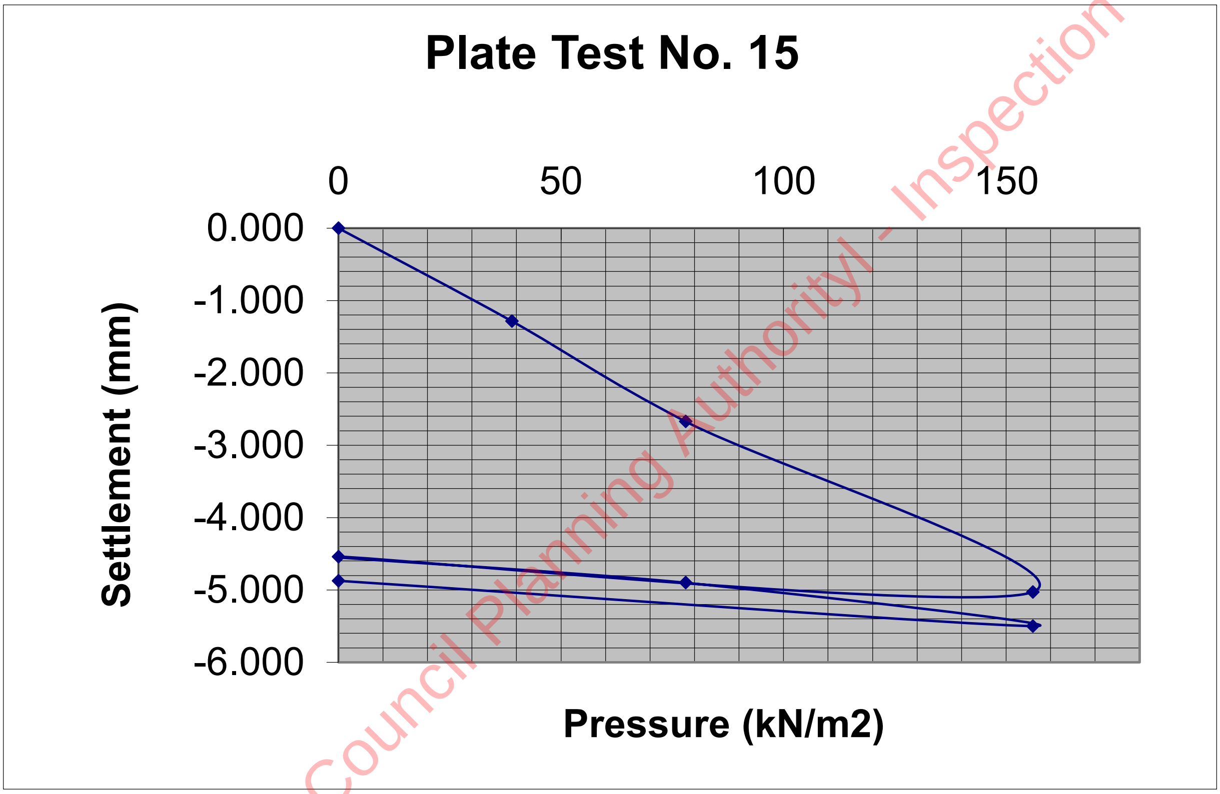
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **2.21 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **32.13 %**

Applied Load	Gauge settlement
0	**0.000**
39	-1.2865
78	-2.672
156	-5.0275
0	-4.5395
78	-4.9005
156	-5.499
0	-4.8735

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Cornamaddy	**MATERIAL**	Firm grey mottled brown slightly sandy slightly gravelly silty CLAY with occasional cobbles
CONTRACT NO.	12205-09-22		
DATE	21/10/2022		
CLIENT	AKM Design	**DEPTH**	0.50m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-15	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **17.45 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **129.15 MN/m2/m**

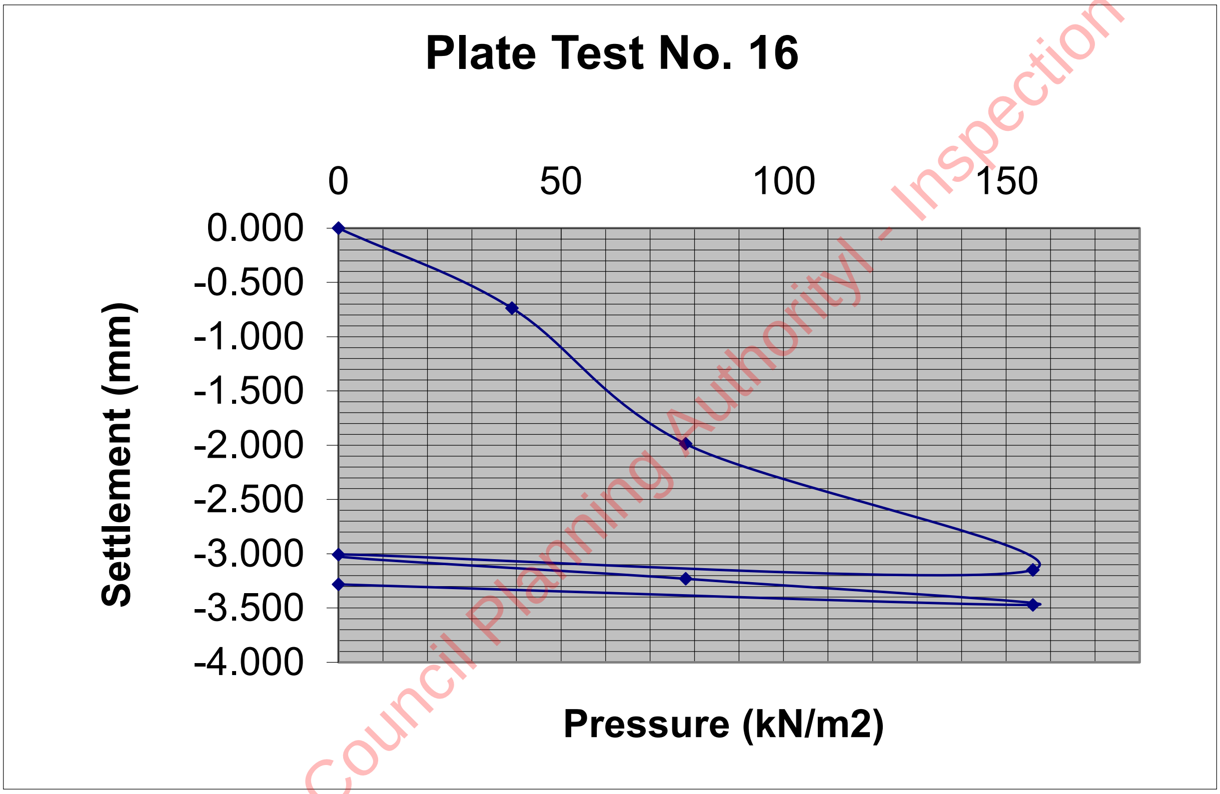
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **1.37 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **43.94 %**

Applied Load	Gauge settlement
0	**0.000**
39	-0.7375
78	-1.9875
156	-3.1485
0	-3.0075
78	-3.2305
156	-3.471
0	-3.282

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Cornamaddy	**MATERIAL**	Firm grey mottled brown slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders
CONTRACT NO.	12205-09-22		
DATE	21/10/2022		
CLIENT	AKM Design	**DEPTH**	0.50m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-16	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **23.46 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **209.07 MN/m2/m**

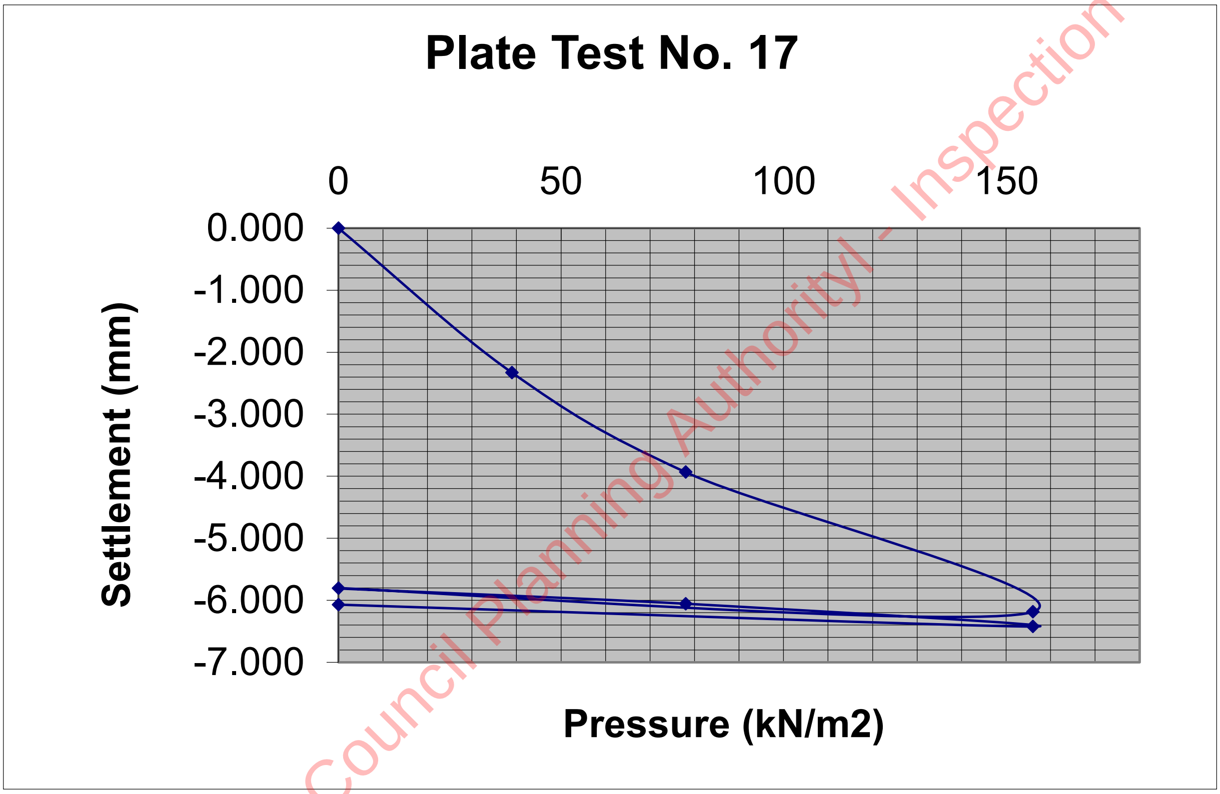
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **2.29 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **101.25 %**

Applied Load	Gauge settlement
0	**0.000**
39	-2.33
78	-3.934
156	-6.1865
0	-5.8035
78	-6.0555
156	-6.423
0	-6.07

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Cornamaddy	**MATERIAL**	Soft to firm brown slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders
CONTRACT NO.	12205-09-22		
DATE	24/10/2022		
CLIENT	AKM Design	**DEPTH**	0.50m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-17	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **11.85 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **185.01 MN/m2/m**

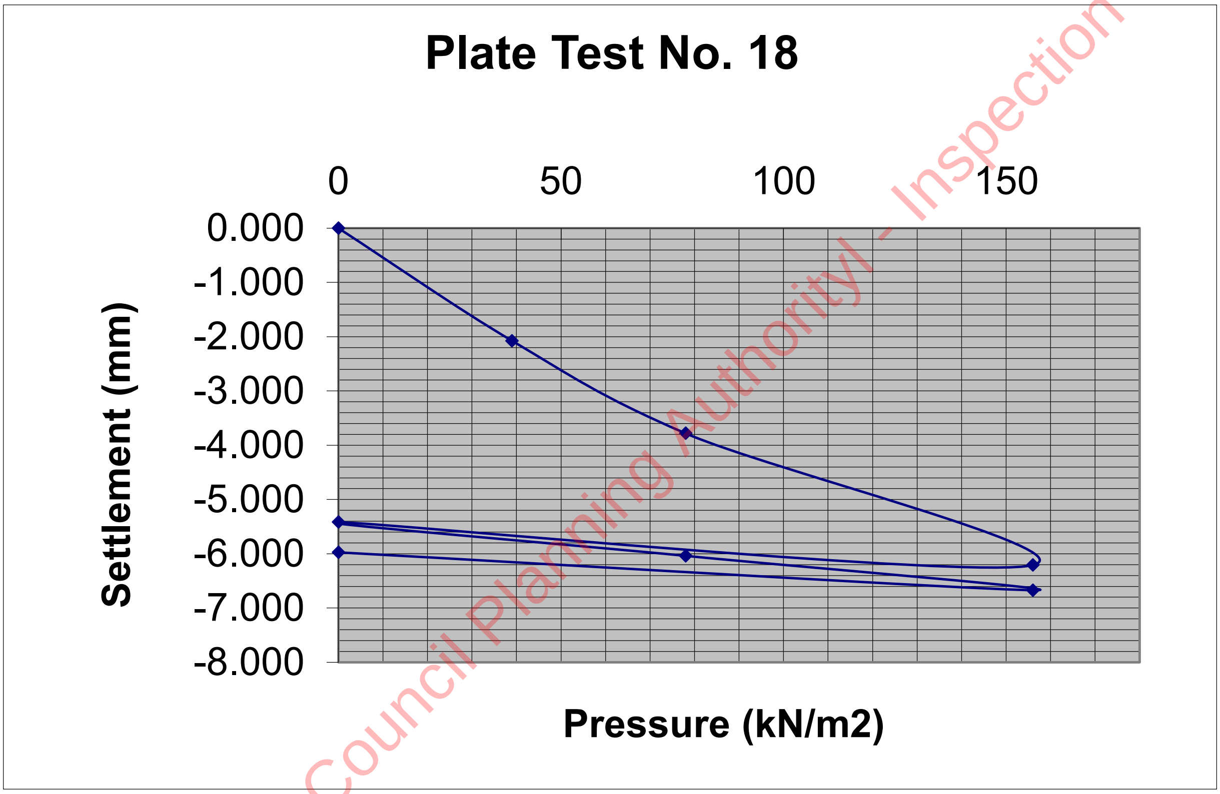
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.70 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **81.92 %**

Applied Load	Gauge settlement
0	**0.000**
39	-2.075
78	-3.781
156	-6.208
0	-5.4165
78	-6.038
156	-6.6705
0	-5.974

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Cornamaddy	**MATERIAL**	Soft to firm grey slightly sandy slightly gravelly silty CLAY with many cobbles and boulders
CONTRACT NO.	12205-09-22		
DATE	18/10/2022		
CLIENT	AKM Design	**DEPTH**	0.50m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-18	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **12.33 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **75.02 MN/m2/m**

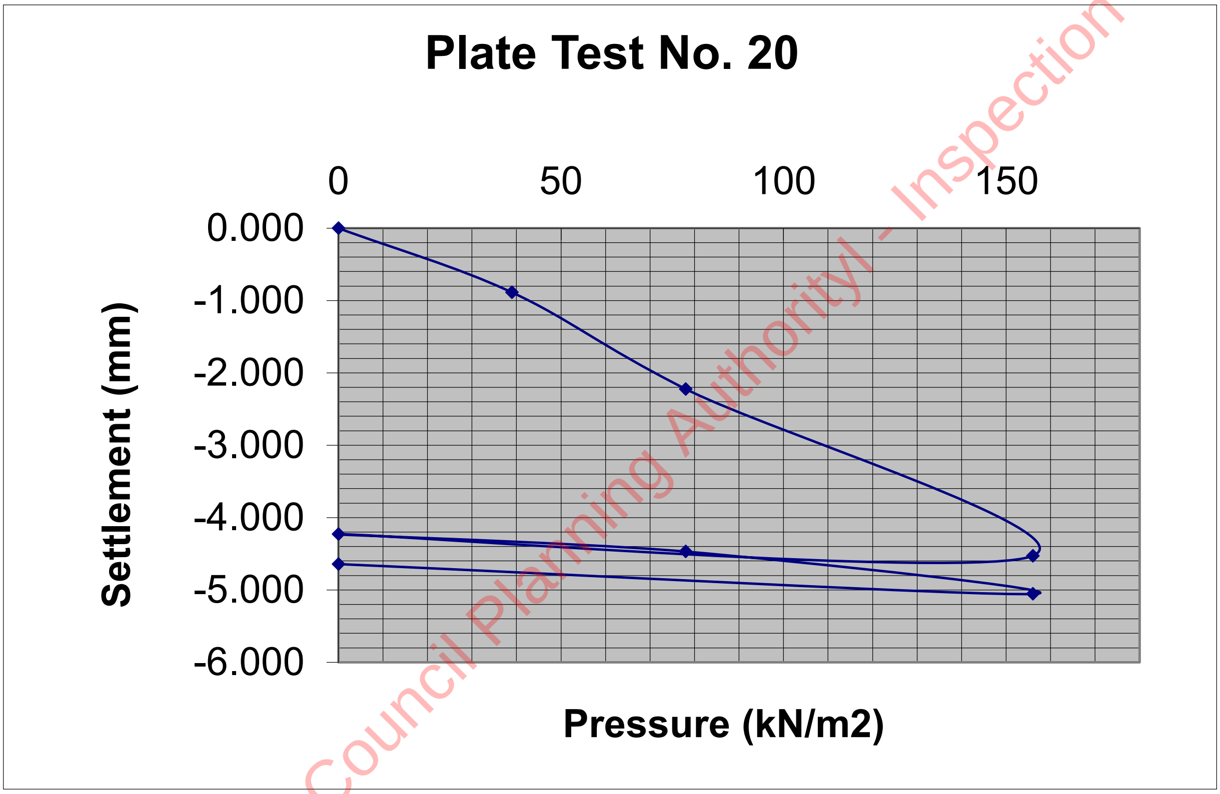
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.75 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **17.14 %**

Applied Load	Gauge settlement
0	**0.000**
39	-0.8875
78	-2.2225
156	-4.528
0	-4.2275
78	-4.4695
156	-5.0555
0	-4.643

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Cornamaddy	**MATERIAL**	Soft to firm grey mottled brown slightly sandy slightly gravelly silty CLAY with occasional cobbles
CONTRACT NO.	12205-09-22		
DATE	18/10/2022		
CLIENT	AKM Design	**DEPTH**	0.50m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-20	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **20.98 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **192.66 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **1.88 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **87.88 %**

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Trial Pit Number: CBR-01
Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 3.00m x 1.80m x 0.60m (L x W x D)	Ground Level (mOD): 44.17	Client: AKM Design	Job Number: 12205-09-22
	Location: 606395.3 E 742928.2 N	Dates: 24/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			Seepage(1) at 0.40m.		(0.60)	MADE GROUND: Grey slightly sandy slightly silty clayey subangular to subrounded fine to coarse Gravel with occassional cobbles and boulders and with occasional fragments of plastic, metal and timber		∇1
0.60	B			43.57	0.60	Complete at 0.60m		

Plan

Remarks

Groundwater encountered at 0.70m BGL; Seepage
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-01

Ground Investigations Ireland Ltd
www.gii.ie

Site	Cornamaddy Athlone Northern Site		**Trial Pit Number**	**CBR-04**
Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 4.70m x 2.10m x 1.80m (L x W x D)	**Ground Level (mOD)** 40.34	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606166.8 E 743253.9 N	**Dates** 18/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			Seepage(1) at 0.70m.		(1.50)	Very soft brown slightly gravelly clayey pseudo fibrous PEAT		∇1
1.60	B			38.84	1.50 (0.30)	Very soft grey slightly sandy slightly clayey SILT with occasional organic fibres		
				38.54	1.80	Complete at 1.80m		

Plan

Remarks

Groundwater encountered at 0.70m BGL; Seepage
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-04

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Trial Pit Number: CBR-05
Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 3.90m x 2.10m x 1.70m (L x W x D)	Ground Level (mOD): 40.34	Client: AKM Design	Job Number: 12205-09-22
	Location: 606227.5 E 743279.6 N	Dates: 18/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
			Medium Ingress(1) at 0.70m.		(1.40)	Very soft brown slighty gravelly clayey pseudo fibrous PEAT with a tree stump. Strong organic odour encountered between GL to 1.40m		∇1
1.50	B			38.94	1.40 (0.30)	Very soft greenish grey slightly sandy slightly gravelly slightly clayey SILT with occasional cobbles and organic fibres		
				38.64	1.70	Complete at 1.70m		

Plan

Remarks

Groundwater encoutered at 0.70m BGL; Medium Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-05

Ground Investigations Ireland Ltd
www.gii.ie

Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 3.00m x 2.10m x 0.90m (L x W x D)	**Ground Level (mOD)** 40.16	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606221.1 E 743349.6 N	**Dates** 18/10/2022	**Engineer**	**Sheet** 1/1

Site: Cornamaddy Athlone Northern Site

Trial Pit Number: CBR-06

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.60)	Very soft brown slightly gravelly clayey pseudo fibrous PEAT with occasional cobbles		
				39.56	0.60			
0.70	B		Fast Ingress(1) at 0.70m.		(0.30)	Very soft grey slightly sandy slightly clayey gravelly SILT with many cobbles and boulders and with organic pockets		∇1
				39.26	0.90	Complete at 0.90m		

Plan

Remarks

Groundwater encountered at 0.70m BGL; Fast Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-06

Ground Investigations Ireland Ltd
www.gii.ie

Site: Cornamaddy Athlone Northern Site				**Trial Pit Number**: CBR-07
Machine: 14T tracked excavator **Method**: Trial Pit	**Dimensions**: 4.20m x 2.10m x 1.20m (L x W x D)	**Ground Level (mOD)**: 40.37	**Client**: AKM Design	**Job Number**: 12205-09-22
	Location: 606157.4 E 743323.6 N	**Dates**: 18/10/2022	**Engineer**:	**Sheet**: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.80)	Very soft brown slightly gravelly clayey pseudo fibrous PEAT		
			Fast Ingress(1) at 0.80m.	39.57	0.80	Very soft grey slightly sandy slightly gravelly slightly clayey SILT with occasional organic fibres		∇1
1.00	B				(0.40)			
				39.17	1.20	Complete at 1.20m		

Plan

Remarks

Groundwater encountered at 0.80m BGL; Fast Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-07

Ground Investigations Ireland Ltd www.gii.ie	**Site** Cornamaddy Athlone Northern Site		**Trial Pit Number** **CBR-08**
Machine : 5T tracked excavator **Method :** Trial Pit	**Dimensions** 4.80m x 2.10m x 1.00m (L x W x D)	**Ground Level (mOD)** 40.41	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606074.8 E 743293.9 N	**Dates** 18/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.70)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
				39.71	0.70			
0.80	B		Fast Ingress(1) at 0.80m.		(0.30)	Very soft brownish grey slightly sandy slightly clayey SILT with many cobbles and boulders and with occasional organic fibres		∇1
				39.41	1.00	Complete at 1.00m		

Plan

Remarks

Groundwater encountered at 0.80m BGL; Fast Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	**Logged By**	**Figure No.**
1:25	CMP RH	12205-09-22.CBR-08

Ground Investigations Ireland Ltd www.gii.ie			Site Cornamaddy Athlone Northern Site	Trial Pit Number CBR-09
Machine : 14T tracked excavator Method : Trial Pit	Dimensions 3.50m x 1.80m x 1.20m (L x W x D)	Ground Level (mOD) 40.17	Client AKM Design	Job Number 12205-09-22
	Location 606012.5 E 743250.6 N	Dates 24/10/2022	Engineer	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.60)	Very soft brown slightly gravelly clayey pseudo fibrous PEAT		
				39.57	0.60	Very soft to soft light grey slightly sandy slightly gravelly clayey SILT with occasional cobbles and boulders		
0.80	B		Seepage(1) at 0.80m.		(0.30)			∇1
				39.27	0.90	Soft to firm grey slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders		
					(0.30)			
				38.97	1.20	Complete at 1.20m		

Plan

Remarks

Groundwater encountered at 0.80m BGL; Seepage
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-09

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Trial Pit Number: **CBR-10**
Machine : 14T Tracked excavator **Method :** Trial Pit	**Dimensions** 4.90m x 2.10m x 1.20m (L x W x D) · **Ground Level (mOD)** 40.54	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606064.6 E 743209.1 N · **Dates** 18/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.85)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT with occasional fragments of wood		
1.00	B		Fast Ingress(1) at 1.00m.	39.69	0.85 (0.35)	Very soft grey slightly sandy slightly clayey SILT with many cobbles and boulders and occasional organic fibres		∇1
				39.34	1.20	Complete at 1.20m		

Plan

Remarks

Groundwater encountered at 1.00m BGL; Fast Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-10

Ground Investigations Ireland Ltd www.gii.ie	Site Cornamaddy Athlone Northern Site	Trial Pit Number **CBR-11**

Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 3.50m x 1.80m x 0.80m (L x W x D)	**Ground Level (mOD)** 40.45	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606034.3 E 743136.8 N	**Dates** 24/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Very soft brown slightly gravelly clayey pseudo fibrous PEAT with occasional cobbles and boulders		
			Fast Ingress(1) at 0.50m.	39.95	0.50			∇1
					(0.30)	Grey slightly sandy slightly silty slightly clayey subangular to subrounded fine to coarse GRAVEL with many cobbles and boulders		
				39.65	0.80			
0.80	B					Complete at 0.80m		

Plan

Remarks

Groundwater encountered at 0.50m BGL; Fast Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-11

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: CBR-13
Machine : 14T tracked excavator Method : Trial Pit	Client: AKM Design	Job Number: 12205-09-22

Dimensions	Ground Level (mOD)	Location	Dates	Engineer	Sheet
3.80m x 2.10m 0.80m (L x W x D)	40.97	606097.1 E 743072.8 N	18/10/2022		1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.65)	Very soft dark brown slightly gravelly slightly clayey amorphous PEAT with rootlets and many boulders		
				40.32	0.65 (0.15)	Firm grey slightly sandy slightly gravelly silty CLAY with many cobbles and boulders		
				40.17	0.80			∇1
0.80	B		Seepage(1) at 0.80m.			Complete at 0.80m		

Plan

Remarks

Groundwater encountered at 0.80m BGL; Seepage
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-13

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: **CBR-19**

Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 3.80m x 2.10m x 1.20m (L x W x D)	Ground Level (mOD): 40.44	Client: AKM Design	Job Number: 12205-09-22
	Location: 605897.1 E 743143.8 N	Dates: 18/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.80)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
			Fast Ingress(1) at 0.60m.					∇1
				39.64	0.80	Very soft grey slightly sandy clayey SILT with occasional organic fibres		
1.00	B				(0.40)			
				39.24	1.20	Complete at 1.20m		

Plan

Remarks

Groundwater encountered at 0.60m BGL; Fast Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-19

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www.gii.ie

Site	Cornamaddy Athlone Northern Site		**Trial Pit Number**	**CBR-21**
Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 3.50m x 1.80m x 1.10m (L x W x D)	**Ground Level (mOD)** 41.06	**Client** AKM Design	**Job Number** 12205-09-22
	Location 605907.4 E 743047.5 N	**Dates** 21/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.60)	Very soft brown slightly gravelly clayey pseudo fibrous PEAT with occasional cobbles and boulders		
				40.46	0.60	Soft to firm grey mottled brown slightly sandy slightly gravelly clayey SILT with occasional cobbles and boulders		∇1
0.80	B		Medium Ingress(1) at 0.70m.		(0.50)			
				39.96	1.10	Complete at 1.10m		

Plan

Remarks

Groundwater encountered at 0.50m BGL; Fast Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-11

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Trial Pit Number: **CBR-22**
Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 3.80m x 2.10m x 1.20m (L x W x D)	**Ground Level (mOD)** 40.63	**Client** AKM Design	**Job Number** 12205-09-22
	Location 605857.6 E 743074.1 N	**Dates** 18/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.80)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT with rootlets		
				39.83	0.80	Soft to firm grey slightly sandy slightly gravelly silty CLAY with many cobbles and boulders		
1.00	B		Fast Ingress(1) at 1.00m.		(0.40)			∇1
				39.43	1.20	Complete at 1.20m		

Plan

Remarks

Groundwater encountered at 1.00m BGL; Fast Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-22

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: CBR-23

Machine : 14T tracked excavator	Dimensions: 3.90m x 2.10m x 1.50m (L x W x D)	Ground Level (mOD): 40.61	Client: AKM Design	Job Number: 12205-09-22
Method : Trial Pit	Location: 605833.3 E 743111.6 N	Dates: 18/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(1.30)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT with occasional fragments of wood		
			Fast Ingress(1) at 1.20m.					▽1
				39.31	1.30 (0.20)	Soft grey slightly sandy slightly gravelly clayey SILT with occasional cobbles and occasional organic fibres		
1.50	B			39.11	1.50	Complete at 1.50m		

Plan

Remarks

Groundwater encountered at 1.20m BGL; Fast Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.CBR-23

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: CBR-24

Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 4.00m x 2.10m x1.00m (L x W x D)	Ground Level (mOD): 40.87	Client: AKM Design	Job Number: 12205-09-22
	Location: 605814.4 E 743069.5 N	Dates: 18/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.70)	MADE GROUND: Dark brown slightly gravelly clayey pseudo fibrous Peat with occasional cobbles and boulders and with rootlets Encountered orange ceramic land drain at 0.40m BGL		
				40.17	0.70	Possible MADE GROUND: Grey slightly gravelly clayey silty fine to coarse Sand with occasional cobbles and boulders		
0.90	B				(0.30)			
				39.87	1.00	Complete at 1.00m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:50	CMP RH	12205-09-22.CBR-24

APPENDIX 7 – Laboratory Testing

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

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Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

UKAS TESTING 4225

Attention :	James Cashen
Date :	10th November, 2022
Your reference :	12205-09-22
Our reference :	Test Report 22/17822 Batch 1
Location :	Cornamaddy Athlone Northern Site
Date samples received :	28th October, 2022
Status :	Final Report
Issue :	1

Fourteen samples were received for analysis on 28th October, 2022 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.

Authorised By:

Bruce Leslie
Project Manager

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	1-4	5-8	9-12	17-20	21-24	25-28	29-32	37-40	41-44	45-48	LOD/LOR	Units	Method No.
Sample ID	TP-01	TP-02	TP-03	TP-06	TP-07	TP-10	TP-11	TP-13	TP-15	TP-17			
Depth	0.00-0.60	0.00-0.90	1.40-2.10	1.00-2.70	1.10-2.30	0.20-0.80	0.20-0.50	0.75-2.00	0.30-0.70	0.20-1.40			
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	24/10/2022	24/10/2022	21/10/2022	21/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022			
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	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022			
Antimony	1	<1	1	1	<1	1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Arsenic #	7.5	5.7	2.3	6.3	9.0	5.6	4.5	14.9	3.2	20.0	<0.5	mg/kg	TM30/PM15
Barium #	45	35	17	60	27	13	16	45	15	69	<1	mg/kg	TM30/PM15
Cadmium #	1.1	0.9	0.5	1.3	0.8	0.7	0.7	1.8	0.5	1.2	<0.1	mg/kg	TM30/PM15
Chromium #	57.3	41.1	107.7	59.1	38.3	94.0	48.8	42.6	43.8	37.2	<0.5	mg/kg	TM30/PM15
Copper #	15	15	6	17	8	8	7	26	6	18	<1	mg/kg	TM30/PM15
Lead #	10	10	<5	10	6	8	<5	16	<5	11	<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 #	3.3	2.4	6.4	3.4	3.0	5.6	3.0	3.4	2.7	3.5	<0.1	mg/kg	TM30/PM15
Nickel #	32.4	30.1	14.2	37.1	19.1	27.5	16.4	58.5	13.1	53.6	<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	1	1	<1	<1	<1	3	<1	<1	<1	mg/kg	TM30/PM15
Zinc #	57	50	23	74	35	44	28	104	17	75	<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	<0.03	<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	<0.03	<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	<0.02	<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	0.09	<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	101	96	94	95	93	97	93	98	94	95	<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30	<30	221	<30	<30	<30	<30	<30	<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: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	1-4	5-8	9-12	17-20	21-24	25-28	29-32	37-40	41-44	45-48	LOD/LOR	Units	Method No.
Sample ID	TP-01	TP-02	TP-03	TP-06	TP-07	TP-10	TP-11	TP-13	TP-15	TP-17			
Depth	0.00-0.60	0.00-0.90	1.40-2.10	1.00-2.70	1.10-2.30	0.20-0.80	0.20-0.50	0.75-2.00	0.30-0.70	0.20-1.40			
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	24/10/2022	24/10/2022	21/10/2022	21/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022			
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	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022			
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<0.2	<0.2	<0.2	<0.2	119.8	<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	101	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	<26	<26	<26	221	<26	<26	<26	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	<10	<10	<10	<10	299	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	<10	<10	<10	<10	<10	<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	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	<0.2	<0.2	<0.2	30.7	<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	24	<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	25	40	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	<26	<26	<26	<26	95	<26	<26	<26	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	<52	<52	<52	<52	316	<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	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	<10	<10	<10	<10	71	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	<10	<10	<10	23	29	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
Benzene #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
Toluene #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35 SV	<35	<35	<35	ug/kg	TM17/PM8

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

Report : **Solid**

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Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-4	5-8	9-12	17-20	21-24	25-28	29-32	37-40	41-44	45-48			
Sample ID	TP-01	TP-02	TP-03	TP-06	TP-07	TP-10	TP-11	TP-13	TP-15	TP-17			
Depth	0.00-0.60	0.00-0.90	1.40-2.10	1.00-2.70	1.10-2.30	0.20-0.80	0.20-0.50	0.75-2.00	0.30-0.70	0.20-1.40			
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	24/10/2022	24/10/2022	21/10/2022	21/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022			
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	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022			
Natural Moisture Content	18.3	15.2	32.7	78.4	42.9	16.3	10.5	26.1	6.4	17.0	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	15.5	13.2	24.7	43.9	30.0	14.0	9.5	20.7	6.0	14.5	<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	57.3	41.1	107.7	59.1	38.3	94.0	48.8	42.6	43.8	37.2	<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.33	0.14	0.55	2.70	0.96	0.12	0.31	0.52	0.06	0.20	<0.02	%	TM21/PM24
pH #	8.19	8.35	8.04	7.73	7.66	8.75	8.47	8.10	8.95	8.63	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1063	0.1012	0.1404	0.1534	0.1461	0.1057	0.0997	0.1192	0.1003	0.1053		kg	NONE/PM17
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

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Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	49-52	53-56			
Sample ID	TP-18	TP-19			
Depth	0.50-1.10	0.70-1.40			
COC No / misc					
Containers	V J T	V J T			
Sample Date	20/10/2022	20/10/2022			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	28/10/2022	28/10/2022	LOD/LOR	Units	Method No.
Antimony	<1	1	<1	mg/kg	TM30/PM15
Arsenic #	2.9	12.9	<0.5	mg/kg	TM30/PM15
Barium #	10	39	<1	mg/kg	TM30/PM15
Cadmium #	0.7	1.2	<0.1	mg/kg	TM30/PM15
Chromium #	50.1	57.9	<0.5	mg/kg	TM30/PM15
Copper #	3	16	<1	mg/kg	TM30/PM15
Lead #	<5	9	<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum #	3.0	3.8	<0.1	mg/kg	TM30/PM15
Nickel #	13.0	55.4	<0.7	mg/kg	TM30/PM15
Selenium #	<1	4	<1	mg/kg	TM30/PM15
Zinc #	21	56	<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	112	94	<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30	mg/kg	TM5/PM8/PM16

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Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	49-52	53-56	LOD/LOR	Units	Method No.
Sample ID	TP-18	TP-19			
Depth	0.50-1.10	0.70-1.40			
COC No / misc					
Containers	V J T	V J T			
Sample Date	20/10/2022	20/10/2022			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	28/10/2022	28/10/2022			
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)#	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)#	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)#	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	<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_1D_AL)	<10	<10	<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_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_1D_AR)	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	<52	<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_1D_AR)	<10	<10	<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_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	<5	<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

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	49-52	53-56									LOD/LOR	Units	Method No.
Sample ID	TP-18	TP-19											
Depth	0.50-1.10	0.70-1.40											
COC No / misc													
Containers	V J T	V J T											
Sample Date	20/10/2022	20/10/2022											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	28/10/2022	28/10/2022											
Natural Moisture Content	9.8	99.2									<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	8.9	49.8									<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3									<0.3	mg/kg	TM38/PM20
Chromium III	50.1	57.9									<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.06	2.33									<0.02	%	TM21/PM24
pH #	8.87	7.60									<0.01	pH units	TM73/PM11
Mass of raw test portion	0.0992	0.1813										kg	NONE/PM17
Mass of dried test portion	0.09	0.09										kg	NONE/PM17

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Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	1-4	5-8	9-12	17-20	21-24	25-28	29-32	37-40	41-44	45-48			
Sample ID	TP-01	TP-02	TP-03	TP-06	TP-07	TP-10	TP-11	TP-13	TP-15	TP-17			
Depth	0.00-0.60	0.00-0.90	1.40-2.10	1.00-2.70	1.10-2.30	0.20-0.80	0.20-0.50	0.75-2.00	0.30-0.70	0.20-1.40			
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	24/10/2022	24/10/2022	21/10/2022	21/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022			
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	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022			
Dissolved Antimony#	<0.002	<0.002	0.016	0.017	0.015	<0.002	<0.002	0.016	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10)#	<0.02	<0.02	0.16	0.17	0.15	<0.02	<0.02	0.16	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic#	0.0026	<0.0025	0.0064	0.0041	0.0087	<0.0025	<0.0025	0.0049	<0.0025	<0.0025	<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10)#	0.026	<0.025	0.064	0.041	0.087	<0.025	<0.025	0.049	<0.025	<0.025	<0.025	mg/kg	TM30/PM17
Dissolved Barium#	0.008	0.004	0.021	0.032	0.032	<0.003	<0.003	0.023	<0.003	0.005	<0.003	mg/l	TM30/PM17
Dissolved Barium (A10)#	0.08	0.04	0.21	0.32	0.32	<0.03	<0.03	0.23	<0.03	0.05	<0.03	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	0.003	0.031	0.028	0.100	<0.002	<0.002	0.074	<0.002	0.002	<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10)#	0.03	0.03	0.31	0.28	1.00	<0.02	<0.02	0.74	<0.02	0.02	<0.02	mg/kg	TM30/PM17
Dissolved Nickel#	<0.002	<0.002	0.003	0.007	0.004	<0.002	<0.002	0.024	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10)#	<0.02	<0.02	0.03	0.07	0.04	<0.02	<0.02	0.24	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium#	<0.003	<0.003	0.008	0.008	0.007	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10)#	<0.03	<0.03	0.08	0.08	0.07	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc#	<0.003	<0.003	0.003	0.003	<0.003	0.004	<0.003	<0.003	<0.003	0.003	<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10)#	<0.03	<0.03	0.03	<0.03	<0.03	0.04	<0.03	<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	0.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.4	<0.3	mg/l	TM173/PM0
Fluoride	5	<3	<3	<3	<3	<3	<3	<3	<3	4	<3	mg/kg	TM173/PM0
Sulphate as SO4#	1.3	0.8	23.1	53.9	46.3	0.7	<0.5	20.9	0.5	0.8	<0.5	mg/l	TM38/PM0
Sulphate as SO4#	13	8	231	539	463	7	<5	209	<5	8	<5	mg/kg	TM38/PM0
Chloride#	0.8	<0.3	0.7	1.1	1.2	0.4	<0.3	12.4	<0.3	0.4	<0.3	mg/l	TM38/PM0
Chloride#	8	<3	7	11	12	4	<3	124	<3	4	<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	<2	8	10	9	<2	3	3	<2	<2	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20	80	100	90	<20	30	30	<20	<20	<20	mg/kg	TM60/PM0
pH	8.40	8.56	8.38	8.36	8.28	8.29	8.52	8.32	9.15	8.33	<0.01	pH units	TM73/PM0
Total Dissolved Solids#	48	<35	131	177	174	<35	63	130	<35	36	<35	mg/l	TM20/PM0
Total Dissolved Solids#	480	<350	1310	1769	1740	<350	630	1300	<350	360	<350	mg/kg	TM20/PM0

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Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	49-52	53-56	LOD/LOR	Units	Method No.
Sample ID	TP-18	TP-19			
Depth	0.50-1.10	0.70-1.40			
COC No / misc					
Containers	V J T	V J T			
Sample Date	20/10/2022	20/10/2022			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	28/10/2022	28/10/2022			
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	0.016	<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	0.16	<0.03	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	0.012	<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	0.12	<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	0.006	<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	0.06	<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	88.6	<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	<5	886	<5	mg/kg	TM38/PM0
Chloride #	<0.3	1.4	<0.3	mg/l	TM38/PM0
Chloride #	<3	14	<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	6	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	60	<20	mg/kg	TM60/PM0
pH	9.03	8.35	<0.01	pH units	TM73/PM0
Total Dissolved Solids #	<35	267	<35	mg/l	TM20/PM0
Total Dissolved Solids #	<350	2670	<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.

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

Report : **EN12457_2**

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-4	5-8	9-12	17-20	21-24	25-28	29-32	37-40	41-44	45-48						
Sample ID	TP-01	TP-02	TP-03	TP-06	TP-07	TP-10	TP-11	TP-13	TP-15	TP-17						
Depth	0.00-0.60	0.00-0.90	1.40-2.10	1.00-2.70	1.10-2.30	0.20-0.80	0.20-0.50	0.75-2.00	0.30-0.70	0.20-1.40						
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	24/10/2022	24/10/2022	21/10/2022	21/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1	1	1	1	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Date of Receipt	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022						
Solid Waste Analysis																
Total Organic Carbon #	0.33	0.14	0.55	2.70	0.96	0.12	0.31	0.52	0.06	0.20	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025^{SV}	<0.025	<0.025	6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035^{SV}	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	221	<30	<30	<30	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	<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 Sum of 17	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	0.026	<0.025	0.064	0.041	0.087	<0.025	<0.025	0.049	<0.025	<0.025	0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	0.08	0.04	0.21	0.32	0.32	<0.03	<0.03	0.23	<0.03	0.05	20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	0.03	0.03	0.31	0.28	1.00	<0.02	<0.02	0.74	<0.02	0.02	0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	0.03	0.07	0.04	<0.02	<0.02	0.24	<0.02	<0.02	0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	0.16	0.17	0.15	<0.02	<0.02	0.16	<0.02	<0.02	0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	0.08	0.08	0.07	<0.03	<0.03	<0.03	<0.03	<0.03	0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03	0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	0.03	4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	480	<350	1310	1769	1740	<350	630	1300	<350	360	4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	<20	<20	80	100	90	<20	30	30	<20	<20	500	800	1000	<20	mg/kg	TM60/PM0
Dry Matter Content Ratio	85.0	89.0	64.1	58.5	61.6	85.4	90.0	75.7	90.0	85.5	-	-	-	<0.1	%	NONE/PM4
Moisture Content 105C (% Dry Weight)	17.7	12.3	55.9	70.8	62.3	17.1	11.1	32.1	11.1	17.0	-	-	-	<0.1	%	PM4/PM0
pH #	8.19	8.35	8.04	7.73	7.66	8.75	8.47	8.10	8.95	8.63	-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	5	<3	<3	<3	<3	<3	<3	<3	<3	4	10	150	500	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	13	8	231	539	463	7	<5	209	<5	8	1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	8	<3	7	11	12	4	<3	124	<3	4	800	15000	25000	<3	mg/kg	TM38/PM0

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

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

Report : EN12457_2

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	49-52	53-56	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	TP-18	TP-19						
Depth	0.50-1.10	0.70-1.40						
COC No / misc								
Containers	V J T	V J T						
Sample Date	20/10/2022	20/10/2022						
Sample Type	Soil	Soil						
Batch Number	1	1						
Date of Receipt	28/10/2022	28/10/2022						
Solid Waste Analysis								
Total Organic Carbon #	0.06	2.33	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	<0.22	<0.22	-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	<0.64	<0.64	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate								
Arsenic #	<0.025	<0.025	0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	0.16	20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	0.12	0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	0.06	0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03	4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	<350	2670	4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	<20	60	500	800	1000	<20	mg/kg	TM60/PM0
Dry Matter Content Ratio	91.1	49.7	-	-	-	<0.1	%	NONE/PM4
Moisture Content 105C (% Dry Weight)	9.8	101.0	-	-	-	<0.1	%	PM4/PM0
pH #	8.87	7.60	-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	10	150	500	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<5	886	1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3	14	800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
22/17822	1	TP-01	0.00-0.60	1-4	No Interpretation Possible
22/17822	1	TP-02	0.00-0.90	5-8	No Interpretation Possible
22/17822	1	TP-03	1.40-2.10	9-12	No Interpretation Possible
22/17822	1	TP-06	1.00-2.70	17-20	No Interpretation Possible
22/17822	1	TP-07	1.10-2.30	21-24	Degraded Kerosene, possible Naturally Occurring Compounds
22/17822	1	TP-10	0.20-0.80	25-28	No Interpretation Possible
22/17822	1	TP-11	0.20-0.50	29-32	No Interpretation Possible
22/17822	1	TP-13	0.75-2.00	37-40	No Interpretation Possible
22/17822	1	TP-15	0.30-0.70	41-44	No Interpretation Possible
22/17822	1	TP-17	0.20-1.40	45-48	No Interpretation Possible
22/17822	1	TP-18	0.50-1.10	49-52	No Interpretation Possible
22/17822	1	TP-19	0.70-1.40	53-56	No Interpretation Possible

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen

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
22/17822	1	TP-01	0.00-0.60	4	Simon Postlewhite	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	08/11/2022	**Asbestos Fibres**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos ACM**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-02	0.00-0.90	8	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-03	1.40-2.10	12	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-06	1.00-2.70	20	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-07	1.10-2.30	24	Simon Postlewhite	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	08/11/2022	**Asbestos Fibres**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos ACM**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-10	0.20-0.80	28	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-11	0.20-0.50	32	Anthony Carman	08/11/2022	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	08/11/2022	**Asbestos Fibres**	NAD
					Anthony Carman	08/11/2022	**Asbestos ACM**	NAD
					Anthony Carman	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-13	0.75-2.00	40	Simon Postlewhite	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	08/11/2022	**Asbestos Fibres**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos ACM**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
22/17822	1	TP-15	0.30-0.70	44	Anthony Carman	08/11/2022	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	08/11/2022	**Asbestos Fibres**	NAD
					Anthony Carman	08/11/2022	**Asbestos ACM**	NAD
					Anthony Carman	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-17	0.20-1.40	48	Anthony Carman	08/11/2022	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	08/11/2022	**Asbestos Fibres**	NAD
					Anthony Carman	08/11/2022	**Asbestos ACM**	NAD
					Anthony Carman	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-18	0.50-1.10	52	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-19	0.70-1.40	56	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
22/17822	1	TP-03	1.40-2.10	9-12	PCB	Sample holding time exceeded
22/17822	1	TP-06	1.00-2.70	17-20	PCB	Sample holding time exceeded
22/17822	1	TP-07	1.10-2.30	21-24	PCB	Sample holding time exceeded
22/17822	1	TP-10	0.20-0.80	25-28	PCB	Sample holding time exceeded
22/17822	1	TP-11	0.20-0.50	29-32	PCB	Sample holding time exceeded
22/17822	1	TP-13	0.75-2.00	37-40	PCB	Sample holding time exceeded
22/17822	1	TP-15	0.30-0.70	41-44	PCB	Sample holding time exceeded
22/17822	1	TP-17	0.20-1.40	45-48	PCB	Sample holding time exceeded
22/17822	1	TP-18	0.50-1.10	49-52	PCB	Sample holding time exceeded
22/17822	1	TP-19	0.70-1.40	53-56	PCB	Sample holding time exceeded

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.

EMT Job No.: 22/17822

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 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease 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 or Fats, Oils and Grease 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 UKAS requirement 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.

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 calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
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.

EMT Job No: 22/17822

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°C or 105°C. 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, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

EMT Job No: 22/17822

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
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 °C. 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 °C. 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
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

EMT Job No: 22/17822

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
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.			AR	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
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.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

APPENDIX 6.2 – SOIL WASTE REPORT

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Ground Investigations Ireland

Cornamaddy Athlone Northern Site

Glenveagh Properties

Waste Classification Report

December 2022

Directors: Fergal McNamara (MD), Conor Finnerty, Aisling McDonnell & Barry Sexton
Ground Investigations Ireland Limited | Registered in Ireland Company Regsitration No.: 405726

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DOCUMENT CONTROL SHEET

Project Title	Cornamaddy Athlone Northern Site
Engineer	AKM Design
Client	Glenveagh Properties
Project No	12205-09-22
Document Title	Waste Classification Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Final	J Cashen	B Sexton	B Sexton	Dublin	14 December 2022

Ground Investigations Ireland Ltd. present the results of the fieldworks and laboratory testing in accordance with the specification and related documents provided by or on behalf of the client. The possibility of variation in the ground and/or groundwater conditions between or below exploratory locations or due to the investigation techniques employed must be taken into account when this report and the appendices inform designs or decisions where such variation may be considered relevant. Ground and/or groundwater conditions may vary due to seasonal, man-made or other activities not apparent during the fieldworks and no responsibility can be taken for such variation. The data presented and the recommendations included in this report and associated appendices are intended for the use of the client and the client's geotechnical representative only and any duty of care to others is excluded unless approved in writing.

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APPENDICES

1.0 Preamble

Ground Investigations Ireland (GII) was appointed by AKM Design on behalf of Glenveagh Properties to carry out a waste classification assessment for a proposed residential development in Athlone, Co. Westmeath. All site investigation works were carried out under the supervision of a GII Geo-Environmental Engineer. The site investigation works were completed in October 2022.

2.0 Purpose & Scope

It is understood that as part of the proposed development there may be an excavation to accommodate foundations, services, pavements and carparking and as such the material which may be excavated and removed from site needs to be assessed in terms of waste disposal outlets. The waste classification was carried out in parallel with a wider geotechnical site investigation.

The purpose of the waste classification exercise was as follows.

- Assess the site in terms of historical use; and
- Classification, in terms of waste management and final disposal outlets, of material that may require disposal following excavation during the construction phase.

The scope of the work undertaken to facilitate the waste classification exercise included the following:

- Site walkover;
- Historical desk study;
- Excavation of nineteen (19 No.) trial pits;
- Collection of subsoil samples for chemical analysis;
- Environmental laboratory testing; and
- Waste classification.

The additional scope of the geotechnical investigation included the following:

- Carry out 3 No. Soakaways to determine a soil infiltration value to BRE Digest 365;
- Carry out 2 No. Percussive Boreholes to recover soil sample and to determine soil strength;
- Carry out 48 No. Dynamic Probes to determine soil strength/density characteristics;
- Carry out 24 No. Plate bearing tests to determine the modulus of subgrade reaction and equivalent CBR values; and
- Geotechnical laboratory testing.

The geotechnical site investigation is discussed in the GII Ground Investigation Report Dated December 2022.[1]

3.0 Limitations

[1] Ground Investigations Ireland, Cornamaddy Athlone Northern Site, Ground Investigation Report, December 2022.

GII has prepared this report for the sole use of Glenveagh Properties. No other warranty, express or implied, is made as to the professional advice included in this report or other services provided by GII.

The conclusions and recommendations contained in this report are based upon information provided by others and the assumption that all relevant information has been provided by those bodies from whom it has been requested. Information obtained from third parties has not been independently verified by GII, unless otherwise stated in this report.

This report has been prepared in line with best industry standards and within the project's budgetary and time constraints. The methodology adopted and the sources of information used by GII in providing its services are outlined in this report.

The work described was undertaken in October 2022, this report is based on the conditions encountered and the information available during that period. The scope of this Report and the services are accordingly factually limited by these circumstances.

Site investigation locations were selected by the consultant engineer.

GII disclaim any undertaking or obligation to advise any person of any change in any matter affecting the Report, which may come or be brought to GII's attention after the date of the Report.

The conclusions presented in this report represent GII's best professional judgement based on review of site conditions observed during any site visit and the relevant information available at the time of writing. The opinions and conclusions presented are valid only to the extent that the information provided was accurate and complete.

The investigation was focused on a broad assessment of the subsoil quality across the site. The assessment did not extend to the identification of asbestos containing materials associated with any on-site structures, ground gases or groundwater.

The waste classification exercise is reflective of and applicable to the ground conditions on site at the time of the site investigation and sampling. Alterations to the ground conditions or any further excavations carried out on site following the investigation are not reflected in this report.

4.0 Site Location and Layout

The site is located at Cornamaddy, Athlone, Co. Westmeath (Figure 1 Appendix 1). At the time of the site investigation the site was predominantly greenfield however the southern portion of the site was previously used as a compound for a neighbouring development. There was also a public water treatment system located in the north of the site.

5.0 Site History

GII reviewed the aerial photographs and historical maps maintained by the Ordnance Survey of Ireland (OSI) and the google imagery records. These included the 6-inch maps that were produced between 1829 and 1842, the 25-inch maps that were produced between 1888 and 1913 and the 6-inch Cassini Maps that were produced between the 1830's and 1930's. The site is undeveloped on the 6-Inch map. Multiple presumed-artificial water/drainage channels are present intersecting and bordering the site on the 25-Inch and Cassini maps.

Based on a review of the OSI and Google Imagery aerial photograph records, the housing estate in the south of the site was constructed sometime between 2005 and 2008. The site has been in its current state of development since at least 2013.

6.0 Subsurface Exploration

6.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.

The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

6.2. Trial Pits

The trial pits were excavated using a 14T tracked excavator at the locations shown in Figures 5 and 6. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

6.3. Surveying

The exploratory hole locations have been recorded using a KQGeo M8 GNSS System which records the coordinates and elevation of the locations to ITM as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

7.0 Ground Conditions

7.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report. For full geotechnical descriptions of the ground conditions refer to the geotechnical site investigation report refenced in Section 2.0.

The sequence of strata encountered were consistent across the site and generally comprised;

- Topsoil / Peat
- Made Ground / Possible Made Ground
- Cohesive Deposits
- Granular Deposits

TOPSOIL: Topsoil was encountered in many of the exploratory holes and was present to a maximum depth of 0.40m BGL.

PEAT: Peat was encountered from ground level in most of the exploratory holes and was generally described as *dark brown slightly gravelly clayey pseudo fibrous PEAT.* At the locations of the trial pits and boreholes, the thickness of peat varied from 0.20m to 4.60m BGL. The results of the dynamic probes indicate the peat may extend to depths of over 6.00m BGL.

MADE GROUND: Made Ground deposits were encountered in exploratory holes TP-01, TP-02, TP-11, and TP-12, and were present to depths ranging from 0.50m to 1.20m BGL. These deposits were described generally as greyish *brown / brown slightly sandy gravelly silty Clay with occasional cobbles and boulders* and contained *rare fragments of plastic.* TP-01 had the most anthropogenic material with *occasional fragments of metal, timber, concrete, and steel* noted. In addition to this, possible made ground deposits were noted to a maximum depth of 1.50m BGL. No anthropogenic material was observed within the possible made ground deposits.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Peat and were described typically as *grey / grey mottled brown slightly sandy slightly gravelly silty CLAY or a Grey slightly sandy slightly gravelly clayey SILT with occasional to many cobbles and boulders*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. These deposits had occasional (<5%), some (5%-20%) or many (20%-50%) cobble and boulder content, where noted on the exploratory hole logs.

GRANULAR DEPOSITS: Granular deposits were encountered beneath the cohesive deposits at TP-09, TP-11, TP-18, and TP-19. These were typically described as g*rey slightly sandy slightly clayey slightly silty subangular to subrounded fine to coarse GRAVEL with many cobbles or grey / greyish brown slightly gravelly clayey silty fine to coarse SAND.* The secondary sand/gravel and fines constituents varied across the site and with depth, while occasional (<5%), some (5%-20%) or many (20%-50%) cobble and boulder content was also present, where noted on the exploratory hole logs. It should be noted that many of the trial pits where granular deposits or groundwater were encountered, experienced instability. This was described either as side wall spalling or as side wall collapse in the remarks section at the base of the trial pit logs.

8.0 Laboratory Analysis

8.1. Analysis Suite

In order to assess materials, which may be excavated and removed from site, in terms of waste classification, a selection of samples collected were analysed for a suite of parameters which allows for the assessment of the soils in terms of total pollutant content for classification of materials as *hazardous* or *non-hazardous* (RILTA Suite). The suite also allows for the assessment of the soils in terms of suitability for placement at various categories of landfill. The parameter list for the RILTA suite includes analysis of the solid samples for arsenic, barium, cadmium, chromium, copper, cyanide, lead, nickel, mercury, zinc, speciated aliphatic and aromatic petroleum hydrocarbons, pH, sulphate, sulphide, moisture content, soil organic matter and an asbestos screen.

The RILTA suite also includes those parameters specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC), which for the solid samples are pH, total organic carbon (TOC), speciated aliphatic and aromatic petroleum hydrocarbons, BTEX, phenol, polychlorinated biphenyls (PCB) and PAH.

In line with the requirement of Council Decision 2003/33/EC a leachate was generated from the solid samples which was in turn analysed for antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, chloride, fluoride, soluble sulphate, sulphide, phenols, dissolved organic carbon (DOC) and total dissolved solids (TDS). The suite was selected due to the unknown origin of the material underlying the site and no evidence of specific contaminants of concern highlighted in the site history.

The laboratory testing was completed by Element Materials Technology (EMT) in the UK; EMT is a UKAS accredited laboratory. The full laboratory reports are included in Appendix 3.

8.2. Asbestos

Asbestos fibres were not detected in the samples. The laboratory did not identify asbestos containing materials (ACMs) in the samples.

9.0 Waste Classification

GII understands that any materials which may be excavated and removed from site would meet the definition of waste under the Waste Framework Directive. Due to the varying levels of anthropogenic materials encountered in the made ground there are potentially two sets of List of Waste (LoW)[2] codes with “mirror” entries which may be applied to excavated materials to be removed from site.

1. 17-05-03* (soil and stone containing dangerous substances, classified as hazardous) or 17-05-04 (soil and stone other than those mentioned in 17-05-03, not hazardous); or

[2] Formerly European Waste Catalogue Codes (EWC Codes)

2. 17-09-03* (other construction and demolition wastes (including mixed wastes) containing hazardous substances) or 17-09-04 (mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03).

Where waste is a mirror entry in the LoW, it can be classified via a process of analysis against standard criteria set out in the Waste Framework Directive. The assessment process is described in detail in guidance published by the Irish (EPA Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-Hazardous, June 2015) and UK regulatory authorities (Guidance on the Classification and Assessment of Waste: Technical Guidance WM3, 2015). The assessment involves comparison of the concentration of various parameters against defined threshold values.

The specific LoW code which should be applied to the material at each sample location is summarised in Table 2 below. These codes are only applicable where the material is being removed from a site as a waste.

GII use HazWasteOnline™, a web-based commercial waste classification software tool which assists in the classification of potentially hazardous materials. This tool was used to determine whether the materials sampled are classified as hazardous or non-hazardous. The use of the online tool is accepted by the EPA (EPA 2014).

The conclusions presented in the report are based on GII's professional opinion. **It should be noted that the environmental regulator (in this case the EPA) and the waste acceptor (in this case a landfill operator) shall decide whether a waste is hazardous or non-hazardous and suitable for disposal at their facility.**

9.1. HazWasteOnLineTM Results

In total, twelve (12 No.) samples were assessed using the HazWasteOnLine™ Tool. All samples were classified as being non-hazardous. The complete HazWasteOnLine™ report for all samples is included in Appendix 4.

The specific LoW code which should be applied to the material at each SI location is summarised in Table 2 below. The assigning of the LoW code is based on observations recorded in the trial pits, an estimation of the % of anthropogenic material present and the results of the HazWasteOnline™ output. The final LoW codes applied at the time of disposal may vary due to variations in % of anthropogenic material observed in the excavation phase. Where there is in excess of 2%[3] anthropogenic material observed the LoW code 17 09 04 may be applied.

9.2. Landfill Waste Acceptance Criteria

Waste Acceptance Criteria (WAC) have been agreed by the EU (Council Decision 2003/33/EC) and are only applicable to material if it is to be disposed of as a waste at a landfill facility. Each individual member

[3] EPA (2020) - Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities.

state and licensed operators of landfills may apply more stringent WAC. WAC limits and the associated laboratory analysis are not suitable for use in the determination of whether a waste is hazardous or non-hazardous. The data have been compared to the WAC limits set out in Council Decision 2003/33/EC as well as the specific WAC which the EPA have applied to the Walshestown and Integrated Materials Solutions (IMS) Landfills. The Walshestown and IMS landfills have higher limits for a range of parameters while still operating under an inert landfill licence. The WAC data considered in combination with the waste classification outlined in Section 9.0 allows the most suitable waste category to be applied to the material tested. The potentially applicable waste categories are summarised in Table 1. A summary of the WAC data is presented in Appendix 5. The waste category assigned to each sample is summarised in Table 2.

Table 1 Potential Waste Categories for Disposal/Recovery

Waste Category	Classification Criteria
Category A Unlined Soil Recovery Facilities	Soil and Stone only which are free from[4] anthropogenic materials such as concrete, brick, timber. Soil must be free from "contamination" e.g. PAHs, Hydrocarbons[5].
Category B1 Inert Landfill	Reported concentrations within inert waste limits, which are set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002). Results also found to be non-hazardous using the HWOL[6] application.
Category B2 Inert Landfill	Reported concentrations greater than Category B1 criteria but less than IMS Hollywood Landfill acceptance criteria, as set out in their Waste Licence W0129-02. Results also found to be non-hazardous using the HWOL application.
Category C Non-Haz Landfill	Reported concentrations greater than Category B2 criteria but within non-haz landfill waste acceptance limits set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002). Results also found to be non-hazardous using the HWOL application.
Category C 1 Non-Haz Landfill	As Category C but containing < 0.001% w/w asbestos fibres.
Category C 2 Non-Haz Landfill	As Category C but containing >0.001% and <0.01% w/w asbestos fibres
Category C 3 Non-Haz Landfill	As Category C but containing >0.01% and <0.1% w/w asbestos fibres.
Category D	Results found to be hazardous using HWOL Application.

[4] Free from equates to less than 2%.
[5] Total BTEX 0.05mg/kg, Mineral Oil 50mg/kg, Total PAHs 1mg/kg, Total PCBs 0.05mg/kg and Asbestos No Asbestos Detected – EPA Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities, 2020.
[6] HazWasteOnLine™ Tool.

Waste Category	Classification Criteria
Hazardous Treatment	
Category D 1 Hazardous Disposal	Results found to be hazardous due to the presence of asbestos (>0.1%).

9.3. Final Waste Categorisation

All samples were assessed in terms of waste classification using the HazWasteOnLine™ tool and also the WAC set out in Council Decision 2003/33/EC and the Walshestown/IMS specific WAC to give a final waste categorisation to determine the most appropriate disposal route for any waste generated. The final and most applicable waste category for each sample is summarised in Table 2.

Table 2 Individual Sample Waste Category

Sample ID	Sample Depth (m)	Material Type	Sample Date	LoW Code	Waste Category
TP-01	0.00-0.60	Made Ground	24/10/2022	17 05 04	Category B1
TP-02	0.00-0.90	Made Ground	24/10/2022	17 05 04	Category B1
TP-03	1.40-2.10	Cohesive	21/10/2022	17 05 04	Category B2
TP-06	1.00-2.70	Cohesive	21/10/2022	17 05 04	Category B2
TP-07	1.10-2.30	Cohesive	20/10/2022	17 05 04	Category B2
TP-10	0.20-0.80	Cohesive	20/10/2022	17 05 04	Category A
TP-11	0.20-0.50	Made Ground	20/10/2022	17 05 04	Category B1
TP-13	0.75-2.00	Cohesive	20/10/2022	17 05 04	Category B2
TP-15	0.30-0.70	Cohesive	20/10/2022	17 05 04	Category A
TP-17	0.20-1.40	Cohesive	20/10/2022	17 05 04	Category A
TP-18	0.50-1.10	Granular	20/10/2022	17 05 04	Category A
TP-19	0.70-1.40	Cohesive	20/10/2022	17 05 04	Category A

10.0 Conclusions & Recommendations

The conclusions and recommendations given and opinions expressed in this report are based on the findings of the site investigation works and laboratory testing undertaken. Where any opinion is expressed on the classification of material between site investigation locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the findings at the site investigation locations.

10.1. Conclusions

10.1.1. Waste Classification

Based on the results of the HazWasteOnLine™ tool the material sampled across the site if being considered a waste can be classified as non-hazardous.

10.1.2. Asbestos

Asbestos was not detected in the soil samples.

10.1.3. Waste Categories

The most applicable waste categories for each of the samples if being considered a waste have been presented in Table 2.

10.2. Recommendations

10.2.1. Waste Transfer

In the event that material is excavated for removal from site, any firm engaged to transport waste material from site and the operator of any waste facility that will accept subsoils excavated from this site should be furnished with, at a minimum, copies of the **full unabridged** laboratory reports and HazWasteOnLine™ report for all samples presented in this report.

The material on site if excavated should be removed to the most appropriate facility under the waste categories and LoW codes identified in Table 2. Potential outlets for the various waste categories are presented in Appendix 6, this list is not exhaustive and applicable at the time of the writing this report.

The non-hazardous material across the site if excavated should be removed from site to an appropriate facility under either the LoW codes 17 05 04 or 17 09 04. Where during excavation there is noted to be in excess of 2% anthropogenic material the appropriate LoW code which should be applied is 17 09 04.

11.0 References

Environment Agency (2013). *Waste Sampling and Testing for Disposal to Landfill.*

Environment Agency (2015). *Technical Guidance WM3 - Guidance on the classification and assessment of waste (1st edition 2015) Technical Guidance WM3*.

Environmental Protection Agency (EPA) (2014). Letter to Licences *Re: Waste Classification & Haz Waste On-Line™*.

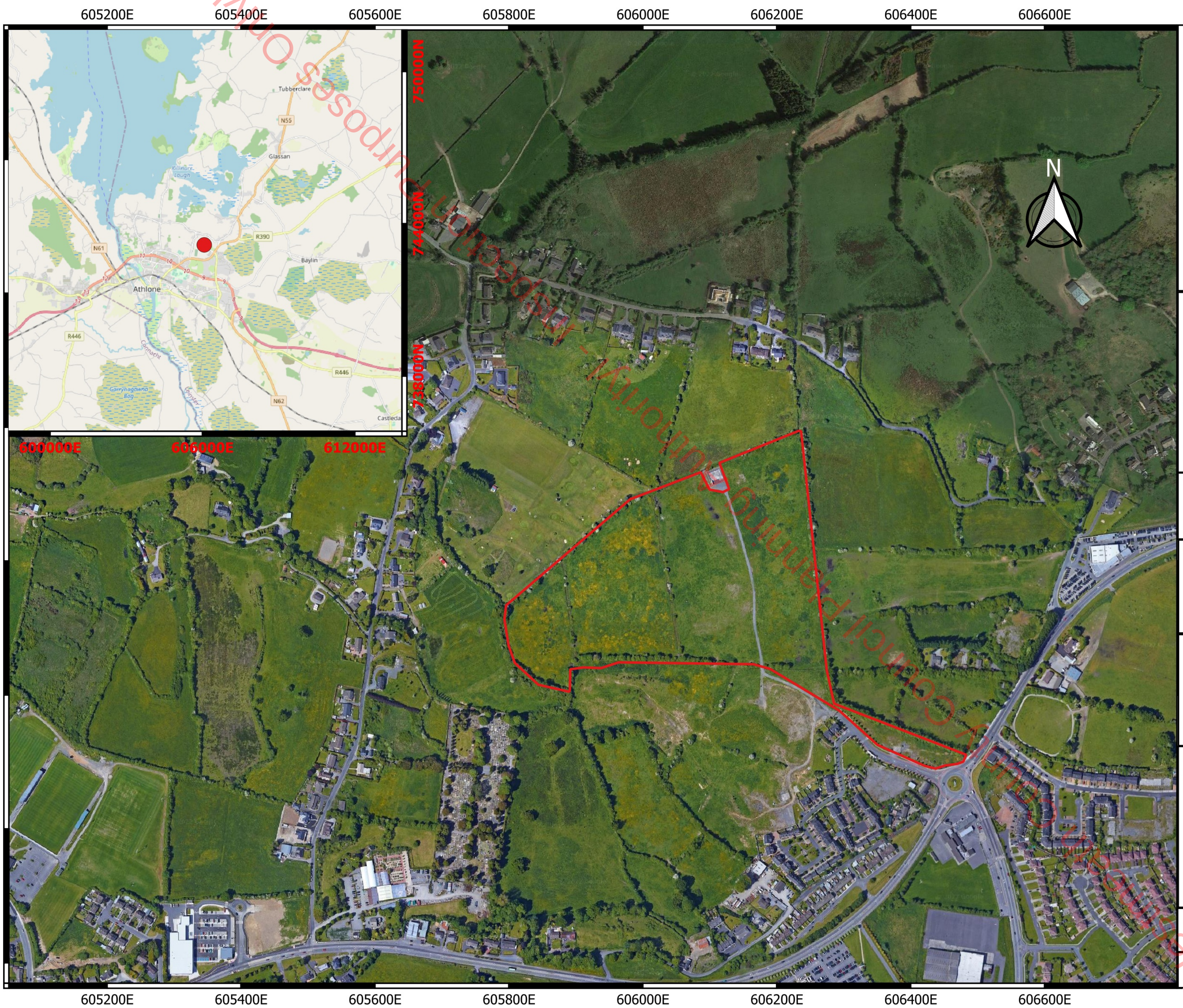
Environmental Protection Agency (EPA) (2015). *Waste Classification List of Waste & Determining if Waste is Hazardous or Non-hazardous.*

Environmental Protection Agency (EPA) (2020). *Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities*.

Environmental Protection Agency (EPA) (June 2019). *Guidance on Soil and Stone By-products in the context of article 27 of the European Communities (Waste Directive) Regulations 2011 Version 3.*

Association of Geotechnical and Geoenvironmental Specialists (2019). *Waste Classification for Soils – A Practitioners Guide.*

APPENDIX 1 - Figures



Site Location

Indicative Site Boundary

Client:

Glenveagh

Project Code:

12205-09-22

Project Title:

Cornamaddy Athlone Northern Site

Drawing Title:

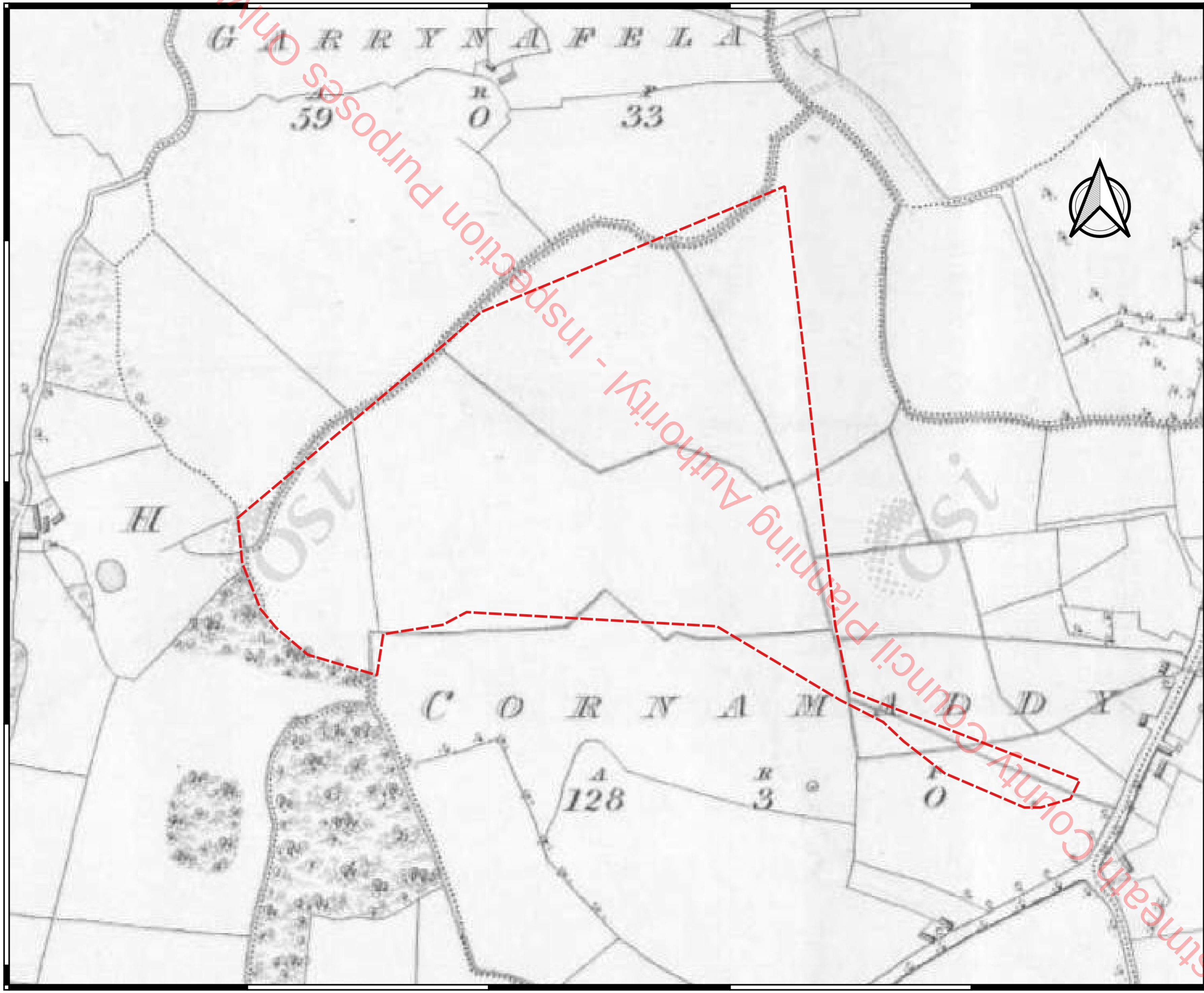
Figure 1 Site Location

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 60 120 180 240 300 m

Drawn By:	Date:
JC	12-12-2022



Indicative Site Location

Client:

Glenveagh

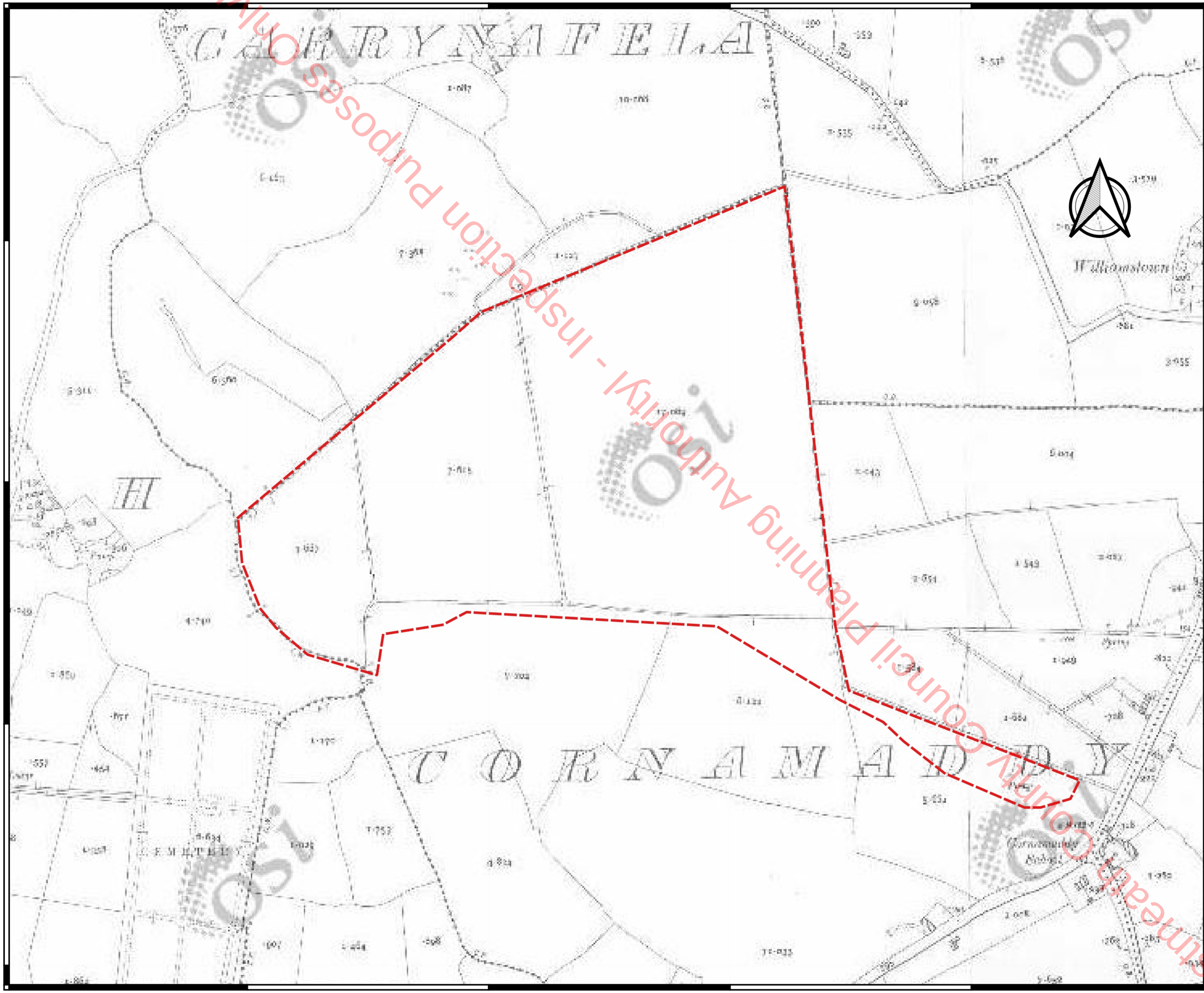
Project Code:
12205-09-22

Project Title:
Cornamaddy Athlone Northern Site

Drawing Title:
Figure 2 OSI 6-Inch Map

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

Drawn By:	Date:
JC	13-12-2022



Indicative Site Location

Client:

Glenveagh

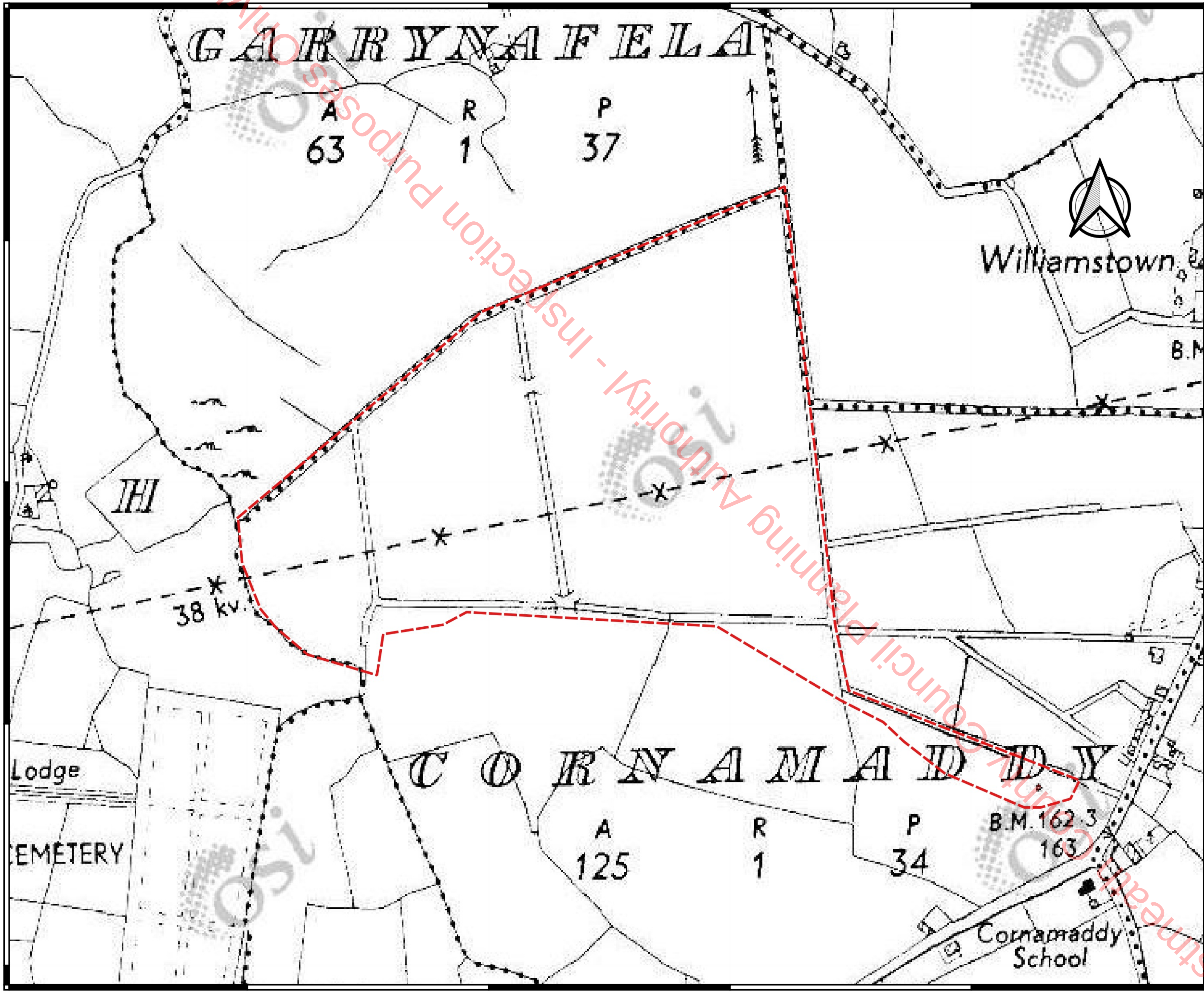
Project Code:
12205-09-22

Project Title:
Cornamaddy Athlone Northern Site

Drawing Title:
Figure 3 OSI 25-Inch Map

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

Drawn By:	Date:
JC	13-12-2022



Indicative Site Location

Client:

Glenveagh

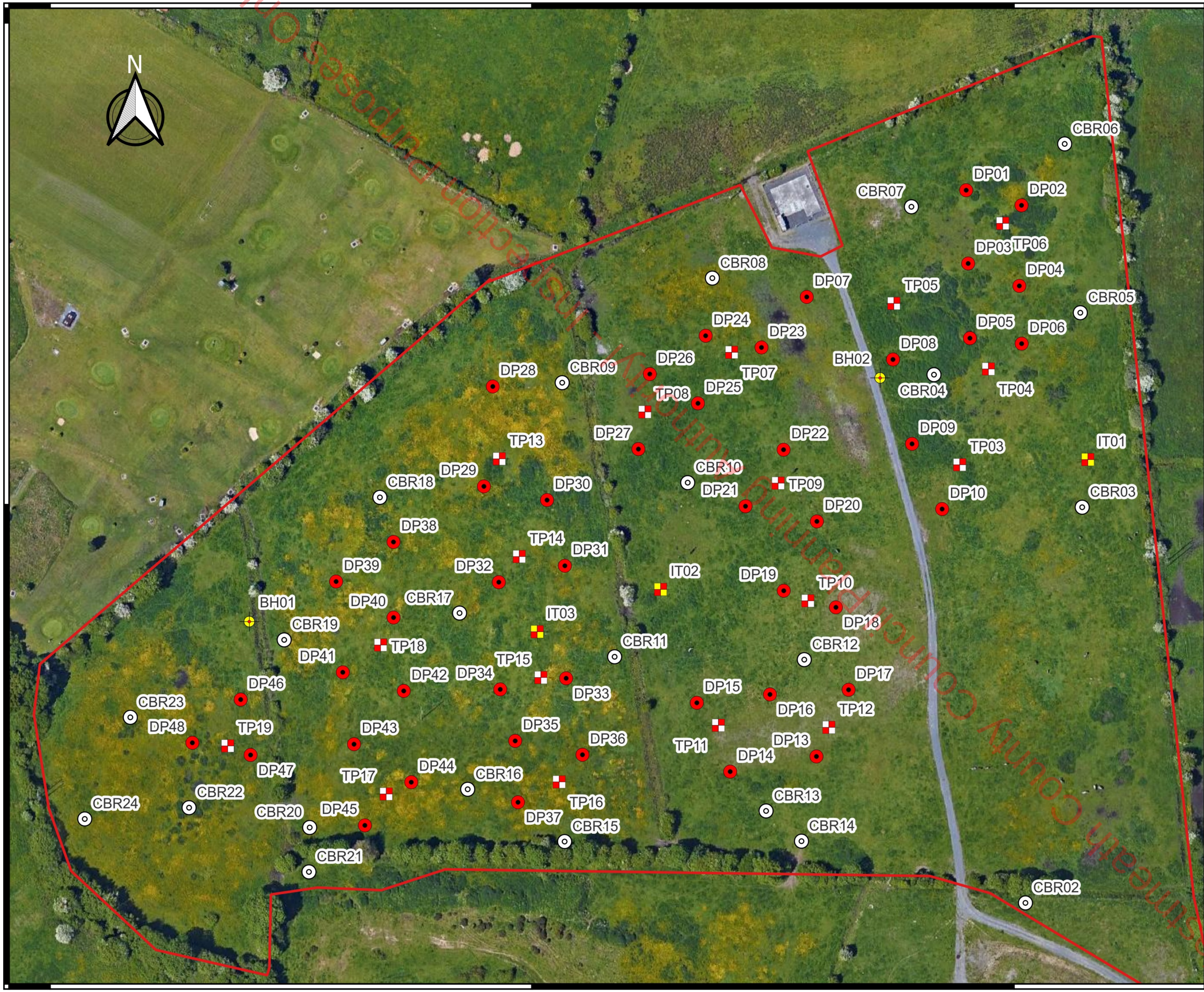
Project Code:
12205-09-22

Project Title:
Cornamaddy Athlone Northern Site

Drawing Title:
Figure 4 OSI Cassini Map

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

Drawn By:	Date:
JC	13-12-2022



Legend	Indicative Site Boundary; Trial Pit; Soakaway Pit; Dynamic Probe; CBR; Borehole
Client:	Glenveagh
Project Code:	12205-09-22
Project Title:	Cornamaddy Athlone Northern Site
Drawing Title:	Figure 5 Site Investigation Points 1 of 2

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 15 30 45 60 75 m

Drawn By:	Date:
JC	12-12-2022

Indicative Site Boundary
Trial Pit
Soakaway Pit
Dynamic Probe
CBR
Borehole

Client:

Glenveagh

Project Code:
12205-09-22

Project Title:
Cornamaddy Athlone Northern Site

Drawing Title:
Figure 6
Site Investigation Points 2 of 2

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 15 30 45 60 75 m

Drawn By: JC
Date: 12-12-2022

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-01
Machine : 14T Tracked excavator Method : Trial Pit	Dimensions: 5.30m x 1.8m x 1.5m (L x W x D)	Ground Level (mOD): 44.01	Client: AKM Design	Job Number: 12205-09-22
	Location: 606441.3 E 742904.1 N	Dates: 24/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.60	ES				(0.60)	MADE GROUND: Greyish brown slightly sandy gravelly silty Clay with occasional cobbles and boulders and with occasional fragments of metal, timber, plastic, concrete and steel.		
0.50	B			43.41	0.60 (0.20)	MADE GROUND: Grey fine to coarse Sand		
				43.21	0.80 (0.70)	Possible MADE GROUND: Firm orangish brown slightly sandy slightly gravelly silty Clay with occasional cobbles and boulders		
1.50	B			42.51	1.50	Complete at 1.50m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion
Trial pit terminated due to potentially encountering services

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-01

Ground Investigations Ireland Ltd
www.gii.ie

Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 4.90m 1.80m x 3.00m (L x W x D)	**Ground Level (mOD)** 42.46	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606337.1 E 742950.2 N	**Dates** 24/10/2022	**Engineer**	**Sheet** 1/1

Site: Cornamaddy Athlone Northern Site

Trial Pit Number: TP-02

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.90	ES					MADE GROUND: Greyish brown slightly sandy slightly gravelly silty Clay with occasional cobbles and boulders and with rare fragments of plastic		
0.50	B				(0.90)			
			Seepage(1) at 0.90m.	41.56	0.90	Very soft dark brown clayey SILT		▽1
					(0.20)			
				41.36	1.10	Firm to stiff grey mottled brown slightly sandy slightly gravelly silty CLAY		
1.50	B							
					(1.20)			
				40.16	2.30	Stiff grey slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders		
					(0.70)			
				39.46	3.00	Complete at 3.00m		

Plan

Remarks

Groundwater encountered at 0.90m BGL; Seepage
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP	12205-09-22.TP-02

Ground Investigations Ireland Ltd
www.gii.ie

Site	Cornamaddy Athlone Northern Site			**Trial Pit Number** TP-03
Machine : 14T Tracked excavator **Method :** Trial Pit	**Dimensions** 5.10m x 1.80m x 3.00m (L x W x D)	**Ground Level (mOD)** 40.50	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606177.4 E 743216.1 N	**Dates** 21/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(1.40)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT with occasional boulders		
1.40-2.10	ES		Fast Ingress(1) at 1.50m.	39.10	1.40 (0.70)	Very soft grey slightly gravelly clayey SILT with occasional organic fibres		∇1
2.00	B			38.40	2.10 (0.40)	Very soft light grey slightly gravelly clayey SILT with occasional organic fibres		
				38.00	2.50 (0.50)	Firm to stiff grey slightly sandy slightly gravelly silty CLAY with many cobbles and boulders		
				37.50	3.00	Complete at 3.00m		

Plan

Remarks

Groundwater encountered at 1.50m BGL; Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-03

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-04
Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 5.00m x 1.80m x 1.50m (L x W x D)	Ground Level (mOD): 40.41	Client: AKM Design	Job Number: 12205-09-22
	Location: 606189.4 E 743255.9 N	Dates: 21/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Possible MADE GROUND: Dark brown slightly gravelly clayey pseudo fibrous Peat with many cobbles and boulders		
			Fast Ingress(1) at 0.70m.	39.91	0.50 (0.30)	Possible MADE GROUND: Orangish brown slightly sandy slightly gravelly silty Clay with occasional cobbles and boulders		∇1
				39.61	0.80 (0.70)	Soft grey slightly sandy gravelly clayey SILT with many cobbles and boulders		
				38.91	1.50	Terminated at 1.50m		

Plan

Remarks

Groundwater encountered at 0.70m BGL; Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion
Trial pit terminated due to groundwater obscuring view

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-04

Ground Investigations Ireland Ltd
www.gii.ie

Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 5.20m x 1.80m x 2.70m (L x W x D)	**Ground Level (mOD)** 40.34	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606150.1 E 743283.1 N	**Dates** 21/10/2022	**Engineer**	**Sheet** 1/1

Site: Cornamaddy Athlone Northern Site

Trial Pit Number: TP-05

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.75)	MADE GROUND: Dark brown slightly gravelly clayey pseudo fibrous Peat with rare fragments of timber and plastic		
				39.59	0.75 (0.55)	Very soft light grey slightly gravelly SILT with occasional cobbles and boulders		
			Fast Ingress(1) at 1.20m.					∇1
1.30-2.00	ES			39.04	1.30 (0.70)	Very soft grey slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders		
1.50	B							
				38.34	2.00 (0.70)	Very soft slightly sandy gravelly clayey SILT with many cobbles and boulders		
2.50	B							
				37.64	2.70	Complete at 2.70m		

Plan

Remarks

Groundwater encountered at 1.20m BGL; Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-05

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-06

Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 5.40m x 1.80m x 3.40m (L x W x D)	Ground Level (mOD): 40.15	Client: AKM Design	Job Number: 12205-09-22
	Location: 606195.3 E 743316.4 N	Dates: 21/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(1.00)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
1.00-2.70	ES		Fast Ingress(1) at 1.20m.	39.15	1.00 (1.70)	Very soft light grey clayey SILT with organic fibres		∇1
				37.45	2.70 (0.70)	Very soft slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders		
3.40	B			36.75	3.40	Complete at 3.40m		

Plan

Remarks

Groundwater encountered at 1.20m BGL; Fast Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-06

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Trial Pit Number: **TP-07**
Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions:** 5.50m x 1.80m x 3.00m (L x W x D) / **Ground Level (mOD):** 40.32	**Client:** AKM Design	**Job Number:** 12205-09-22
	Location: 606082.8 E 743262.8 N / **Dates:** 20/10/2022	**Engineer:**	**Sheet:** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(1.10)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
0.70	B		Medium Ingress(1) at 0.70m.					∇1
				39.22	1.10	Very soft light grey clayey SILT with organic fibres		
1.10-2.30	ES							
			Medium Ingress(2) at 1.30m.					∇2
1.70	B				(1.20)			
				38.02	2.30	Firm grey silty CLAY with occasional cobbles and rare boulders		
2.70	B				(0.70)			
				37.32	3.00	Complete at 3.00m		

Plan

Remarks

Groundwater encountered at 0.70m BGL and 1.30m BGL; Medium Ingress
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-07

Ground Investigations Ireland Ltd www.gii.ie			Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-08
Machine: 14T tracked excavator **Method:** Trial Pit	**Dimensions:** 5.00m x 1.80m x 1.70m (L x W x D)	**Ground Level (mOD):** 40.46	**Client:** AKM Design	**Job Number:** 12205-09-22
	Location: 606046.8 E 743238.1 N	**Dates:** 20/10/2022	**Engineer:**	**Sheet:** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.75)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
			Fast Ingress(1) at 0.80m.	39.71	0.75 (0.35)	Soft to firm orangish brown slightly sandy gravelly silty CLAY with many cobbles and boulders		∇1
				39.36	1.10 (0.30)	Soft to firm grey slightly sandy slightly gravelly clayey SILT with occasional cobbles and rare boulders		
1.50	B			39.06	1.40 (0.30)	Firm grey slightly sandy slightly gravelly clayey SILT with occasional cobbles and rare boulders		
				38.76	1.70	Terminated at 1.70m		

Plan

Remarks

Groundwater encountered 0.80m BGL; Fast Ingress
Trial pit unstable; side walls collapsed
Trial pit backfilled upon completion
Trial pit terminated due to groundwater obscuring view

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-08

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-09
Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 5.10m x 1.80m x 2.80m (L x W x D)	**Ground Level (mOD)** 40.68
Client AKM Design	**Job Number** 12205-09-22	
Location 606102.1 E 743208.5 N	**Dates** 20/10/2022	**Engineer**
Sheet 1/1		

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Peaty TOPSOIL		
				40.48	0.20 (0.20)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
			Medium Ingress(1) at 1.00m.	40.28	0.40 (0.80)	Soft to firm grey mottled brown slightly sandy slightly gravelly clayey SILT with occasional cobbles and boulders		∇1
1.50	B			39.48	1.20 (1.10)	Firm grey slightly sandy gravelly silty CLAY with many cobbles and boulders		
2.50	B			38.38	2.30 (0.50)	Medium dense grey slightly gravelly clayey silty fine to coarse SAND with many cobbles and boulders		
				37.88	2.80	Complete at 2.80m		

Plan

Remarks

Groundwaer encountered at 1.00m BGL; Medium Ingress
Trial pit unstable; side walls collapsed
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-09

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: **TP-10**
Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions:** 5.00m x 1.80m x 2.70m (L x W x D) **Ground Level (mOD):** 42.26 **Client:** AKM Design	**Job Number:** 12205-09-22
	Location: 606114.4 E 743159.7 N **Dates:** 20/10/2022 **Engineer:**	**Sheet:** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Peaty TOPSOIL		
0.20-0.80	ES			42.06	0.20	Possible MADE GROUND: Grey mottled brown sandy slightly gravelly silty Clay		
0.50	B				(0.60)			
				41.46	0.80	Firm grey mottled brown slightly sandy slightly gravelly clayey SILT with occasional cobbles and boulders		
					(0.70)			
				40.76	1.50	Firm greyish brown slightly sandy gravelly silty CLAY with many cobbles and boulders		
2.00	B				(1.20)			
				39.56	2.70	Complete at 2.70m		

Plan

Remarks

No groundwater encountered
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-10

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-11

Machine : 14T tracked excavator	Dimensions: 5.40m x 1.80m x 2.70m (L x W x D)	Ground Level (mOD): 41.00	Client: AKM Design	Job Number: 12205-09-22
Method : Trial Pit	Location: 606077.3 E 743108 N	Dates: 20/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Water
					(0.20)	Peaty TOPSOIL	
0.20-0.50	ES			40.80	0.20 (0.30)	MADE GROUND: Brown slightly sandy gravelly silty Clay. (Reworked)	
				40.50	0.50 (0.30)	Possible MADE GROUND: Dark brown slightly gravelly clayey pseudo fibrous PEAT with occasional fragments of wood	
1.00	B		Fast Ingress(1) at 0.80m.	40.20	0.80 (0.90)	Very soft grey silty CLAY with occasional cobbles and rare boulders	∇1
				39.30	1.70 (0.65)	Firm grey silty CLAY with occasional cobbles and rare boulders	
2.50	B			38.65	2.35 (0.35)	Medium dense grey slightly sandy silty clayey subangular to subrounded fine to coarse GRAVEL	
				38.30	2.70	Complete at 2.70m	

Plan

Remarks

Groundwater encountered at 0.80m BGL; Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-11

Ground Investigations Ireland Ltd
www.gii.ie

Site Cornamaddy Athlone Northern Site				**Trial Pit Number** TP-12
Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 5.00m x 1.80m x 3.00m (L x W x D)	**Ground Level (mOD)** 43.29	**Client** AKM Design	**Job Number** 12205-09-22
	Location 606123.1 E 743107.2 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	Peaty TOPSOIL		
0.20-1.20	ES			43.09	0.20	MADE GROUND: Brown slightly sandy slightly gravelly silty Clay with rare fragments of plastic.		
0.70	B				(1.00)			
				42.09	1.20	Firm brown slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders		
					(0.60)			
				41.49	1.80	Stiff brown slightly sandy gravelly silty CLAY with many cobbles and boulders		
					(1.20)			
2.50	B							
				40.29	3.00	Complete at 3.00m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-12

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-13
Machine : 14T tracked excavator; Method : Trial Pit; Dimensions: 5.50m x 1.80m x 2.60 (L x W x D); Ground Level (mOD): 40.22	Client: AKM Design	Job Number: 12205-09-22
Location: 605986.4 E 743218.6 N; Dates: 20/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.60)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT with rootlets		
			Fast Ingress(1) at 0.60m.	39.62	0.60 (0.15)	Very soft orangish brown slightly sandy gravelly silty CLAY with many cobbles and boulders		∇1
0.75-2.00	ES			39.47	0.75	Very soft grey clayey SILT with rare cobbles		
1.00	B				(1.25)			
				38.22	2.00 (0.60)	Very soft slightly sandy gravelly clayey SILT with many cobbles and boulders		
2.30	B							
				37.62	2.60	Complete at 2.60m		

Plan

Remarks

Groundwater encountered at 0.60m BGL; Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-13

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Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 5.40m x 1.80m 3.00m (L x W x D)	**Ground Level (mOD)** 41.82	**Site** Cornamaddy Athlone Northern Site **Client** AKM Design	**Trial Pit Number** **TP-14**	**Job Number** 12205-09-22
	Location 605994.6 E 743178.1 N	**Dates** 20/10/2022	**Engineer**	**Sheet** 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL		
0.50	B			41.42	0.40 (0.90)	Firm grey mottled brown slightly sandy slightly gravelly silty CLAY with occasional cobbles and boulders		
1.50	B			40.52	1.30 (1.20)	Firm grey mottled brown slightly sandy gravelly silty CLAY with many cobbles and boulders		
				39.32	2.50 (0.50)	Firm to stiff grey mottled brown slightly sandy gravelly silty CLAY with many cobbles and boulders		
				38.82	3.00	Complete at 3.00m		

Plan

Remarks

No groundwater encountered
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-14

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-15
Machine : 14T tracked excavator Method : Trial Pit	Dimensions: 5.50m x 1.80m x 3.00m (L x W x D)	Ground Level (mOD): 41.92	Client: AKM Design	Job Number: 12205-09-22
	Location: 606003.6 E 743127.9 N	Dates: 20/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	TOPSOIL		
0.30-0.70	ES			41.62	0.30	Soft greyish brown slightly sandy gravelly silty CLAY with occasional cobbles and rare boulders		
0.50	B				(0.40)			
				41.22	0.70	Firm grey mottled brown slightly sandy gravelly clayey SILT with occasional cobbles and boulders		
					(0.80)			
				40.42	1.50	Firm grey mottled brown slightly sandy gravelly clayey SILT with many cobbles and boulders		
					(0.70)			
				39.72	2.20	Firm greyish brown slightly sandy gravelly silty CLAY with many cobbles and boulders		
					(0.80)			
3.00	B			38.92	3.00	Complete at 3.00m		

Plan

Remarks

No groundwater encountered
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-15

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Trial Pit Number: **TP-16**
Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions:** 5.30m x 1.80m x 2.40m (L x W x D) **Ground Level (mOD):** 40.43	**Client:** AKM Design	**Job Number:** 12205-09-22
	Location: 606011.3 E 743084.5 N **Dates:** 20/10/2022	**Engineer:**	**Sheet:** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT		
			Fast Ingress(1) at 0.50m.	39.93	0.50	Very soft light grey slightly sandy slightly gravelly silty CLAY with occasional cobbles		∇1
					(0.70)			
				39.23	1.20	Very soft grey silty CLAY with occasional cobbles		
1.70	B				(1.00)			
				38.23	2.20 (0.20)	Firm grey slightly sandy slightly gravelly silty CLAY with many cobbles and boulders		
				38.03	2.40	Terminated at 2.40m		

Plan

Remarks

Groundwater encountered at 0.50m BGL; Fast Ingress
Trial pit unstable; side walls collapsed
Trial pit backfilled upon completion
Terminated due to trial pit collapse

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-16

Ground Investigations Ireland Ltd www.gii.ie	Site: Cornamaddy Athlone Northern Site	Trial Pit Number: TP-17

Machine : 14T tracked excavator	Dimensions: 5.30m x 1.80m x 3.00m (L x W x D)	Ground Level (mOD): 41.84	Client: AKM Design	Job Number: 12205-09-22
Method : Trial Pit	Location: 605939.4 E 743079.5 N	Dates: 20/10/2022	Engineer:	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
0.20-1.40	ES			41.64	0.20	Firm grey mottled brown slightly sandy slightly gravelly silty CLAY with occasional cobbles		
0.50	B				(1.20)			
				40.44	1.40	Firm to stiff grey mottled brown slightly sandy slightly gravelly silty CLAY with many cobbles and occasional boulders		
					(0.80)			
				39.64	2.20	Firm to stiff grey slightly silty sandy gravelly CLAY with many cobbles and boulders Multiple sand lens encountered between 2.20m to 3.00m BGL		
2.50	B				(0.80)			
			Seepage(1) at 3.00m.	38.84	3.00	Complete at 3.00m		∇1

Plan

Remarks

Groundwater encountered at 3.00m BGL; Seepage
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-17

Ground Investigations Ireland Ltd www.gii.ie		Site: Cornamaddy Athlone Northern Site	Trial Pit Number: **TP-18**
Machine : 14T tracked excavator **Method :** Trial Pit	**Dimensions** 5.00m x 1.80m x 3.00m (L x W x D) / **Ground Level (mOD)** 43.08	**Client** AKM Design	**Job Number** 12205-09-22
	Location 605937.1 E 743141.4 N / **Dates** 20/10/2022	**Engineer**	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				42.88	(0.20) 0.20	TOPSOIL		
				42.58	(0.30) 0.50	Soft brown slightly sandy slightly gravelly CLAY		
0.50-1.10	ES							
1.00	B			41.98	(0.60) 1.10	Medium dense greyish brown slightly clayey gravelly silty fine to coarse SAND with occasional cobbles and boulders		
				41.38	(0.60) 1.70	Firm to stiff grey mottled brown slightly sandy slightly gravelly silty CLAY with many cobbles and boulders		
2.00	B			40.08	(1.30) 3.00	Stiff grey sandy gravelly slightly clayey SILT with many cobbles and boulders		
						Complete at 3.00m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-18

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Site: Cornamaddy Athlone Northern Site				**Trial Pit Number**: TP-19
Machine: 14T tracked excavator **Method**: Trial Pit	**Dimensions**: 5.50m x 1.80m x 2.70m (L x W x D)	**Ground Level (mOD)**: 40.61	**Client**: AKM Design	**Job Number**: 12205-09-22
	Location: 605873.7 E 743099.5 N	**Dates**: 20/10/2022	**Engineer**:	**Sheet**: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.70)	Very soft dark brown slightly gravelly clayey pseudo fibrous PEAT with occasional fragments of wood		
0.70-1.40	ES		Seepage(1) at 0.60m.	39.91	0.70	Very soft light grey slightly sandy slightly gravelly clayey SILT with many cobbles and boulders		∇1
1.00	B				(0.70)			
			Fast Ingress(2) at 1.50m.	39.21	1.40 (0.50)	Soft dark grey slightly sandy slightly gravelly clayey SILT with many cobbles and boulders		∇2
2.00	B			38.71	1.90 (0.40)	Stiff to very stiff dark grey slightly sandy slightly gravelly clayey SILT with many cobbles and boulders		
				38.31	2.30 (0.40)	Medium dense dark grey slightly sandy slightly clayey slightly silty subangular to subrounded fine to coarse GRAVEL with many cobbles and boulders		
				37.91	2.70	Complete at 2.70m		

Plan

Remarks

Groundwater encountered at 0.60m and 1.50m BGL; Seepage and Fast Ingress
Trial pit unstable; side walls spalling
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	CMP RH	12205-09-22.TP-19

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-01

TP-01

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-01

TP-01

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-01

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-02

TP-02

Cornamaddy Athlone Northern Site – Trial Pit Photographs

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TP-02

Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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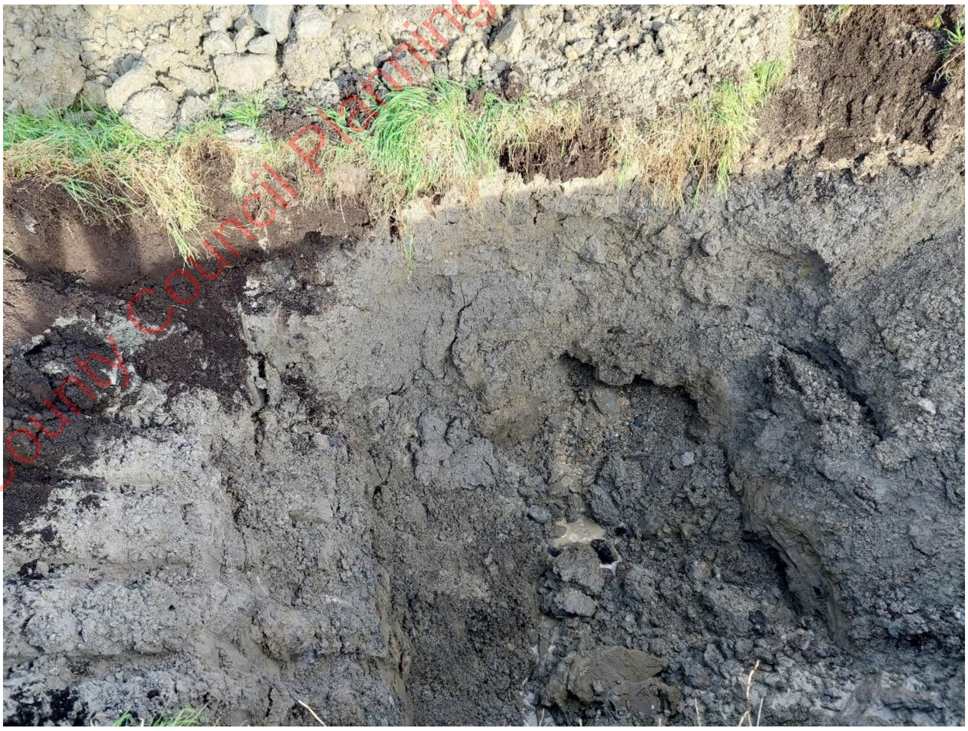

Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-09

Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

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Cornamaddy Athlone Northern Site – Trial Pit Photographs

TP-19

APPENDIX 3 – Laboratory Testing

Element Materials Technology
Unit 3 Deeside Point
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Deeside
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Catherinestown House
Hazelhatch Road
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Ireland

UKAS TESTING 4225

Attention :	James Cashen
Date :	10th November, 2022
Your reference :	12205-09-22
Our reference :	Test Report 22/17822 Batch 1
Location :	Cornamaddy Athlone Northern Site
Date samples received :	28th October, 2022
Status :	Final Report
Issue :	1

Fourteen samples were received for analysis on 28th October, 2022 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.

Authorised By:

Bruce Leslie
Project Manager

Please include all sections of this report if it is reproduced

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	1-4	5-8	9-12	17-20	21-24	25-28	29-32	37-40	41-44	45-48			
Sample ID	TP-01	TP-02	TP-03	TP-06	TP-07	TP-10	TP-11	TP-13	TP-15	TP-17			
Depth	0.00-0.60	0.00-0.90	1.40-2.10	1.00-2.70	1.10-2.30	0.20-0.80	0.20-0.50	0.75-2.00	0.30-0.70	0.20-1.40			
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	24/10/2022	24/10/2022	21/10/2022	21/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022			
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	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022			
Antimony	1	<1	1	1	<1	1	<1	<1	<1	<1	<1	mg/kg	TM30/PM15
Arsenic #	7.5	5.7	2.3	6.3	9.0	5.6	4.5	14.9	3.2	20.0	<0.5	mg/kg	TM30/PM15
Barium #	45	35	17	60	27	13	16	45	15	69	<1	mg/kg	TM30/PM15
Cadmium #	1.1	0.9	0.5	1.3	0.8	0.7	0.7	1.8	0.5	1.2	<0.1	mg/kg	TM30/PM15
Chromium #	57.3	41.1	107.7	59.1	38.3	94.0	48.8	42.6	43.8	37.2	<0.5	mg/kg	TM30/PM15
Copper #	15	15	6	17	8	8	7	26	6	18	<1	mg/kg	TM30/PM15
Lead #	10	10	<5	10	6	8	<5	16	<5	11	<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 #	3.3	2.4	6.4	3.4	3.0	5.6	3.0	3.4	2.7	3.5	<0.1	mg/kg	TM30/PM15
Nickel #	32.4	30.1	14.2	37.1	19.1	27.5	16.4	58.5	13.1	53.6	<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	1	1	<1	<1	<1	3	<1	<1	<1	mg/kg	TM30/PM15
Zinc #	57	50	23	74	35	44	28	104	17	75	<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	<0.03	<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	<0.03	<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	<0.02	<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	0.09	<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	101	96	94	95	93	97	93	98	94	95	<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30	<30	221	<30	<30	<30	<30	<30	<30	mg/kg	TM5/PM8/PM16

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	1-4	5-8	9-12	17-20	21-24	25-28	29-32	37-40	41-44	45-48			
Sample ID	TP-01	TP-02	TP-03	TP-06	TP-07	TP-10	TP-11	TP-13	TP-15	TP-17			
Depth	0.00-0.60	0.00-0.90	1.40-2.10	1.00-2.70	1.10-2.30	0.20-0.80	0.20-0.50	0.75-2.00	0.30-0.70	0.20-1.40			
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	24/10/2022	24/10/2022	21/10/2022	21/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022			
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	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022			
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL)#	<0.2	<0.2	<0.2	<0.2	119.8	<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	101	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)#	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)#	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	<26	<26	<26	221	<26	<26	<26	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	<10	<10	<10	<10	299	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	<10	<10	<10	<10	<10	<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	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<0.2	<0.2	<0.2	<0.2	30.7	<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	24	<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	25	40	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	<26	<26	<26	<26	95	<26	<26	<26	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	<52	<52	<52	<52	316	<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	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	<10	<10	<10	<10	71	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	<10	<10	<10	23	29	<10	<10	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
MTBE#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
Benzene#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
Toluene#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
Ethylbenzene#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
m/p-Xylene#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
o-Xylene#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM36/PM12
PCB 28#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 52#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 101#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 118#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 138#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 153#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
PCB 180#	<5	<5	<5	<5	<5	<5	<5	<5 SV	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs#	<35	<35	<35	<35	<35	<35	<35	<35 SV	<35	<35	<35	ug/kg	TM17/PM8

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	1-4	5-8	9-12	17-20	21-24	25-28	29-32	37-40	41-44	45-48			
Sample ID	TP-01	TP-02	TP-03	TP-06	TP-07	TP-10	TP-11	TP-13	TP-15	TP-17			
Depth	0.00-0.60	0.00-0.90	1.40-2.10	1.00-2.70	1.10-2.30	0.20-0.80	0.20-0.50	0.75-2.00	0.30-0.70	0.20-1.40			
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	24/10/2022	24/10/2022	21/10/2022	21/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022			
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	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022			
Natural Moisture Content	18.3	15.2	32.7	78.4	42.9	16.3	10.5	26.1	6.4	17.0	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	15.5	13.2	24.7	43.9	30.0	14.0	9.5	20.7	6.0	14.5	<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	57.3	41.1	107.7	59.1	38.3	94.0	48.8	42.6	43.8	37.2	<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.33	0.14	0.55	2.70	0.96	0.12	0.31	0.52	0.06	0.20	<0.02	%	TM21/PM24
pH #	8.19	8.35	8.04	7.73	7.66	8.75	8.47	8.10	8.95	8.63	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1063	0.1012	0.1404	0.1534	0.1461	0.1057	0.0997	0.1192	0.1003	0.1053		kg	NONE/PM17
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

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:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	12205-09-22		
Location:	Cornamaddy Athlone Northern Site	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	James Cashen		
EMT Job No:	22/17822		

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	49-52	53-56	LOD/LOR	Units	Method No.
Sample ID	TP-18	TP-19			
Depth	0.50-1.10	0.70-1.40			
COC No / misc					
Containers	V J T	V J T			
Sample Date	20/10/2022	20/10/2022			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	28/10/2022	28/10/2022			
Antimony	<1	1	<1	mg/kg	TM30/PM15
Arsenic#	2.9	12.9	<0.5	mg/kg	TM30/PM15
Barium#	10	39	<1	mg/kg	TM30/PM15
Cadmium#	0.7	1.2	<0.1	mg/kg	TM30/PM15
Chromium#	50.1	57.9	<0.5	mg/kg	TM30/PM15
Copper#	3	16	<1	mg/kg	TM30/PM15
Lead#	<5	9	<5	mg/kg	TM30/PM15
Mercury#	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum#	3.0	3.8	<0.1	mg/kg	TM30/PM15
Nickel#	13.0	55.4	<0.7	mg/kg	TM30/PM15
Selenium#	<1	4	<1	mg/kg	TM30/PM15
Zinc#	21	56	<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	112	94	<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30	mg/kg	TM5/PM8/PM16

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	49-52	53-56	LOD/LOR	Units	Method No.
Sample ID	TP-18	TP-19			
Depth	0.50-1.10	0.70-1.40			
COC No / misc					
Containers	V J T	V J T			
Sample Date	20/10/2022	20/10/2022			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	28/10/2022	28/10/2022			
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)#	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)#	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)#	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	<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_1D_AL)	<10	<10	<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_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_1D_AR)	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	<26	<26	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	<52	<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_1D_AR)	<10	<10	<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_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	<5	<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

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	49-52	53-56									LOD/LOR	Units	Method No.
Sample ID	TP-18	TP-19											
Depth	0.50-1.10	0.70-1.40											
COC No / misc													
Containers	V J T	V J T											
Sample Date	20/10/2022	20/10/2022											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	28/10/2022	28/10/2022											
Natural Moisture Content	9.8	99.2									<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	8.9	49.8									<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3									<0.3	mg/kg	TM38/PM20
Chromium III	50.1	57.9									<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.06	2.33									<0.02	%	TM21/PM24
pH #	8.87	7.60									<0.01	pH units	TM73/PM11
Mass of raw test portion	0.0992	0.1813										kg	NONE/PM17
Mass of dried test portion	0.09	0.09										kg	NONE/PM17

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	1-4	5-8	9-12	17-20	21-24	25-28	29-32	37-40	41-44	45-48			
Sample ID	TP-01	TP-02	TP-03	TP-06	TP-07	TP-10	TP-11	TP-13	TP-15	TP-17			
Depth	0.00-0.60	0.00-0.90	1.40-2.10	1.00-2.70	1.10-2.30	0.20-0.80	0.20-0.50	0.75-2.00	0.30-0.70	0.20-1.40			
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	24/10/2022	24/10/2022	21/10/2022	21/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022			
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	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022			
Dissolved Antimony #	<0.002	<0.002	0.016	0.017	0.015	<0.002	<0.002	0.016	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	0.16	0.17	0.15	<0.02	<0.02	0.16	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	0.0026	<0.0025	0.0064	0.0041	0.0087	<0.0025	<0.0025	0.0049	<0.0025	<0.0025	<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	0.026	<0.025	0.064	0.041	0.087	<0.025	<0.025	0.049	<0.025	<0.025	<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.008	0.004	0.021	0.032	0.032	<0.003	<0.003	0.023	<0.003	0.005	<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.08	0.04	0.21	0.32	0.32	<0.03	<0.03	0.23	<0.03	0.05	<0.03	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	0.003	0.031	0.028	0.100	<0.002	<0.002	0.074	<0.002	0.002	<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	0.03	0.03	0.31	0.28	1.00	<0.02	<0.02	0.74	<0.02	0.02	<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	0.003	0.007	0.004	<0.002	<0.002	0.024	<0.002	<0.002	<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	0.03	0.07	0.04	<0.02	<0.02	0.24	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	0.008	0.008	0.007	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	0.08	0.08	0.07	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003	0.003	0.003	<0.003	0.004	<0.003	<0.003	<0.003	0.003	<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	0.03	<0.03	<0.03	0.04	<0.03	<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	0.5	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.4	<0.3	mg/l	TM173/PM0
Fluoride	5	<3	<3	<3	<3	<3	<3	<3	<3	4	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	1.3	0.8	23.1	53.9	46.3	0.7	<0.5	20.9	0.5	0.8	<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	13	8	231	539	463	7	<5	209	<5	8	<5	mg/kg	TM38/PM0
Chloride #	0.8	<0.3	0.7	1.1	1.2	0.4	<0.3	12.4	<0.3	0.4	<0.3	mg/l	TM38/PM0
Chloride #	8	<3	7	11	12	4	<3	124	<3	4	<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	<2	8	10	9	<2	3	3	<2	<2	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20	80	100	90	<20	30	30	<20	<20	<20	mg/kg	TM60/PM0
pH	8.40	8.56	8.38	8.36	8.28	8.29	8.52	8.32	9.15	8.33	<0.01	pH units	TM73/PM0
Total Dissolved Solids #	48	<35	131	177	174	<35	63	130	<35	36	<35	mg/l	TM20/PM0
Total Dissolved Solids #	480	<350	1310	1769	1740	<350	630	1300	<350	360	<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: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

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.	49-52	53-56			
Sample ID	TP-18	TP-19			
Depth	0.50-1.10	0.70-1.40			
COC No / misc					
Containers	V J T	V J T			
Sample Date	20/10/2022	20/10/2022			
Sample Type	Soil	Soil			
Batch Number	1	1	LOD/LOR	Units	Method No.
Date of Receipt	28/10/2022	28/10/2022			
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	0.016	<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	0.16	<0.03	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	0.012	<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	0.12	<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	0.006	<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	0.06	<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	88.6	<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	<5	886	<5	mg/kg	TM38/PM0
Chloride #	<0.3	1.4	<0.3	mg/l	TM38/PM0
Chloride #	<3	14	<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	6	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	60	<20	mg/kg	TM60/PM0
pH	9.03	8.35	<0.01	pH units	TM73/PM0
Total Dissolved Solids #	<35	267	<35	mg/l	TM20/PM0
Total Dissolved Solids #	<350	2670	<350	mg/kg	TM20/PM0

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Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

Report : **EN12457_2**

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-4	5-8	9-12	17-20	21-24	25-28	29-32	37-40	41-44	45-48						
Sample ID	TP-01	TP-02	TP-03	TP-06	TP-07	TP-10	TP-11	TP-13	TP-15	TP-17						
Depth	0.00-0.60	0.00-0.90	1.40-2.10	1.00-2.70	1.10-2.30	0.20-0.80	0.20-0.50	0.75-2.00	0.30-0.70	0.20-1.40						
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	24/10/2022	24/10/2022	21/10/2022	21/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1	1	1	1	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Date of Receipt	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022	28/10/2022						
Solid Waste Analysis																
Total Organic Carbon#	0.33	0.14	0.55	2.70	0.96	0.12	0.31	0.52	0.06	0.20	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025[SV]	<0.025	<0.025	6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs#	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035[SV]	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	221	<30	<30	<30	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6#	<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 Sum of 17	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic#	0.026	<0.025	0.064	0.041	0.087	<0.025	<0.025	0.049	<0.025	<0.025	0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium#	0.08	0.04	0.21	0.32	0.32	<0.03	<0.03	0.23	<0.03	0.05	20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium#	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium#	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper#	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	2	50	100	<0.07	mg/kg	TM30/PM17
Mercury#	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum#	0.03	0.03	0.31	0.28	1.00	<0.02	<0.02	0.74	<0.02	0.02	0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel#	<0.02	<0.02	0.03	0.07	0.04	<0.02	<0.02	0.24	<0.02	<0.02	0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead#	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony#	<0.02	<0.02	0.16	0.17	0.15	<0.02	<0.02	0.16	<0.02	<0.02	0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium#	<0.03	<0.03	0.08	0.08	0.07	<0.03	<0.03	<0.03	<0.03	<0.03	0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc#	<0.03	<0.03	0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	0.03	4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids#	480	<350	1310	1769	1740	<350	630	1300	<350	360	4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	<20	<20	80	100	90	<20	30	30	<20	<20	500	800	1000	<20	mg/kg	TM60/PM0
Dry Matter Content Ratio	85.0	89.0	64.1	58.5	61.6	85.4	90.0	75.7	90.0	85.5	-	-	-	<0.1	%	NONE/PM4
Moisture Content 105C (% Dry Weight)	17.7	12.3	55.9	70.8	62.3	17.1	11.1	32.1	11.1	17.0	-	-	-	<0.1	%	PM4/PM0
pH#	8.19	8.35	8.04	7.73	7.66	8.75	8.47	8.10	8.95	8.63	-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	5	<3	<3	<3	<3	<3	<3	<3	<3	4	10	150	500	<3	mg/kg	TM173/PM0
Sulphate as SO4#	13	8	231	539	463	7	<5	209	<5	8	1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride#	8	<3	7	11	12	4	<3	124	<3	4	800	15000	25000	<3	mg/kg	TM38/PM0

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen
EMT Job No: 22/17822

Report : **EN12457_2**

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	49-52	53-56	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	TP-18	TP-19						
Depth	0.50-1.10	0.70-1.40						
COC No / misc								
Containers	V J T	V J T						
Sample Date	20/10/2022	20/10/2022						
Sample Type	Soil	Soil						
Batch Number	1	1						
Date of Receipt	28/10/2022	28/10/2022						
Solid Waste Analysis								
Total Organic Carbon #	0.06	2.33	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	<0.22	<0.22	-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	<0.64	<0.64	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate								
Arsenic #	<0.025	<0.025	0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	0.16	20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	0.12	0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	0.06	0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03	4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	<350	2670	4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	<20	60	500	800	1000	<20	mg/kg	TM60/PM0
Dry Matter Content Ratio	91.1	49.7	-	-	-	<0.1	%	NONE/PM4
Moisture Content 105C (% Dry Weight)	9.8	101.0	-	-	-	<0.1	%	PM4/PM0
pH #	8.87	7.60	-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	10	150	500	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<5	886	1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3	14	800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
22/17822	1	TP-01	0.00-0.60	1-4	No Interpretation Possible
22/17822	1	TP-02	0.00-0.90	5-8	No Interpretation Possible
22/17822	1	TP-03	1.40-2.10	9-12	No Interpretation Possible
22/17822	1	TP-06	1.00-2.70	17-20	No Interpretation Possible
22/17822	1	TP-07	1.10-2.30	21-24	Degraded Kerosene, possible Naturally Occurring Compounds
22/17822	1	TP-10	0.20-0.80	25-28	No Interpretation Possible
22/17822	1	TP-11	0.20-0.50	29-32	No Interpretation Possible
22/17822	1	TP-13	0.75-2.00	37-40	No Interpretation Possible
22/17822	1	TP-15	0.30-0.70	41-44	No Interpretation Possible
22/17822	1	TP-17	0.20-1.40	45-48	No Interpretation Possible
22/17822	1	TP-18	0.50-1.10	49-52	No Interpretation Possible
22/17822	1	TP-19	0.70-1.40	53-56	No Interpretation Possible

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen

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
22/17822	1	TP-01	0.00-0.60	4	Simon Postlewhite	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	08/11/2022	**Asbestos Fibres**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos ACM**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-02	0.00-0.90	8	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-03	1.40-2.10	12	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-06	1.00-2.70	20	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-07	1.10-2.30	24	Simon Postlewhite	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	08/11/2022	**Asbestos Fibres**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos ACM**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-10	0.20-0.80	28	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-11	0.20-0.50	32	Anthony Carman	08/11/2022	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	08/11/2022	**Asbestos Fibres**	NAD
					Anthony Carman	08/11/2022	**Asbestos ACM**	NAD
					Anthony Carman	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-13	0.75-2.00	40	Simon Postlewhite	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/stones
					Simon Postlewhite	08/11/2022	**Asbestos Fibres**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos ACM**	NAD
					Simon Postlewhite	08/11/2022	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
22/17822	1	TP-15	0.30-0.70	44	Anthony Carman	08/11/2022	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	08/11/2022	**Asbestos Fibres**	NAD
					Anthony Carman	08/11/2022	**Asbestos ACM**	NAD
					Anthony Carman	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-17	0.20-1.40	48	Anthony Carman	08/11/2022	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	08/11/2022	**Asbestos Fibres**	NAD
					Anthony Carman	08/11/2022	**Asbestos ACM**	NAD
					Anthony Carman	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-18	0.50-1.10	52	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD
22/17822	1	TP-19	0.70-1.40	56	Matthew Turner	08/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	08/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	08/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	08/11/2022	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 12205-09-22
Location: Cornamaddy Athlone Northern Site
Contact: James Cashen

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
22/17822	1	TP-03	1.40-2.10	9-12	PCB	Sample holding time exceeded
22/17822	1	TP-06	1.00-2.70	17-20	PCB	Sample holding time exceeded
22/17822	1	TP-07	1.10-2.30	21-24	PCB	Sample holding time exceeded
22/17822	1	TP-10	0.20-0.80	25-28	PCB	Sample holding time exceeded
22/17822	1	TP-11	0.20-0.50	29-32	PCB	Sample holding time exceeded
22/17822	1	TP-13	0.75-2.00	37-40	PCB	Sample holding time exceeded
22/17822	1	TP-15	0.30-0.70	41-44	PCB	Sample holding time exceeded
22/17822	1	TP-17	0.20-1.40	45-48	PCB	Sample holding time exceeded
22/17822	1	TP-18	0.50-1.10	49-52	PCB	Sample holding time exceeded
22/17822	1	TP-19	0.70-1.40	53-56	PCB	Sample holding time exceeded

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.

EMT Job No.: 22/17822

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 37°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease 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 or Fats, Oils and Grease 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 UKAS requirement 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.

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 calibration range, the result should be considered the minimum value. The actual result could be significantly higher.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
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.

EMT Job No: 22/17822

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°C or 105°C. 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, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

EMT Job No: 22/17822

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
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 °C. 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 °C. 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
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

EMT Job No: 22/17822

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
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.			AR	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
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.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

APPENDIX 4 – HazWasteOnLine^{TM} Report

HazWasteOnline™

Waste Classification Report

HazWasteOnline™ classifies waste as either **hazardous** or **non-hazardous** based on its chemical composition, related legislation and the rules and data defined in the current UK or EU technical guidance (Appendix C) (note that HP 9 Infectious is not assessed). It is the responsibility of the classifier named below to:

a) understand the origin of the waste
b) select the correct List of Waste code(s)
c) confirm that the list of determinands, results and sampling plan are fit for purpose
d) select and justify the chosen metal species (Appendix B)
e) correctly apply moisture correction and other available corrections
f) add the meta data for their user-defined substances (Appendix A)
g) check that the classification engine is suitable with respect to the national destination of the waste (Appendix C)

To aid the reviewer, the laboratory results, assumptions and justifications managed by the classifier are highlighted in pale yellow.

ZO4P9-PVD47-EWJWB

Job name

Cornamaddy Athlone

Description/Comments

Project

12205-09-22

Site

Cornamaddy Athlone Northern Site

Classified by

Name:
James Cashen
Date:
12 Dec 2022 14:58 GMT
Telephone:

Company:
Ground Investigations Ireland Ltd

HazWasteOnline™ provides a two day, hazardous waste classification course that covers the use of the software and both basic and advanced waste classification techniques. Certification has to be renewed every 3 years.

HazWasteOnline™ Certification:	**CERTIFIED**
Course	**Date**
Hazardous Waste Classification	06 Aug 2020

Next 3 year Refresher due by Aug 2023

Purpose of classification

7 - Disposal of Waste

Address of the waste

Cornamaddy, Athlone, Co. Westmeath

Post Code N/A

Description of industry/producer giving rise to the waste

Residential development

Description of the specific process, sub-process and/or activity that created the waste

Excavation for earthworks and foundations on proposed residential development

Description of the waste

Soil and stone

Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	Page
1	TP-01-24/10/2022-0.00-0.60m		Non Hazardous		3
2	TP-02-24/10/2022-0.00-0.90m		Non Hazardous		5
3	TP-03-21/10/2022-1.40-2.10m		Non Hazardous		7
4	TP-06-21/10/2022-1.00-2.70m		Non Hazardous		9
5	TP-07-20/10/2022-1.10-2.30m		Non Hazardous		11
6	TP-10-20/10/2022-0.20-0.80m		Non Hazardous		14
7	TP-11-20/10/2022-0.20-0.50m		Non Hazardous		16
8	TP-13-20/10/2022-0.75-2.00m		Non Hazardous		18
9	TP-15-20/10/2022-0.30-0.70m		Non Hazardous		20
10	TP-17-20/10/2022-0.20-1.40m		Non Hazardous		22
11	TP-18-20/10/2022-0.50-1.10m		Non Hazardous		24
12	TP-19-20/10/2022-0.70-1.40m		Non Hazardous		26

Related documents

#	Name	Description
1	Cornamaddy.HWOL	Element .hwol file used to populate the Job
2	Example waste stream template for contaminated soils	waste stream template used to create this Job

Report

Created by: James Cashen

Created date: 12 Dec 2022 14:58 GMT

Classification of sample: TP-01-24/10/2022-0.00-0.60m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:	LoW Code:	
TP-01-24/10/2022-0.00-0.60m	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:		
15.5% (wet weight correction)	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 15.5% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1	mg/kg	1.197	1.012	mg/kg	0.000101 %	✓	
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		7.5	mg/kg	1.32	8.368	mg/kg	0.000837 %	✓	
3	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.1	mg/kg	1.142	1.062	mg/kg	0.000106 %	✓	
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		57.3	mg/kg	1.462	70.766	mg/kg	0.00708 %	✓	
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		15	mg/kg	1.126	14.271	mg/kg	0.00143 %	✓	
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	10	mg/kg	1.56	13.18	mg/kg	0.000845 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
9	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.3	mg/kg	1.5	4.183	mg/kg	0.000418 %	✓	
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		32.4	mg/kg	2.976	81.484	mg/kg	0.00815 %	✓	
11	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
12	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		57	mg/kg	2.774	133.617	mg/kg	0.0134 %	✓	
13	TPH (C6 to C40) petroleum group			TPH		<52	mg/kg		<52	mg/kg	<0.0052 %		<LOD
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
15	benzene	601-020-00-8	200-753-7	71-43-2		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
16	toluene	601-021-00-3	203-625-9	108-88-3		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
17	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
18		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
19	●	pH			PH		8.19	pH		8.19	pH	8.19 pH		
20		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
21	●	acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
22	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
23	●	fluorene		201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
24	●	phenanthrene		201-581-5	85-01-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
25	●	anthracene		204-371-1	120-12-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
26	●	fluoranthene		205-912-4	206-44-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
27	●	pyrene		204-927-3	129-00-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
28		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
29		chrysene	601-048-00-0	205-923-4	218-01-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
30		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
31		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
32		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
33	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
34		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
35	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
36	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.035	mg/kg		<0.035	mg/kg	<0.0000035 %		<LOD
37		barium { ● barium sulphide }	016-002-00-X	244-214-4	21109-95-5		45	mg/kg	1.233	46.904	mg/kg	0.00469 %	✓	
38	●	coronene		205-881-7	191-07-1		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
39		benzo[j]fluoranthene	601-035-00-X	205-910-3	205-82-3		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
											Total:	0.0427 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP-02-24/10/2022-0.00-0.90m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP-02-24/10/2022-0.00-0.90m		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:			
13.2% (wet weight correction)		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 13.2% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<1 mg/kg	1.197	<1.197 mg/kg	<0.00012 %		<LOD
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		5.7 mg/kg	1.32	6.532 mg/kg	0.000653 %	✓	
3	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.9 mg/kg	1.142	0.892 mg/kg	0.0000892 %	✓	
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		41.1 mg/kg	1.462	52.141 mg/kg	0.00521 %	✓	
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.3 mg/kg	2.27	<0.681 mg/kg	<0.0000681 %		<LOD
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		15 mg/kg	1.126	14.659 mg/kg	0.00147 %	✓	
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	10 mg/kg	1.56	13.539 mg/kg	0.000868 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
9	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		2.4 mg/kg	1.5	3.125 mg/kg	0.000313 %	✓	
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		30.1 mg/kg	2.976	77.76 mg/kg	0.00778 %	✓	
11	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
12	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		50 mg/kg	2.774	120.398 mg/kg	0.012 %	✓	
13	TPH (C6 to C40) petroleum group			TPH		<52 mg/kg		<52 mg/kg	<0.0052 %		<LOD
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
15	benzene	601-020-00-8	200-753-7	71-43-2		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
16	toluene	601-021-00-3	203-625-9	108-88-3		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD

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#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
17	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
18	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
19	pH			PH		8.35 pH		8.35 pH	8.35 pH		
20	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
21	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
22	acenaphthene		201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
23	fluorene		201-695-5	86-73-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
24	phenanthrene		201-581-5	85-01-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
25	anthracene		204-371-1	120-12-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
26	fluoranthene		205-912-4	206-44-0		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
27	pyrene		204-927-3	129-00-0		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
28	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
29	chrysene	601-048-00-0	205-923-4	218-01-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
30	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
31	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
32	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
33	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
34	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
35	benzo[ghi]perylene		205-883-8	191-24-2		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
36	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.035 mg/kg		<0.035 mg/kg	<0.0000035 %		<LOD
37	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		35 mg/kg	1.233	37.474 mg/kg	0.00375 %	✓	
38	coronene		205-881-7	191-07-1		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
39	benzo[j]fluoranthene	601-035-00-X	205-910-3	205-82-3		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
								Total:	0.038 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
(icon)	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP-03-21/10/2022-1.40-2.10m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP-03-21/10/2022-1.40-2.10m		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:			
24.7% (wet weight correction)		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 24.7% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1 mg/kg	1.197	0.901 mg/kg	0.0000901 %	✓	
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		2.3 mg/kg	1.32	2.287 mg/kg	0.000229 %	✓	
3	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.5 mg/kg	1.142	0.43 mg/kg	0.000043 %	✓	
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		107.7 mg/kg	1.462	118.529 mg/kg	0.0119 %	✓	
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.3 mg/kg	2.27	<0.681 mg/kg	<0.0000681 %		<LOD
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		6 mg/kg	1.126	5.087 mg/kg	0.000509 %	✓	
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	<5 mg/kg	1.56	<7.799 mg/kg	<0.0005 %		<LOD
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
9	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		6.4 mg/kg	1.5	7.23 mg/kg	0.000723 %	✓	
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		14.2 mg/kg	2.976	31.824 mg/kg	0.00318 %	✓	
11	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		1 mg/kg	2.554	1.923 mg/kg	0.000192 %	✓	
12	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		23 mg/kg	2.774	48.045 mg/kg	0.0048 %	✓	
13	TPH (C6 to C40) petroleum group			TPH		<52 mg/kg		<52 mg/kg	<0.0052 %		<LOD
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
15	benzene	601-020-00-8	200-753-7	71-43-2		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
16	toluene	601-021-00-3	203-625-9	108-88-3		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
17	•	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
18		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
19	•	pH			PH		8.04 pH		8.04 pH	8.04 pH		
20		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
21	•	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
22	•	acenaphthene		201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
23	•	fluorene		201-695-5	86-73-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
24	•	phenanthrene		201-581-5	85-01-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
25	•	anthracene		204-371-1	120-12-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
26	•	fluoranthene		205-912-4	206-44-0		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
27	•	pyrene		204-927-3	129-00-0		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
28		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
29		chrysene	601-048-00-0	205-923-4	218-01-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
30		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
31		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
32		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
33	•	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
34		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
35	•	benzo[ghi]perylene		205-883-8	191-24-2		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
36	•	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.035 mg/kg		<0.035 mg/kg	<0.0000035 %		<LOD
37		barium { • barium sulphide }	016-002-00-X	244-214-4	21109-95-5		17 mg/kg	1.233	15.79 mg/kg	0.00158 %	✓	
38	•	coronene		205-881-7	191-07-1		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
39		benzo[j]fluoranthene	601-035-00-X	205-910-3	205-82-3		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
									Total:	0.0292 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP-06-21/10/2022-1.00-2.70m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP-06-21/10/2022-1.00-2.70m		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:			
43.9% (wet weight correction)		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 43.9% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1	mg/kg	1.197	0.672	mg/kg	0.0000672 %	✓	
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		6.3	mg/kg	1.32	4.666	mg/kg	0.000467 %	✓	
3	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.3	mg/kg	1.142	0.833	mg/kg	0.0000833 %	✓	
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		59.1	mg/kg	1.462	48.458	mg/kg	0.00485 %	✓	
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		17	mg/kg	1.126	10.738	mg/kg	0.00107 %	✓	
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	10	mg/kg	1.56	8.751	mg/kg	0.000561 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
9	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.4	mg/kg	1.5	2.861	mg/kg	0.000286 %	✓	
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		37.1	mg/kg	2.976	61.945	mg/kg	0.00619 %	✓	
11	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		1	mg/kg	2.554	1.433	mg/kg	0.000143 %	✓	
12	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		74	mg/kg	2.774	115.166	mg/kg	0.0115 %	✓	
13	TPH (C6 to C40) petroleum group			TPH		<52	mg/kg		<52	mg/kg	<0.0052 %		<LOD
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
15	benzene	601-020-00-8	200-753-7	71-43-2		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
16	toluene	601-021-00-3	203-625-9	108-88-3		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
17		ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
18		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
19		pH			PH		7.73	pH		7.73	pH	7.73 pH		
20		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
21		acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
22		acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
23		fluorene		201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
24		phenanthrene		201-581-5	85-01-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
25		anthracene		204-371-1	120-12-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
26		fluoranthene		205-912-4	206-44-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
27		pyrene		204-927-3	129-00-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
28		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
29		chrysene	601-048-00-0	205-923-4	218-01-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
30		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
31		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
32		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
33		indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
34		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
35		benzo[ghi]perylene		205-883-8	191-24-2		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
36		polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.035	mg/kg		<0.035	mg/kg	<0.0000035 %		<LOD
37		barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		60	mg/kg	1.233	41.519	mg/kg	0.00415 %	✓	
38		coronene		205-881-7	191-07-1		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
39		benzo[j]fluoranthene	601-035-00-X	205-910-3	205-82-3		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
											Total:	0.0348 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP-07-20/10/2022-1.10-2.30m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP-07-20/10/2022-1.10-2.30m		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
30% (wet weight correction)			

Hazard properties

None identified

Determinands

Moisture content: 30% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<1	mg/kg	1.197	<1.197	mg/kg	<0.00012 %		<LOD
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		9	mg/kg	1.32	8.318	mg/kg	0.000832 %	✓	
3	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.8	mg/kg	1.142	0.64	mg/kg	0.000064 %	✓	
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		38.3	mg/kg	1.462	39.184	mg/kg	0.00392 %	✓	
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		8	mg/kg	1.126	6.305	mg/kg	0.00063 %	✓	
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	6	mg/kg	1.56	6.551	mg/kg	0.00042 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
9	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3	mg/kg	1.5	3.15	mg/kg	0.000315 %	✓	
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		19.1	mg/kg	2.976	39.793	mg/kg	0.00398 %	✓	
11	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
12	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		35	mg/kg	2.774	67.967	mg/kg	0.0068 %	✓	
13	TPH (C6 to C40) petroleum group			TPH		316	mg/kg		221.2	mg/kg	0.0221 %	✓	
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
15	benzene	601-020-00-8	200-753-7	71-43-2		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
16	toluene	601-021-00-3	203-625-9	108-88-3		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
17	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
18	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
19	pH			PH		7.66 pH		7.66 pH	7.66 pH		
20	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
21	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
22	acenaphthene		201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
23	fluorene		201-695-5	86-73-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
24	phenanthrene		201-581-5	85-01-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
25	anthracene		204-371-1	120-12-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
26	fluoranthene		205-912-4	206-44-0		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
27	pyrene		204-927-3	129-00-0		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
28	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
29	chrysene	601-048-00-0	205-923-4	218-01-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
30	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
31	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
32	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
33	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
34	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
35	benzo[ghi]perylene		205-883-8	191-24-2		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
36	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.035 mg/kg		<0.035 mg/kg	<0.0000035 %		<LOD
37	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		27 mg/kg	1.233	23.313 mg/kg	0.00233 %	✓	
38	coronene		205-881-7	191-07-1		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
39	benzo[j]fluoranthene	601-035-00-X	205-910-3	205-82-3		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
								Total:	0.042 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Supplementary Hazardous Property Information

HP 3(i): Flammable "flammable liquid waste: liquid waste having a flash point below 60°C or waste gas oil, diesel and light heating oils having a flash point > 55°C and <= 75°C"
Force this Hazardous property to non hazardous because Solid Waste Without Liquid Phase

Hazard Statements hit:

Flam. Liq. 3; H226 "Flammable liquid and vapour."

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.0221%)

Classification of sample: TP-10-20/10/2022-0.20-0.80m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP-10-20/10/2022-0.20-0.80m		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:			
14% (wet weight correction)		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 14% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1	mg/kg	1.197	1.03	mg/kg	0.000103 %	✓	
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		5.6	mg/kg	1.32	6.359	mg/kg	0.000636 %	✓	
3	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.7	mg/kg	1.142	0.688	mg/kg	0.0000688 %	✓	
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		94	mg/kg	1.462	118.152	mg/kg	0.0118 %	✓	
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		8	mg/kg	1.126	7.746	mg/kg	0.000775 %	✓	
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	8	mg/kg	1.56	10.732	mg/kg	0.000688 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
9	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		5.6	mg/kg	1.5	7.225	mg/kg	0.000722 %	✓	
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		27.5	mg/kg	2.976	70.389	mg/kg	0.00704 %	✓	
11	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
12	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		44	mg/kg	2.774	104.974	mg/kg	0.0105 %	✓	
13	TPH (C6 to C40) petroleum group			TPH		<52	mg/kg		<52	mg/kg	<0.0052 %		<LOD
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
15	benzene	601-020-00-8	200-753-7	71-43-2		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
16	toluene	601-021-00-3	203-625-9	108-88-3		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
17	•	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
18		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
19	•	pH			PH		8.75	pH		8.75	pH	8.75 pH		
20		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
21	•	acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
22	•	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
23	•	fluorene		201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
24	•	phenanthrene		201-581-5	85-01-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
25	•	anthracene		204-371-1	120-12-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
26	•	fluoranthene		205-912-4	206-44-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
27	•	pyrene		204-927-3	129-00-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
28		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
29		chrysene	601-048-00-0	205-923-4	218-01-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
30		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
31		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
32		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
33	•	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
34		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
35	•	benzo[ghi]perylene		205-883-8	191-24-2		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
36	•	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.035	mg/kg		<0.035	mg/kg	<0.0000035 %		<LOD
37		barium { • barium sulphide }	016-002-00-X	244-214-4	21109-95-5		13	mg/kg	1.233	13.79	mg/kg	0.00138 %	✓	
38	•	coronene		205-881-7	191-07-1		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
39		benzo[j]fluoranthene	601-035-00-X	205-910-3	205-82-3		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
											Total:	0.0394 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP-11-20/10/2022-0.20-0.50m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP-11-20/10/2022-0.20-0.50m		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
9.5% (wet weight correction)			

Hazard properties

None identified

Determinands

Moisture content: 9.5% Wet Weight Moisture Correction applied (MC)

#	Determinand / EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide } 051-005-00-X	215-175-0	1309-64-4		<1	mg/kg	1.197	<1.197	mg/kg	<0.00012 %		<LOD
2	arsenic { arsenic trioxide } 033-003-00-0	215-481-4	1327-53-3		4.5	mg/kg	1.32	5.377	mg/kg	0.000538 %	✓	
3	cadmium { cadmium oxide } 048-002-00-0	215-146-2	1306-19-0		0.7	mg/kg	1.142	0.724	mg/kg	0.0000724 %	✓	
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		48.8	mg/kg	1.462	64.548	mg/kg	0.00645 %	✓	
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex } 024-017-00-8				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
6	copper { dicopper oxide; copper (I) oxide } 029-002-00-X	215-270-7	1317-39-1		7	mg/kg	1.126	7.133	mg/kg	0.000713 %	✓	
7	lead { lead chromate } 082-004-00-2	231-846-0	7758-97-6	1	<5	mg/kg	1.56	<7.799	mg/kg	<0.0005 %		<LOD
8	mercury { mercury dichloride } 080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
9	molybdenum { molybdenum(VI) oxide } 042-001-00-9	215-204-7	1313-27-5		3	mg/kg	1.5	4.073	mg/kg	0.000407 %	✓	
10	nickel { nickel chromate } 028-035-00-7	238-766-5	14721-18-7		16.4	mg/kg	2.976	44.174	mg/kg	0.00442 %	✓	
11	selenium { nickel selenate } 028-031-00-5	239-125-2	15060-62-5		<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
12	zinc { zinc chromate } 024-007-00-3	236-878-9	13530-65-9		28	mg/kg	2.774	70.297	mg/kg	0.00703 %	✓	
13	TPH (C6 to C40) petroleum group		TPH		<52	mg/kg		<52	mg/kg	<0.0052 %		<LOD
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane 603-181-00-X	216-653-1	1634-04-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
15	benzene 601-020-00-8	200-753-7	71-43-2		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
16	toluene 601-021-00-3	203-625-9	108-88-3		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		EU CLP index number	EC Number	CAS Number									
17	●	ethylbenzene											
		601-023-00-4	202-849-4	100-41-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
18		xylene											
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
19	●	pH											
				PH		8.47	pH		8.47	pH	8.47 pH		
20		naphthalene											
		601-052-00-2	202-049-5	91-20-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
21	●	acenaphthylene											
			205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
22	●	acenaphthene											
			201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
23	●	fluorene											
			201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
24	●	phenanthrene											
			201-581-5	85-01-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
25	●	anthracene											
			204-371-1	120-12-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
26	●	fluoranthene											
			205-912-4	206-44-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
27	●	pyrene											
			204-927-3	129-00-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
28		benzo[a]anthracene											
		601-033-00-9	200-280-6	56-55-3		<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
29		chrysene											
		601-048-00-0	205-923-4	218-01-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
30		benzo[b]fluoranthene											
		601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
31		benzo[k]fluoranthene											
		601-036-00-5	205-916-6	207-08-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
32		benzo[a]pyrene; benzo[def]chrysene											
		601-032-00-3	200-028-5	50-32-8		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
33	●	indeno[123-cd]pyrene											
			205-893-2	193-39-5		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
34		dibenz[a,h]anthracene											
		601-041-00-2	200-181-8	53-70-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
35	●	benzo[ghi]perylene											
			205-883-8	191-24-2		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
36	●	polychlorobiphenyls; PCB											
		602-039-00-4	215-648-1	1336-36-3		<0.035	mg/kg		<0.035	mg/kg	<0.0000035 %		<LOD
37		barium { ● barium sulphide }											
		016-002-00-X	244-214-4	21109-95-5		16	mg/kg	1.233	17.861	mg/kg	0.00179 %	✓	
38	●	coronene											
			205-881-7	191-07-1		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
39		benzo[j]fluoranthene											
		601-035-00-X	205-910-3	205-82-3		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
										Total:	0.0277 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

HazWasteOnline™
Report created by James Cashen on 12 Dec 2022

Classification of sample: TP-13-20/10/2022-0.75-2.00m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:
TP-13-20/10/2022-0.75-2.00m
Moisture content:
20.7%
(wet weight correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 20.7% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<1 mg/kg	1.197	<1.197 mg/kg	<0.00012 %		<LOD
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		14.9 mg/kg	1.32	15.601 mg/kg	0.00156 %	✓	
3	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.8 mg/kg	1.142	1.631 mg/kg	0.000163 %	✓	
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		42.6 mg/kg	1.462	49.374 mg/kg	0.00494 %	✓	
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.3 mg/kg	2.27	<0.681 mg/kg	<0.0000681 %		<LOD
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		26 mg/kg	1.126	23.214 mg/kg	0.00232 %	✓	
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	16 mg/kg	1.56	19.791 mg/kg	0.00127 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
9	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.4 mg/kg	1.5	4.045 mg/kg	0.000404 %	✓	
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		58.5 mg/kg	2.976	138.07 mg/kg	0.0138 %	✓	
11	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		3 mg/kg	2.554	6.076 mg/kg	0.000608 %	✓	
12	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		104 mg/kg	2.774	228.789 mg/kg	0.0229 %	✓	
13	TPH (C6 to C40) petroleum group			TPH		<52 mg/kg		<52 mg/kg	<0.0052 %		<LOD
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
15	benzene	601-020-00-8	200-753-7	71-43-2		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
16	toluene	601-021-00-3	203-625-9	108-88-3		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
17	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
18	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
19	pH			PH		8.1 pH		8.1 pH	8.1 pH		
20	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
21	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
22	acenaphthene		201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
23	fluorene		201-695-5	86-73-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
24	phenanthrene		201-581-5	85-01-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
25	anthracene		204-371-1	120-12-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
26	fluoranthene		205-912-4	206-44-0		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
27	pyrene		204-927-3	129-00-0		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
28	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
29	chrysene	601-048-00-0	205-923-4	218-01-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
30	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
31	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
32	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
33	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
34	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
35	benzo[ghi]perylene		205-883-8	191-24-2		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
36	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.035 mg/kg		<0.035 mg/kg	<0.0000035 %		<LOD
37	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		45 mg/kg	1.233	44.017 mg/kg	0.0044 %	✓	
38	coronene		205-881-7	191-07-1		0.09 mg/kg		0.0714 mg/kg	0.00000714 %	✓	
39	benzo[j]fluoranthene	601-035-00-X	205-910-3	205-82-3		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
								Total:	0.0579 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
(speciated icon)	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP-15-20/10/2022-0.30-0.70m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP-15-20/10/2022-0.30-0.70m		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:			
6% (wet weight correction)		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 6% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<1	mg/kg	1.197	<1.197	mg/kg	<0.00012 %		<LOD
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		3.2	mg/kg	1.32	3.972	mg/kg	0.000397 %	✓	
3	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		0.5	mg/kg	1.142	0.537	mg/kg	0.0000537 %	✓	
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		43.8	mg/kg	1.462	60.175	mg/kg	0.00602 %	✓	
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		6	mg/kg	1.126	6.35	mg/kg	0.000635 %	✓	
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	<5	mg/kg	1.56	<7.799	mg/kg	<0.0005 %		<LOD
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
9	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		2.7	mg/kg	1.5	3.807	mg/kg	0.000381 %	✓	
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		13.1	mg/kg	2.976	36.65	mg/kg	0.00366 %	✓	
11	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
12	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		17	mg/kg	2.774	44.331	mg/kg	0.00443 %	✓	
13	TPH (C6 to C40) petroleum group			TPH		<52	mg/kg		<52	mg/kg	<0.0052 %		<LOD
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
15	benzene	601-020-00-8	200-753-7	71-43-2		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
16	toluene	601-021-00-3	203-625-9	108-88-3		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
17	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
18	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
19	pH			PH		8.95 pH		8.95 pH	8.95 pH		
20	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
21	acenaphthylene		205-917-1	208-96-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
22	acenaphthene		201-469-6	83-32-9		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
23	fluorene		201-695-5	86-73-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
24	phenanthrene		201-581-5	85-01-8		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
25	anthracene		204-371-1	120-12-7		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
26	fluoranthene		205-912-4	206-44-0		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
27	pyrene		204-927-3	129-00-0		<0.03 mg/kg		<0.03 mg/kg	<0.000003 %		<LOD
28	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06 mg/kg		<0.06 mg/kg	<0.000006 %		<LOD
29	chrysene	601-048-00-0	205-923-4	218-01-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
30	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05 mg/kg		<0.05 mg/kg	<0.000005 %		<LOD
31	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02 mg/kg		<0.02 mg/kg	<0.000002 %		<LOD
32	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
33	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
34	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
35	benzo[ghi]perylene		205-883-8	191-24-2		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
36	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.035 mg/kg		<0.035 mg/kg	<0.0000035 %		<LOD
37	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		15 mg/kg	1.233	17.392 mg/kg	0.00174 %	✓	
38	coronene		205-881-7	191-07-1		<0.04 mg/kg		<0.04 mg/kg	<0.000004 %		<LOD
39	benzo[j]fluoranthene	601-035-00-X	205-910-3	205-82-3		<1 mg/kg		<1 mg/kg	<0.0001 %		<LOD
								Total:	0.0236 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP-17-20/10/2022-0.20-1.40m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP-17-20/10/2022-0.20-1.40m		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
14.5% (wet weight correction)			

Hazard properties

None identified

Determinands

Moisture content: 14.5% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<1 mg/kg	1.197	<1.197 mg/kg	<0.00012 %		<LOD
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		20 mg/kg	1.32	22.578 mg/kg	0.00226 %	✓	
3	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.2 mg/kg	1.142	1.172 mg/kg	0.000117 %	✓	
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		37.2 mg/kg	1.462	46.486 mg/kg	0.00465 %	✓	
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.3 mg/kg	2.27	<0.681 mg/kg	<0.0000681 %		<LOD
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		18 mg/kg	1.126	17.327 mg/kg	0.00173 %	✓	
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	11 mg/kg	1.56	14.67 mg/kg	0.00094 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.1 mg/kg	1.353	0.116 mg/kg	0.0000116 %	✓	
9	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.5 mg/kg	1.5	4.489 mg/kg	0.000449 %	✓	
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		53.6 mg/kg	2.976	136.396 mg/kg	0.0136 %	✓	
11	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		<1 mg/kg	2.554	<2.554 mg/kg	<0.000255 %		<LOD
12	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		75 mg/kg	2.774	177.892 mg/kg	0.0178 %	✓	
13	TPH (C6 to C40) petroleum group			TPH		<52 mg/kg		<52 mg/kg	<0.0052 %		<LOD
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
15	benzene	601-020-00-8	200-753-7	71-43-2		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD
16	toluene	601-021-00-3	203-625-9	108-88-3		<0.005 mg/kg		<0.005 mg/kg	<0.0000005 %		<LOD

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
17	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
18	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
19	pH			PH		8.63	pH		8.63	pH	8.63 pH		
20	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
21	acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
22	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
23	fluorene		201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
24	phenanthrene		201-581-5	85-01-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
25	anthracene		204-371-1	120-12-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
26	fluoranthene		205-912-4	206-44-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
27	pyrene		204-927-3	129-00-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
28	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
29	chrysene	601-048-00-0	205-923-4	218-01-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
30	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
31	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
32	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
33	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
34	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
35	benzo[ghi]perylene		205-883-8	191-24-2		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
36	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.035	mg/kg		<0.035	mg/kg	<0.0000035 %		<LOD
37	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		69	mg/kg	1.233	72.77	mg/kg	0.00728 %	✓	
38	coronene		205-881-7	191-07-1		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
39	benzo[j]fluoranthene	601-035-00-X	205-910-3	205-82-3		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
										Total:	0.0547 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP-18-20/10/2022-0.50-1.10m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP-18-20/10/2022-0.50-1.10m		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
8.9% (wet weight correction)			

Hazard properties

None identified

Determinands

Moisture content: 8.9% Wet Weight Moisture Correction applied (MC)

#		Determinand EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		antimony { antimony trioxide } 051-005-00-X	215-175-0	1309-64-4		<1	mg/kg	1.197	<1.197	mg/kg	<0.00012 %		<LOD
2		arsenic { arsenic trioxide } 033-003-00-0	215-481-4	1327-53-3		2.9	mg/kg	1.32	3.488	mg/kg	0.000349 %	✓	
3		cadmium { cadmium oxide } 048-002-00-0	215-146-2	1306-19-0		0.7	mg/kg	1.142	0.728	mg/kg	0.0000728 %	✓	
4		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }	215-160-9	1308-38-9		50.1	mg/kg	1.462	66.707	mg/kg	0.00667 %	✓	
5		chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex } 024-017-00-8				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
6		copper { dicopper oxide; copper (I) oxide } 029-002-00-X	215-270-7	1317-39-1		3	mg/kg	1.126	3.077	mg/kg	0.000308 %	✓	
7		lead { lead chromate } 082-004-00-2	231-846-0	7758-97-6	1	<5	mg/kg	1.56	<7.799	mg/kg	<0.0005 %		<LOD
8		mercury { mercury dichloride } 080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
9		molybdenum { molybdenum(VI) oxide } 042-001-00-9	215-204-7	1313-27-5		3	mg/kg	1.5	4.1	mg/kg	0.00041 %	✓	
10		nickel { nickel chromate } 028-035-00-7	238-766-5	14721-18-7		13	mg/kg	2.976	35.248	mg/kg	0.00352 %	✓	
11		selenium { nickel selenate } 028-031-00-5	239-125-2	15060-62-5		<1	mg/kg	2.554	<2.554	mg/kg	<0.000255 %		<LOD
12		zinc { zinc chromate } 024-007-00-3	236-878-9	13530-65-9		21	mg/kg	2.774	53.072	mg/kg	0.00531 %	✓	
13		TPH (C6 to C40) petroleum group		TPH		<52	mg/kg		<52	mg/kg	<0.0052 %		<LOD
14		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane 603-181-00-X	216-653-1	1634-04-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
15		benzene 601-020-00-8	200-753-7	71-43-2		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
16		toluene 601-021-00-3	203-625-9	108-88-3		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
17	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
18		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
19	●	pH			PH		8.87	pH		8.87	pH	8.87 pH		
20		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
21	●	acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
22	●	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
23	●	fluorene		201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
24	●	phenanthrene		201-581-5	85-01-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
25	●	anthracene		204-371-1	120-12-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
26	●	fluoranthene		205-912-4	206-44-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
27	●	pyrene		204-927-3	129-00-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
28		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
29		chrysene	601-048-00-0	205-923-4	218-01-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
30		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
31		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
32		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
33	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
34		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
35	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
36	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.035	mg/kg		<0.035	mg/kg	<0.0000035 %		<LOD
37		barium { ● barium sulphide }	016-002-00-X	244-214-4	21109-95-5		10	mg/kg	1.233	11.237	mg/kg	0.00112 %	✓	
38	●	coronene		205-881-7	191-07-1		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
39		benzo[j]fluoranthene	601-035-00-X	205-910-3	205-82-3		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
											Total:	0.0241 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP-19-20/10/2022-0.70-1.40m

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample name:		LoW Code:	
TP-19-20/10/2022-0.70-1.40m		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
49.8% (wet weight correction)			

Hazard properties

None identified

Determinands

Moisture content: 49.8% Wet Weight Moisture Correction applied (MC)

#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		1	mg/kg	1.197	0.601	mg/kg	0.0000601 %	✓	
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		12.9	mg/kg	1.32	8.55	mg/kg	0.000855 %	✓	
3	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.2	mg/kg	1.142	0.688	mg/kg	0.0000688 %	✓	
4	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		57.9	mg/kg	1.462	42.481	mg/kg	0.00425 %	✓	
5	chromium in chromium(VI) compounds { chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex }	024-017-00-8				<0.3	mg/kg	2.27	<0.681	mg/kg	<0.0000681 %		<LOD
6	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		16	mg/kg	1.126	9.043	mg/kg	0.000904 %	✓	
7	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	9	mg/kg	1.56	7.047	mg/kg	0.000452 %	✓	
8	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
9	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.8	mg/kg	1.5	2.862	mg/kg	0.000286 %	✓	
10	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		55.4	mg/kg	2.976	82.772	mg/kg	0.00828 %	✓	
11	selenium { nickel selenate }	028-031-00-5	239-125-2	15060-62-5		4	mg/kg	2.554	5.128	mg/kg	0.000513 %	✓	
12	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		56	mg/kg	2.774	77.987	mg/kg	0.0078 %	✓	
13	TPH (C6 to C40) petroleum group			TPH		<52	mg/kg		<52	mg/kg	<0.0052 %		<LOD
14	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
15	benzene	601-020-00-8	200-753-7	71-43-2		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
16	toluene	601-021-00-3	203-625-9	108-88-3		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD

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#	Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
17	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.005	mg/kg		<0.005	mg/kg	<0.0000005 %		<LOD
18	xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
19	pH			PH		7.6	pH		7.6	pH	7.6 pH		
20	naphthalene	601-052-00-2	202-049-5	91-20-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
21	acenaphthylene		205-917-1	208-96-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
22	acenaphthene		201-469-6	83-32-9		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
23	fluorene		201-695-5	86-73-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
24	phenanthrene		201-581-5	85-01-8		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
25	anthracene		204-371-1	120-12-7		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
26	fluoranthene		205-912-4	206-44-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
27	pyrene		204-927-3	129-00-0		<0.03	mg/kg		<0.03	mg/kg	<0.000003 %		<LOD
28	benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.06	mg/kg		<0.06	mg/kg	<0.000006 %		<LOD
29	chrysene	601-048-00-0	205-923-4	218-01-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
30	benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.05	mg/kg		<0.05	mg/kg	<0.000005 %		<LOD
31	benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
32	benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
33	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
34	dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
35	benzo[ghi]perylene		205-883-8	191-24-2		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
36	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.035	mg/kg		<0.035	mg/kg	<0.0000035 %		<LOD
37	barium { barium sulphide }	016-002-00-X	244-214-4	21109-95-5		39	mg/kg	1.233	24.149	mg/kg	0.00241 %	✓	
38	coronene		205-881-7	191-07-1		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
39	benzo[j]fluoranthene	601-035-00-X	205-910-3	205-82-3		<1	mg/kg		<1	mg/kg	<0.0001 %		<LOD
										Total:	0.0313 %		

Key

(yellow)	User supplied data
(grey)	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non EU CLP determinands

chromium(III) oxide (worst case) (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H332 , Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Resp. Sens. 1; H334 , Skin Sens. 1; H317 , Repr. 1B; H360FD , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3; H226 , Asp. Tox. 1; H304 , STOT RE 2; H373 , Muta. 1B; H340 , Carc. 1B; H350 , Repr. 2; H361d , Aquatic Chronic 2; H411

ethylbenzene (EC Number: 202-849-4, CAS Number: 100-41-4)

EU CLP index number: 601-023-00-4
Description/Comments:
Additional Hazard Statement(s): Carc. 2; H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2; H351 hazard statement sourced from: IARC Group 2B (77) 2000

pH (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4; H302 , Acute Tox. 1; H330 , Acute Tox. 1; H310 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Aquatic Chronic 2; H411

fluorene (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

phenanthrene (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Carc. 2; H351 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410 , Skin Irrit. 2; H315

anthracene (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2; H319 , STOT SE 3; H335 , Skin Irrit. 2; H315 , Skin Sens. 1; H317 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

fluoranthene (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4; H302 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

pyrene (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2; H315 , Eye Irrit. 2; H319 , STOT SE 3; H335 , Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

indeno[123-cd]pyrene (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2; H351

benzo[ghi]perylene (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1; H400 , Aquatic Chronic 1; H410

polychlorobiphenyls; PCB (EC Number: 215-648-1, CAS Number: 1336-36-3)

EU CLP index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans; POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Additional Hazard Statement(s): Carc. 1A; H350
Reason for additional Hazards Statement(s):
29 Sep 2015 - Carc. 1A; H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

barium sulphide (EC Number: 244-214-4, CAS Number: 21109-95-5)

EU CLP index number: 016-002-00-X
Description/Comments:
Additional Hazard Statement(s): EUH031 >= 0.8 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - EUH031 >= 0.8 % hazard statement sourced from: WM3, Table C12.2

coronene (EC Number: 205-881-7, CAS Number: 191-07-1)

Description/Comments: Data from C&L Inventory Database; no entries in Registered Substances or Pesticides Properties databases; SDS: Sigma Aldrich, 1907/2006 compliant, dated 2012 - no entries; IARC – Group 3, not carcinogenic.
Data source: http://clp-inventory.echa.europa.eu/SummaryOfClassAndLabelling.aspx?SubstanceID=17010&HarmOnly=no?fc=true&lang=en
Data source date: 16 Jun 2014
Hazard Statements: STOT SE 2; H371

Appendix B: Rationale for selection of metal species

antimony {antimony trioxide}

Worst case CLP species based on hazard statements/molecular weight and low solubility. Industrial sources include: flame retardants in electrical apparatus, textiles and coatings (edit as required)

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds (edit as required)

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. (edit as required) Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history (edit as required)

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass (edit as required)

chromium in chromium(VI) compounds {chromium (VI) compounds, with the exception of barium chromate and of compounds specified elsewhere in this Annex}

Worst case species based on hazard statements/molecular weight (edit as required)

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. (edit as required) Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected. (edit as required)

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

molybdenum {molybdenum(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

selenium {nickel selenate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight (edit as required)

barium {barium sulphide}

No Cr VI detected

Appendix C: Version

HazWasteOnline Classification Engine: EU WM3 1st Edition v1.1.NI using the EU LoW
HazWasteOnline Classification Engine Version: 2022.325.5408.10064 (21 Nov 2022)
HazWasteOnline Database: 2022.325.5408.10064 (21 Nov 2022)

This classification utilises the following guidance and legislation:
WM3 v1.1.NI - Waste Classification - 1st Edition v1.1.NI - Jan 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
17th ATP - Regulation (EU) 2021/849 of 11 March 2021
18th ATP - Regulation (EU) 2022/692 of 16 February 2022

APPENDIX 5 - WAC Summary Data

Waste Categorisation Summary Table
Cornamaddy Athlone Northern Site, December 2022

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Sample ID	TP-01	TP-02	TP-03	TP-06	TP-07	TP-10	TP-11	TP-13	TP-15	TP-17	TP-18	TP-19	Inert Criteria	Walshestown / IMS* Criteria	Hazardous Criteria	LOD LOR	Units
Sample Depth (m)	0.00-0.60	0.00-0.90	1.40-2.10	1.00-2.70	1.10-2.30	0.20-0.80	0.20-0.50	0.75-2.00	0.30-0.70	0.20-1.40	0.50-1.10	0.70-1.40					
Material Description	Made Ground	Made Ground	Cohesive	Cohesive	Cohesive	Cohesive	Made Ground	Cohesive	Cohesive	Cohesive	Granular	Cohesive					
Sample Date	24/10/2022	24/10/2022	21/10/2022	21/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022	20/10/2022					
LoW Code	17 05 04	17 05 04	17 05 04	17 05 04	17 05 04	17 05 04	17 05 04	17 05 04	17 05 04	17 05 04	17 05 04	17 05 04					
Waste Category	Category B1	Category B1	Category B2	Category B2	Category B2	Category A	Category B1	Category B2	Category A	Category A	Category A	Category A					
Metals																	
Antimony	1	<1	1	1	<1	1	<1	<1	<1	<1	<1	1	-	-	HazWaste	<1	mg/kg
Arsenic	7.5	5.7	2.3	6.3	9	5.6	4.5	14.9	3.2	20	2.9	12.9	-	-	HazWaste	<0.5	mg/kg
Barium	45	35	17	60	27	13	16	45	15	69	10	39	-	-	HazWaste	<1	mg/kg
Cadmium	1.1	0.9	0.5	1.3	0.8	0.7	0.7	1.8	0.5	1.2	0.7	1.2	-	-	HazWaste	<0.1	mg/kg
Chromium	57.3	41.1	107.7	59.1	38.3	94	48.8	42.6	43.8	37.2	50.1	57.9	-	-	HazWaste	<0.5	mg/kg
Copper	15	15	6	17	8	8	7	26	6	18	3	16	-	-	HazWaste	<1	mg/kg
Lead	10	10	<5	10	6	8	<5	16	<5	11	<5	9	-	-	HazWaste	<5	mg/kg
Mercury	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	<0.1	<0.1	-	-	HazWaste	<0.1	mg/kg
Molybdenum	3.3	2.4	6.4	3.4	3	5.6	3	3.4	2.7	3.5	3.0	3.8	-	-	HazWaste	<0.1	mg/kg
Nickel	32.4	30.1	14.2	37.1	19.1	27.5	16.4	58.5	13.1	53.6	13.0	55.4	-	-	HazWaste	<0.7	mg/kg
Selenium	<1	<1	1	1	<1	<1	<1	3	<1	<1	<1	4	-	-	HazWaste	<1	mg/kg
Zinc	57	50	23	74	35	44	28	104	17	75	21	56	-	-	HazWaste	<5	mg/kg
Hexavalent Chromium	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	-	-	HazWaste	<0.3	mg/kg
pH (solid sample)	8.19	8.35	8.04	7.73	7.66	8.75	8.47	8.1	8.95	8.63	8.87	7.60	-	-	HazWaste	<0.01	pH units
alkali reserve	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	<0.000	gNaOH/100g
Asbestos																	
Asbestos (Dry Weight)	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	-	-	-	-	%
Asbestos (Moisture Corrected Weight)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.1	<0.001	%
ACM Detected	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Presence	Presence
PAHs																	
Naphthalene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	-	-	HazWaste	<0.04	mg/kg
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	-	-	HazWaste	<0.03	mg/kg
Acenaphthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	-	-	HazWaste	<0.05	mg/kg
Fluorene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	-	-	HazWaste	<0.04	mg/kg
Phenanthrene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	-	-	HazWaste	<0.03	mg/kg
Anthracene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	-	-	HazWaste	<0.04	mg/kg
Fluoranthene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	-	-	HazWaste	<0.03	mg/kg
Pyrene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	-	-	HazWaste	<0.03	mg/kg
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	<0.06	-	-	HazWaste	<0.06	mg/kg
Chrysene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	-	-	HazWaste	<0.02	mg/kg
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	<0.07	-	-	HazWaste	<0.07	mg/kg
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	<0.04	-	-	HazWaste	<0.04	mg/kg
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	<0.04	-	-	HazWaste	<0.04	mg/kg
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	<0.04	-	-	HazWaste	<0.04	mg/kg
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	<0.04	-	-	HazWaste	<0.04	mg/kg
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.09	<0.04	<0.04	<0.04	<0.04	-	-	HazWaste	<0.04	mg/kg
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	<0.22	-	-	-	<0.22	mg/kg
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	<0.64	100	100	-	<0.64	mg/kg
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	<0.05	-	-	HazWaste	<0.05	mg/kg
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	<0.02	-	-	HazWaste	<0.02	mg/kg
Benzo(j)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	-	-	HazWaste	<1	mg/kg
Hydrocarbons																	
TPH (C5-40)	<52	<52	<52	<52	316	<52	<52	<52	<52	<52	<52	<52	-	-	HazWaste	<52	mg/kg
MTBE	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	HazWaste	<5	ug/kg
Benzene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	HazWaste	<5	ug/kg
Toluene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	HazWaste	<5	ug/kg
Ethylbenzene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	HazWaste	<5	ug/kg
m/p-Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	HazWaste	<5	ug/kg
o-Xylene	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	-	-	HazWaste	<5	ug/kg
Total 7 PCBs	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	1,000	1,000	HazWaste	<35	ug/kg
WAC Solid Sample Summary**																	
Total Organic Carbon *	0.33	0.14	0.55	2.7	0.96	0.12	0.31	0.52	0.06	0.2	0.06	2.33	3	6	-	<0.02	%
Sum of BTEX	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	6	6	-	<0.025	mg/kg
Sum of 7 PCBs	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	1	1	-	<0.035	mg/kg
Mineral Oil	<30	<30	<30	<30	221	<30	<30	<30	<30	<30	<30	<30	500	500	-	<30	mg/kg
PAH Sum of 6	<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	mg/kg
PAH Sum of 17	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	100	100	-	<0.64	mg/kg
WAC Leachate Data**																	
Arsenic	0.026	<0.025	0.064	0.041	0.087	<0.025	<0.025	0.049	<0.025	<0.025	<0.025	<0.025	0.5	1.5	-	<0.025	mg/kg
Barium	0.08	0.04	0.21	0.32	0.32	<0.03	<0.03	0.23	<0.03	0.05	<0.03	0.16	20	20	-	<0.03	mg/kg
Cadmium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.04	0.04	-	<0.005	mg/kg
Chromium	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	0.5	0.5	-	<0.015	mg/kg
Copper	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	2	2	-	<0.07	mg/kg
Mercury	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.01	0.01	-	<0.0001	mg/kg
Molybdenum	0.03	0.03	0.31	0.28	1.00	<0.02	<0.02	0.74	<0.02	0.02	<0.02	0.12	0.5	1.5	-	<0.02	mg/kg
Nickel	<0.02	<0.02	0.03	0.07	0.04	<0.02	<0.02	0.24	<0.02	<0.02	<0.02	0.06	0.4	0.4	-	<0.02	mg/kg
Lead	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.5	0.5	-	<0.05	mg/kg
Antimony	<0.02	<0.02	0.16	0.17	0.15	<0.02	<0.02	0.16	<0.02	<0.02	<0.02	<0.02	0.06	0.18	-	<0.02	mg/kg
Selenium	<0.03	<0.03	0.08	0.08	0.07	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.1	0.3	-	<0.03	mg/kg
Zinc	<0.03	<0.03	0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	0.03	<0.03	<0.03	4	4	-	<0.03	mg/kg
Total Dissolved Solids	480	<350	1310	1769	1740	<350	630	1300	<350	360	<350	2670	4000	12,000	-	<350	mg/kg
Dissolved Organic Carbon	<20	<20	80	100	90	<20	30	30	<20	<20	<20	60	500	500	-	<20	mg/kg
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	1	1	-	<0.1	mg/kg
Fluoride	5	<3	<3	<3	<3	<3	<3	<3	<3	4	<3	<3	10	10	-	<3	mg/kg
Sulphate as SO4	13	8	231	539	463	7	<5	209	<5	8	<5	886	1000	3,000	-	<0.5	mg/kg
Chloride	8	<3	7	11	12	4	<3	124	<3	4	<3	14	800	2,400	-	<3	mg/kg

NAD- no asbestos detected
* - Integrated Materials Solutions Landfill, Hollywood Great, Nag's Head, The Naul, Co. Dublin
** - limits as specified in Council Decision 2003/33/EC

APPENDIX 6 – Potential Material Outlets

www.gii.ie

Waste Category	Classification Criteria	Potential Outlets
Category A Unlined Soil Recovery Facilities	Soil and Stone only which are free from[7] anthropogenic materials such as concrete, brick, timber. Soil must be free from "contamination" e.g. PAHs, Hydrocarbons[8].	Soil Recovery Facilities, Waste Facility Permitted Sites, COR Sites or potential by-product if deemed not to be a waste and complying with requirements under Article 27 of European Waste Directive Regulations (2011).[9]
Category B1 Inert Landfill	Reported concentrations within inert waste limits, which are set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002). Results also found to be non-hazardous using the HWOL application.	Integrated Materials Solutions Limited Partnership (IMS), Naul, County Dublin W0129-02 Walshestown Landfill Walshestown, Blackhall, Tipperkevin & Bawnoge, Naas, County Kildare W0254-01
Category B2 Inert Landfill	Reported concentrations greater than Category B1 criteria but less than IMS Hollywood Landfill acceptance criteria, as set out in their Waste Licence W0129-02. Results also found to be non-hazardous using the HWOL application.	Integrated Materials Solutions Limited Partnership (IMS), Naul, County Dublin W0129-02 Walshestown Landfill Walshestown, Blackhall, Tipperkevin & Bawnoge, Naas, County Kildare W0254-01[10]
Category C Non-Haz Landfill	Reported concentrations greater than Category B2 criteria but within non-haz landfill waste acceptance limits set out by the adopted EU Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 and Annex II of Directive 1999/31/EC (2002). Results also found to be non-hazardous using the HWOL application.	Walshestown Landfill Walshestown, Blackhall, Tipperkevin & Bawnoge, Naas, County Kildare W0254-01[11] Ballynagran Landfill, Co. Wicklow. W165-02 Drehid Landfill, Co. Kildare. W0201-01 East Galway Landfill, Co. Galway. W0178-02 Knockharley Landfill, Co. Meath. W0146-02
Category C 1 Non-Haz Landfill	As Category C but containing < 0.001% w/w asbestos fibres.	RILTA Environmental LTD. W0192-03

[7] Free from equates to less than 2%.
[8] Total BTEX 0.05mg/kg, Mineral Oil 50mg/kg, Total PAHs 1mg/kg, Total PCBs 0.05mg/kg and Asbestos No Asbestos Detected – EPA Guidance on Waste Acceptance Criteria at Authorised Soil Recovery Facilities, 2020.
[9] S.I. No. 126/2011 - European Communities (Waste Directive) Regulations 2011 (Article 27).
[10] Licenced to accept Category B2 material for recovery.
[11] Licenced to accept Category C material for recovery.

		Enva Portlaoise. W0184-02
Category C 2 Non-Haz Landfill	As Category C but containing >0.001% and <0.01% w/w asbestos fibres.	RILTA Environmental LTD. W0192-03 Enva Portlaoise. W0184-02
Category C 3 Non-Haz Landfill	As Category C but containing >0.01% and <0.1% w/w asbestos fibres.	RILTA Environmental LTD. W0192-03 Enva Portlaoise. W0184-02
Category D Hazardous Treatment	Results found to be hazardous using HWOL Application.	RILTA Environmental LTD. W0192-03 Enva Portlaoise. W0184-02
Category D 1 Hazardous Treatment	Results found to be hazardous due to the presence of asbestos (>0.1%).	RILTA Environmental LTD. W0192-03

APPENDIX 6.3 – BADGER SURVEY

Cornamaddy Badger Survey
Survey Report

FLYNN FURNEY
ENVIRONMENTAL CONSULTANTS

For: Enviroguide
Date: November 2022

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Mammal trail near eastern boundary of the Cornamaddy Site

Statement of Authority

This report and contributory fieldwork was carried out by Billy Flynn BSc, MSc, MCIEEM, MIEnvSci, CEnv. Billy has over 20 years of experience in mammal survey and mammal mitigation design.

1. INTRODUCTION

Flynn Furney Environmental Consultants were commissioned to carry out a survey of Badger (*Meles meles*) activity at a site at Cornamaddy, near Athlone County Westmeath. The purpose of this survey was to assess the activity of this protected species within a site that is proposed for development. In particular, the survey was to determine whether any refugia or resting places of this species occur within the site. The survey was completed on 6 November 2022. A number of Badger setts were found, as well as numerous other signs of Badger activity within the site.

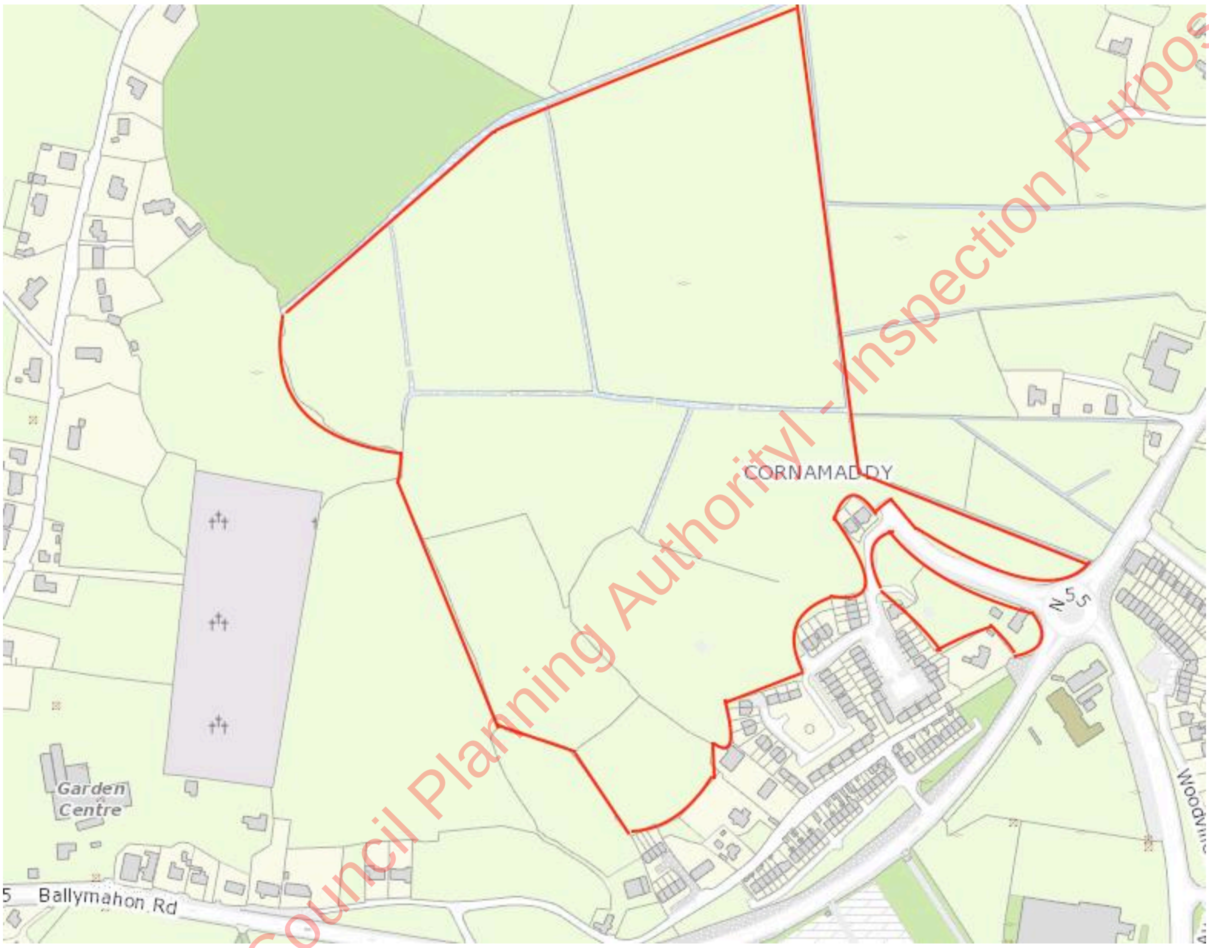

Fig. 1. Site under survey indicated by red line. Base mapping from www.gis.archaeology.ie

2. METHODOLOGY

The survey was completed during daylight hours on 6 November 2022. Although the day was somewhat overcast, there was sufficient visibility for survey. There was no rainfall during the survey period. Survey methodology followed guidelines for surveys of this species given by the National Roads Authority (NRA, 2010, 2005). Habitats were classified as per Fossitt (2000). The surveys involved direct search for of signs of mammalian activity which included prints, tracks, hairs, droppings, odour, digging and evidence of feeding. Places of refuge, rest and other activity such as Badger setts were also observed and recorded.

3. RESULTS

3.1 Field Signs

Numerous signs of Badger activity were found. These included several well-established mammal trails that were found throughout the site. Evidence of Badger feeding was found in numerous areas. These are known as 'snuffles' or 'scrapes' in the vegetation (usually in grassland) where Badgers seek invertebrate prey at shallow depths beneath soil surface. Badger field signs found are shown in the figures in Appendix A.

Fig. 2. Badger Snuffle toward centre of site.

3.2 Badger Setts

Four sites identified as Badger setts were found during the survey. These are concentrated within the south-western portion of the site. Three of these are associated with a substantial field boundary. The fourth is on a raised portion of ground (esker) to the north of this. The details of the setts are given in the table below.

Sett No.	Description	Location
1	Single-entrance subsidiary Sett in a treeline that has been substantially removed. **Inactive** and not in regular use. Now in use by Rabbits.	53 26 10.8 N, -7, 54 34 W
2	Single-entrance Annex Sett. **Active**. On the northern side of another treeline that has been substantially removed	53 26 11 N, -7 54 31 W
3	Multiple-entrance **active** Sett. May be the Main Sett of this Badger group. Minimum of 3 no. entrances. On the southern side of this treeline.	53 26 10 N, -7 54 32 W
4	Single-entrance Outlier Sett. **Recently active**. On Esker.	53 26 13 N, - 7 54 36 W

4. DISCUSSION

4.1 Badger Activity

Evidence of Badger activity was found throughout much of the site. However, this tended to be concentrated toward the south of the site. Most of the evidence of Badger commuting and feeding was found here. There is some evidence of Badgers accessing lands to the north and the west of the site under survey. The substantial drainage ditch on the eastern boundary of site may present a barrier to Badgers accessing lands to this side. It may be concluded that an active Badger territory exists within the lands at Cornamaddy.

4.2 Badger Setts

There were four setts found within the area under survey. Two of these were active at time of survey, one inactive and one recently active. Some observations of the setts are given below:

Sett No.	Status	Notes
1	Inactive Subsidiary	Sett is in the remnant of a treeline that runs approximately north-south. This treeline is perpendicular to the treeline where Setts 2 & 3 are located.
2	Active Annex	This Sett appears to be an annex to Sett 3. It is located between semi-mature-mature Elder trees. Recent prints were noted here. This sett may have been interfered with or dogs may have dug at this entrance. However, it remains active with a long spoil heap with fresh spoil.
3	Active Possible Main Sett	This sett has a minimum of 3 no. entrances. In order to minimise disturbance to the sett, no vegetation was cleared during survey. It is therefore possible that there are further entrances to this sett. Some fresh bedding was noted at one entrance. Another entrance is active but has a partial collapse. The third entrance located was not in use and was covered by vegetation.
4	Recently Active Outlier	This is a single-entrance outlier located in an elevated location on top of an esker. This was previously identified as a possible Fox den in a previous report. However, the presence of bedding and the size of the spoil heap here would indicate that this is a Badger sett that has been in recent use.

5. RECOMMENDATIONS

5.1 Badger Legal Protection

Badgers are protected species under national legislation (Wildlife Acts, 1976, 2000 and 2012 as amended) and international legislation (Bern Convention Annex III). Therefore, no actions may be carried out that may impact upon this species without suitable licence being received from the National Parks and Wildlife Service.

5.2 Monitoring Prior to and During Site Clearance

Where dense vegetation has prevented absolute determination of the presence or absence of setts, these areas will require monitoring during vegetation clearance to ensure that any setts present will be found and treated appropriately. See Appendix A, Fig. 3.

It is recommended that trail cameras are placed in the vicinity of Sett 4 in order to confirm that this sett is in use by Badgers and to determine levels of activity.

5.3 Evacuation of setts within the Development Area

It is acknowledged that in order to allow the proposed development to proceed, some or all of the Badger setts may require removal. Where required, evacuation and destruction of active badger setts within the CPO may be carried out by an appropriately qualified ecologist under licence from the National Parks and Wildlife Service (NPWS). Evacuation and destruction should be undertaken during the period 1st July to 30th November, in accordance with the *NRA Guidelines for the Treatment of Badgers prior to the Construction of National Road Schemes* (2005).

Until such time as they can be evacuated and removed, all active setts must be protected from interference or disturbance by an exclusion zone of 30m (50m during the breeding season-December to June inclusive) within which no machinery or removal of vegetation will take place. Sett tunnels can extend for over 20m from sett entrances and use of any vehicles, digging, or heavy machinery can cause collapse of tunnels and cause mortality of badgers. Light work, such as hand digging or scrub clearance must not take place within 10m of sett entrances.

The setts should be clearly marked and the area from which site vehicles are prohibited will be clearly marked by timber post and rail fencing (and appropriate signage) which will allow badgers to move in and out freely. To ensure that accidents do not occur to setts, it is important that there is a transfer of information between construction personnel at all levels.

Exclusion of badgers from disused or currently inactive setts and the removal of these setts is not seasonally restricted and can be conducted at any time.

5.4 Artificial Badger Sett

An artificial Badger sett should be created in order to provide compensatory habitat for the main sett if this is to be removed. The artificial sett should ideally be constructed 4-6 months prior to exclusion. The exclusion of a natural badger sett will generally only be licensed to occur between the end of June and end of November. the artificial sett should ideally be located as close as possible to the original sett yet far enough away from any construction activity/development that could cause disturbance. It must also be situated in a site easily located by any excluded badgers.

6. REFERENCES

Fossitt

National Roads Authority (2005). *Guidelines for The Treatment of Badgers Prior To The Construction Of National Road Schemes*. NRA, Dublin.

National Roads Authority (2010). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes NRA, Dublin.

Appendix A. Site Location and Findings

Fig. 1. Setts located.

Fig. 2. Badger signs at Cornamaddy. X – snuffles and scrapes, S – droppings, ____ - mammal trails

Fig. 3. Setts (in red) and areas to be cleared under supervision shown in blue.

APPENDIX B – Some Photographs of Site

Fig. 1 Mammal trail close to eastern extent of site

Fig. 2 One of the very substantial drainage ditches within the site.

Fig. 3 Mammal trail on side of ditch outside the site to the north (adjacent the golf course)

Fig. 4 Sett 1 – a disused sett. Note extensive vegetation growth.

Fig. 5 Sett 2 with clear signs of use shown.

Fig. 6 One of the entrances to Sett 3.

Fig. 7 Day nest adjacent Sett 3.

Fig. 8 A disused entrance of Sett 3.

Fig. 9 A clear mammal trail toward the west of the site.

APPENDIX 6.4 – BAT SURVEY

October
2021

Preliminary Bat Survey Report

Cornamaddy,
Athlone
Co. Westmeath

Aisling Walsh M.Sc MCIEEM Trading as Ash Ecology & Environmental Ltd.
Tel: 089 4991181 / Company Reg: 630819 /
Office: Monine Kilfinane, Co. Limerick / Full membership of the CIEEM

ASH Ecology & Environmental

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1. INTRODUCTION

1.1 Purpose of the Report

Ash Ecology and Environmental Ltd (AEE) was commissioned to carry out a bat survey on behalf of Enviroguide Consulting during September 2021 as part of a proposed residential development at a site located in Cornamaddy, Athlone, Co. Westmeath, (Grid Ref 53.436974, -7.906666); see Figure 1. An aerial photo with existing layout and surrounding landscape is shown as Figure 2. A proposed site layout is shown as Figure 3.

Figure 1 Site Location Map.

Figure 2 Aerial Photo of Site showing existing layout and surrounding landscape.

Figure 3 Proposed Site Layout.

1.2 Competency of Assessor

This report has been prepared by Ash Ecology & Environmental Ltd (AEE) whose managing director and leading ecologist is Aisling Walsh who is a full member of the Chartered Institute of Ecological & Environmental Management (CIEEM) while the company, AEE, is a Registered Practice by the CIEEM.

Aisling's qualifications include M.Sc. (Dist) in Biodiversity and Conservation (TCD) and B.Sc. (Hons) Zoology (NUIG), a diploma in Applicated Aquatic Science (GMIT) and a Certificate in Applied Biology (GMIT). Aisling has over 14 years of experience providing environmental consultancy and environmental assessment services. Aisling has written numerous Ecological Impact Assessments (EcIA), Screening for Appropriate Assessment Stage I and Stage II Natura Impact Statements, chapters for Environmental Impact Assessments/Statements (EIAR), Badger Surveys, Bat Surveys, Bird and Habitat Surveys. Academically Aisling has also spent several years working in Forestry and Biodiversity Research at TCD (BIOPLAN and FORESTBIO programmes) and as a Teaching Assistant in the Life Sciences Department of the University of Limerick.

Aisling is a licenced bat ecologist (example of recent: DER/BAT 2020 – 46 EUROPEAN, DER/BAT 2020 – 48 EUROPEAN, DER/BAT 2021 – 89) and a member of Bat Conservation Ireland. In addition she has completed several bat courses to continue her training and CPD with the most recently (May 2021) a Lantra-accredited course, developed by the Bat Conservation Trust and supported by the Arboricultural Association to access bat tree roost features. Over the past 14 years Aisling has completed 100s of bat surveys providing her with more than adequate experience in the profession.

1.3 Bat Legislation

In view of their sensitive status across Europe, all species of bat have been listed on Annex IV of the EC 'Habitats and Species Directive' and some, such as the lesser horseshoe bat, are given further protection and listed on Annex II of this Directive. This Directive was transposed into Irish law as the European Communities (Natural Habitats) Regulations, 1997, and combined with the Wildlife Acts (1976 to 2018), ensures that individual bats and their breeding sites and resting places are fully protected. This has important implications for those who own or manage sites where bats occur.
All bat species are protected under the Wildlife Acts 1976-2018 which make it an offence to wilfully interfere with or destroy the breeding or resting place of these species; however, the Acts permit limited exemptions for certain kinds of development.

All species of bats in Ireland are listed on Schedule 5 of the 1976 Act, and are therefore subject to the provisions of Section 23, which make it an offence to:

1. *Intentionally kill, injure or take a bat,*
2. *Possess or control any live or dead specimen or anything derived from a bat,*
3. *Wilfully interfere with any structure or place used for breeding or resting by a bat,*

4. *Wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose.*

1.4 Derogation licences

In order to obtain a licence to allow the destruction of bat roosts etc., in advance of any otherwise legitimate development which may impact on the favourable conservation status of bats, Section 25 of the Habitats Regulations must be satisfied along with Regulation 54 of S.I. 477 (2011):

A derogation licence may only be granted:

(a) Where there is no satisfactory alternative and

(b) the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range.

Where both conditions are satisfied, the derogation licence may only be granted where it is—

(a) in the interests of protecting wild fauna and flora and conserving natural habitats,

(b) to prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property,

(c) in the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and beneficial consequences of primary importance for the environment,

(d) for the purpose of research and education, of repopulating and reintroducing these species and for the breeding operations necessary for these purposes, including the artificial propagation of plants, or

(e) to allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of certain specimens of the species to the extent specified therein, which are referred to in the First Schedule.

The first aim of the developer, working with professional advice, should be to entirely avoid or minimise the potential impact of a proposed development on bats and their breeding and resting places.

Current NPWS advice is that there should be no net loss in local bat population status, taking into account factors such as population size, viability and connectivity.[1] Hence, when it is unavoidable that a development will affect a bat population, the mitigation should aim to maintain a population of equivalent status in the area.

One of the key aims of the Habitats Directive is to encourage member states to maintain at, or restore to, favourable conservation status those species of community interest (Article 2(2)). 'Favourable conservation status' is defined in the Habitats and Species Directive (Article 1(i)). Conservation status is defined as "the

[1] Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

sum of the influences acting on the species concerned that may affect the long term distribution and abundance of its population within the territory." It is assessed as favourable when: "population dynamics data on the species concerned indicate that it is maintaining itself on a long term basis as a viable component of its natural habitats, and the natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future, and there is, or will probably continue to be, a sufficiently large habitat to maintain its populations on a long term basis." Note that even though there is apparent overlap between the Wildlife Acts and the Habitats Regulations, they run concurrently. No action in relation to bats that would not be permitted under the Habitats Regulations may be licensed under the Wildlife Acts.

Derogation licences granted under the Regulations include reference to the relevant provisions of the Wildlife Acts to ensure that all requirements for licensing are covered in the one document. It should also be noted that a licence only allows what is permitted within its terms and conditions; it does not legitimise all actions related to bats at a given site.[2]

2 Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

2. METHODOLOGY

2.1 Information Sources

A desk-based review of information sources was completed. Information contained on the websites of the National Parks and Wildlife Service (NPWS)[3] and the National Biodiversity Data Centre (NBDC)[4] was reviewed.

The following publications and websites were also reviewed and consulted:

- Bat Conservation Ireland https://www.batconservationireland.org/
- Bat Roosts in Trees: A Guide to Identification and Assessment for Tree-Care and Ecology Professionals (2018)
- Bat Conservation Trust (2018) Bats and artificial lighting in the UK Bats and the Built Environment series[5]
- Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- Mitchell-Jones, A.J, & McLeish, A.P. (eds). 2004., 3rd Edition Bat Workers' Manual, JNCC, Peterborough, ISBN 1 86107 558 8
- Bat Conservation Ireland (2012) Bats and Appropriate Assessment Guidelines, Version 1, December 2012. Bat Conservation Ireland, www.batconservationireland.org[6]
- Bat Conservation Trust (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition
- Bat Conservation Ireland (2010) Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers[7]
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (National Roads Authority, 2005).
- Guidelines for the Treatment of Bats during the Construction of National Road Schemes (National Roads Authority, 2005).
- Bats and Lighting in the UK – Bats and the Built Environment Series (Institute of Lighting Professionals, September 2011
- Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2011.
- Bats and Lighting – Guidance Notes for Planners, Engineers, Architects and Developers (Bat Conservation Ireland);
- The Eurobats Mitigation of Lighting Document;
- Entwistle, A. et al (2001) Habitat Management for Bats A Guide for Land Managers, Land Owners and Their Advisors, Joint Nature Conservation Committee (JNCC, Great Britain)
- Grant, G., Gunnell, K. & Williams C. (2012) Landscape and urban design for bats and biodiversity Bat Conservation Trust, London.

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[3] The National Parks and Wildlife Services map viewer http://webgis.npws.ie/npwsviewer/
[4] The National Biodiversity Data Centre www.NBDC.ie
[5] https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/
[6] https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIreland-AA-Guidelines_Version1.pdf
[7] https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIrelandGuidelines_Lighting.pdf

2.2 Desk Study

2.2.1 Previous Records

A desktop review was carried out to identify the previous records of Bat species within the Proposed Development Site and its environs. The study area occurs in 10km² Grid Square N04. The website the NBDC (www.nbdc.ie) was accessed on 09/10/2021 to establish any previous bat records and shown below in Table 1.

Table 1 Historical Bat Records in 10km² Grid Square N04 (NBDC website www.nbdc.ie accessed 09/10/2021)

Species Name - Common	*Species Name - Latin*	Last Documented Record N04
Brown Long-eared Bat	*Plecotus auritus*	03/04/2002
Daubenton's Bat	*Myotis daubentonii*	29/07/2009
Leisler's Bat	*Nyctalus leisleri*	29/07/2009
Common Pipistrelle	*Pipistrellus pipistrellus*	21/08/2013
Soprano Pipistrelle	*Pipistrellus pygmaeus*	21/08/2013

2.2.2 Species Background

Ireland had ten known bat species until February 2013, when a single live greater horseshoe bat (*Rhinolophus ferrumequinum)* was found roosting in Co. Wexford[8]. On 8th June 2020, a single audio recording was confirmed in the Glendaough area, Co. Wicklow. It was found on two more occasions in the same area in early July 2020 (Bat Conservation Ireland, July 2020).

The ten species (excluding the greater horseshoe) are briefly described overleaf. For a more comprehensive overview see McAney, 2006.[9]

The dependence of Irish bat species on insect prey has left them vulnerable to habitat destruction, land drainage, agricultural intensification and increase use of pesticides. Also, their reliance on buildings as roosting sites has made them particularly vulnerable to renovation works and the use of timber chemical treatment. Buildings are highly important as roosting sites for bats and all Irish bat species use buildings for all roost types. Most significant in terms of roosts in houses are maternity roosts, but cellars and even attics may serve as hibernation sites for bats. Roosts within buildings can far exceed the numbers encountered in trees, bridges, caves or cliffs and roosts of over 1,000 bats have been recorded in buildings.[10]

[8] National Biodiversity Data Centre http://www.biodiversityireland.ie/new-bat-species-found-in-ireland/

[9] McAney, K. (2006) *A Conservation Plan for Irish Vesper Bats.* Irish Wildlife Manual No.20. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government.

[10] NRA (2005) Guidelines for the Treatment of Bats Prior to the Construction of National Road Schemes. National Roads Authority, Dublin

2.2.2.1 Family Vespertilionidae:

Common pipistrelle *Pipistrellus pipistrellus*
This species was only recently separated from its sibling, the soprano or brown pipistrelle P. pygmaeus[11], which is detailed below. The common pipistrelle's echolocation calls peak at 45 kHz. The species forages along linear landscape features such as hedgerows and treelines as well as within woodland.

Soprano pipistrelle *Pipistrellus pygmaeus*
The soprano pipistrelle's echolocation calls peak at 55 kHz, which distinguishes it readily from the common pipistrelle on detector. The pipistrelles are the smallest and most often seen of our bats, flying at head height and taking small prey such as midges and small moths. Summer roost sites are usually in buildings, but tree holes and heavy ivy are also used. Roost numbers can exceed 1,500 animals in mid-summer.

Nathusius' pipistrelle *Pipistrellus nathusii*
Nathusius' pipistrelle is a recent addition to the Irish fauna and has mainly been recorded from the north-east of the island in Counties Antrim and Down[12] and also in Fermanagh, Longford and Cavan. It has also recently been recorded in Counties Cork and Kerry.[13] However, the known resident population is enhanced in the autumn months by an influx of animals from Scandinavian countries. The status of the species has not yet been determined.

Leisler's bat *Nyctalus leisleri*
This species is Ireland's largest bat, with a wingspan of up to 320mm; it is also the third most common bat, preferring to roost in buildings, although it is sometimes found in trees and bat boxes. It is the earliest bat to emerge in the evening, flying fast and high with occasional steep dives to ground level, feeding on moths, caddisflies and beetles. The echolocation calls are sometimes audible to the human ear being around 15 kHz at their lowest. The audible chatter from their roost on hot summer days is sometimes an aid to location. This species is uncommon in Europe and as Ireland holds the largest national population the species is considered as Near Threatened here.

Brown long-eared bat *Plecotus auritus*
This species of bat is a 'gleaner', hunting amongst the foliage of trees and shrubs, and hovering briefly to pick a moth or spider off a leaf, which it then takes to a sheltered perch to consume. They often land on the ground to capture their prey. Using its nose to emit its echolocation, the long-eared bat 'whispers' its calls so that the insects, upon which it preys, cannot hear its approach (and hence, it needs oversize ears to hear the returning echoes). As this is a whispering species, it is extremely difficult to monitor in the field as it is seldom heard on a bat detector. Furthermore, keeping within the foliage, as it does, it is easily overlooked. It prefers to roost in old buildings.

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[11] Barratt, E. M., Deauville, R., Burland, T. M., Bruford, M. W., Jones, G., Racey, P. A., & Wayne, R. K. (1997) *DNA Answers the Call of Pipistrelle Bat Species. Nature* 387: 138 - 139.
[12] Richardson, P. (2000) *Distribution Atlas of Bats in Britain and Ireland 1980 - 1999*. The Bat Conservation Trust, London, England.
[13] Kelleher, C. (2005) *International Bat Fieldcraft Workshop, Killarney, Co. Kerry*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government.

<u>Natterer's bat *Myotis nattereri*</u>
This species has a slow to medium flight, usually over trees but sometimes over water. It usually follows hedges and treelines to its feeding sites, consuming flies, moths, caddisflies and spiders. Known roosts are usually in old stone buildings but they have been found in trees and bat boxes. The Natterer's bat is one of our least studied species and further work is required to establish its status in Ireland.

<u>Daubenton's bat *Myotis daubentonii*</u>
This bat species feeds close to the surface of water, either over rivers, canals, ponds, lakes or reservoirs but it can also be found foraging in woodlands. Flying at 15 kilometres per hour, it gaffs insects with its over-sized feet as they emerge from the surface of the water - feeding on caddis flies, moths, mosquitoes, midges etc. It is often found roosting beneath bridges or in tunnels and also makes use of hollows in trees.

<u>Whiskered bat *Myotis mystacinus*</u>
This species, although widely distributed, has been rarely recorded in Ireland. It is often found in woodland, frequently near water. Flying high, near the canopy, it maintains a steady beat and sometimes glides as it hunts. It also gleans spiders from the foliage of trees. Whiskered bats prefer to roost in buildings, under slates, lead flashing or exposed beneath the ridge beam within attics. However, they also use cracks and holes in trees and sometimes bat boxes. The whiskered bat is one of our least studied species and further work is required to establish its status in Ireland.

<u>Brandt's bat *Myotis brandtii*</u>
This species is known from five specimens found in Counties Wicklow (Mullen, 2007), Cavan, and Clare in 2003, a specimen in Kerry in 2005[14] and another in Tipperary in 2006.[15] No maternity roosts have yet been found. It is very similar to the whiskered bat and cannot be separated by the use of detectors. Its habits are similar to its sibling.

2.2.2.2 Family Rhinolophidae:

<u>Lesser horseshoe bat *Rhinolophus hipposideros*</u>

This species is the only representative of the Rhinolophidae or horseshoe bat family in Ireland. It differs from our other species in both habits and looks, having a unique nose leaf with which it projects its echolocation calls. It is also quite small and, at rest, wraps its wings around its body. Lesser horseshoe bats feed close to the ground, gleaning their prey from branches and stones. It often carries its prey to a perch to consume, leaving the remains beneath as an indication of its presence.

The echolocation call of this species is of constant frequency and, on a heterodyne bat detector, sounds like a melodious warble. The species is confined to six counties along the Atlantic seaboard: Mayo, Galway, Clare, Limerick, Kerry

[14] Kelleher, C. 2006a Nathusius pipistrelle Pipistrellus nathusii and Brandt's Bat Myotis brandtii - New Bat Species to Co. Kerry – Irish Naturalists' Journal 28: 258.
[15] Kelleher, C. 2006b Brandt's Bat Myotis brandtii, New Bat Species to Co. Tipperary. Irish Naturalists' Journal 28: 345.

and Cork. The current Irish national population is estimated at 12,500 animals. This species is listed on Annex II of the EC Habitats Directive and 41 Special Areas of Conservation have been designated in Ireland for its protection. Where it occurs, it is often found roosting within farm buildings.

2.2.3 Landscape Suitability

The National Biodiversity Data Centre (NBDC) maps landscape suitability bats based on Lundy *et al.* (2011). The maps are a visualisation of the results of the analyses based on a 'habitat suitability' index. The index ranges from 0 to 100 with 0 being least favourable and 100 most favourable for individual bat species and between 36.44 - 58.56 for the highest average range. The overall average assessment of bat habitats for the current study area is given as 41.22 (High). Table 2 gives the suitability of the study area for the bat species found in the study area (based on NBDC) along with their Irish Red List Status (from Marnell *et al.*, 2019).[16]

Table 2 Suitability of the study area for the bat species found in the Athlone area (based on the NBDC data) with Irish Red list status indicated.

Common name	Scientific name	Suitability index	Irish red list status
All bats	-	41.22	Least Concern
Soprano pipistrelle	*Pipistrellus pygmaeus*	52	Least Concern
Brown long-eared bat	*Plecotus auritus*	53	Least Concern
Common pipistrelle	*Pipistrellus pipistrellus*	58	Least Concern
Lesser-horseshoe bat	*Rhinolophus hipposideros*	3	Least Concern
Leisler's bat	*Nyctalus leisleri*	55	Least Concern
Whiskered bat	*Myotis mystacinus*	29	Least Concern
Daubenton's bat	*Myotis daubentonii*	43	Least Concern
Nathusius' pipistrelle	*Pipistrellus nathusii*	30	Least Concern
Natterer's bat	*Myotis nattereri*	48	Least Concern

[16] Marnell, F., Looney, D. & Lawton, C. (2019) Ireland Red List No. 12: Terrestrial Mammals. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.

2.2.4 Bat Roosts

Bats were originally cave and tree dwelling animals but many now find buildings just as suitable for their needs. Bats are social animals and most species congregate in large colonies during summer. These colonies consist mostly of females of every reproductive class, with some juvenile males from the previous year. Male bats normally roost individually or in small groups meeting up with the females in the late autumn-early winter, when it is time to mate. In summer, bats seek warm dry buildings in which they can give birth and suckle their young. In winter, they seek out places with a constant low temperature and high humidity where they can become torpid and hibernate during adverse weather conditions. However, bats do not hibernate continuously during winter and will awake and hunt during mild nights when there are insects available, and it is energetically advantageous to forage.

2.2.4.1 Maternity Roosts

Maternity roosts are the most significant roosts and they are predominantly all-female aggregations that are formed from late May onwards and remain as a relatively cohesive unit until mid to late August. Not all female bats give birth annually. These females that do bear young in a given year avail of a suitable building, tree and sometimes cave (or equivalent). The young are flightless for several weeks and hence are vulnerable to dangers such as tree felling and restoration, reinforcement or demolition of structures such as buildings and bridges.

2.2.4.2 Mating Roosts

Most bat species mate in autumn but pregnancy does not occur until the following spring. During this time males will take possession of a cavity in a building, tree, bridge, cave or mine and attract females to these sites to establish a harem. Male bats call both from a perch and in flight in much the same manner that male birds sing.

2.2.4.3 Hibernation Roosts

Bats have a high metabolic rate and in temperate countries, such as Ireland, flying insects are not available in sufficient numbers during winter to sustain bats. Therefore, bats hibernate during winter. In hibernation sites, bats are often completely inactive for several days and are extremely vulnerable to disturbance by human activities due to the time taken for them to become sufficiently active to allow escape. Hibernation may extend from November to the end of March, during which time bat activity will take place sporadically.

2.2.4.4 Night Roosts

These are roosts which are used as resting places for bats between foraging bouts. They also provide retreats for bats from predators or during inclement weather conditions. They also function as feeding perches and may be important for socialising.

2.3 General Activity Survey

A preliminary general bat activity survey was also undertaken on the 29th September 2021 from 18.45 to 21.15 (sunset was 19.13) by walking the Site field boundaries where accessible. The weather was optimal for a bat survey with temperatures on the night was 12-14°C with a gentle breeze. Rain arrived at the end of the survey. Bat activity and emergence surveys are best carried out from April to end-September in suitable weather conditions[17] which this survey was.

The equipment used for the bat activity survey included a Elekon Bat Logger M detector. Visual observations were taken with the aid of a powerful L.E.D. torch (AP Pros-Series 220 Lumens High Performance Spotlight).

General Site photos are contained in Appendix A.

2.4 Bat Potential Tree Assessment

A number of mature trees are present along existing field boundaries. The treelines were preliminarily assessed as a whole for any 'Potential Roost Features' (PRFs) listed below and, to assess whether the treelines along with scrub and hedgerows may be used as important commuting and foraging routes.

- Natural holes (e.g., knot holes) arising from naturally shed branches or branches previously pruned back to a branch collar.
- Man-made holes (e.g., cavities that have developed from flush cuts or cavities created by branches tearing out from parent stems).
- Cracks/splits in stems or braches (horizontal and vertical).
- Partially detached or loose bark plates.
- Cankers (caused by localised bark death) in which cavities have developed.
- Other hollows or cavities, including butt rots.
- Compression of forks with included bark, forming potential cavities.
- Crossing stems or branches with suitable roosting space between.
- Ivy stems with diameters in excess of 50mm with suitable roosting space behind (or where roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk).
- Bat or bird boxes.
- Other suitable places of rest or shelter.

Certain factors such as orientation of the feature, height from the ground, the direct surroundings and its location in respect to other features may enhance or reduce the potential value.

A preliminary rating was assigned to treelines for commuting and foraging using the following the BCT guidelines with the assessment rating[18] and classification using Table 4.1 of the BCT guidelines (2016) - which is shown as Table 3 overleaf.

[17] Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
[18] *Bat Surveys for Professional Ecologists, Good Practice Guidelines (2016)*

Table 3 Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of roost features within the landscape, to be applied using professional judgement.

Suitability	Description Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[a] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation[b]). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.[c]	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions[a] and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions[a] and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

[a] For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.
[b] Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten *et al.*, 2015). This phenomenon requires some research in the UK but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in large buildings in highly urbanised environments.
[c] This system of categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI, 2015).

Treelines were also classified into general bat roost potential groups based upon the presence of these features. An evaluation table is shown as Table 4.

Table 4 Classification and Survey Requirements for Bats in Trees[19]

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey Work / Actions
Confirmed Roost	Evidence of roosting bats in the form of live / dead bats, droppings, urine staining, mammalian fur oil staining, etc.	A National Parks and Wildlife (NPWS) derogation licence application will be required if the tree or roost site is affected by the development or proposed arboricultural works. This will require a combination of aerial assessment by roped access bat workers (where possible, health and safety constraints allowing) and nocturnal survey during appropriate periods (e.g. nocturnal survey - May to August) to inform on the licence. Works to tree undertaken under supervision in accordance with the approved good practice method statement provided within the licence. However, where confirmed roost site(s) are not affected by works, work under a precautionary good practice method statement may be possible.
High Potential	A tree with one or more Potential Roosting Features that are obviously suitable for larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter protection, conditions (height above ground level, light levels, etc.) and surrounding	Aerial assessment by roped access bat workers (if appropriate) and / or nocturnal survey during appropriate period (May to August). Following additional assessments, tree may be upgraded or downgraded based on findings. If roost sites are confirmed and the

[19] Bat Surveys for Professional Ecologists: Good Practice Guidelines (J., Collins (Bat Conservation Trust), 2016[19]).

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey Work / Actions
	habitat. Examples include (but are not limited to); woodpecker holes, larger cavities, hollow trunks, hazard beams, etc.	tree or roost is to be affected by proposals a licence from the NPWS will be required. After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate.
Moderate Potential	A tree with Potential Roosting Features which could support one or more potential roost sites due to their size, shelter protection, conditions (height above ground level, light levels, etc.) and surrounding habitat but unlikely to support a roost of high conservation status (i.e., larger roost, irrespective of wider conservation status). Examples include (but are not limited to); woodpecker holes, rot cavities, branch socket cavities, etc.	A combination of aerial assessment by roped access bat workers and / or nocturnal survey during appropriate period (May to August). Following additional assessments, tree may be upgraded or downgraded based on findings. After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate. If a roost site/s is confirmed a licence from the NPWS will be required.
Low Potential	A tree of sufficient size and age to contain Potential Roosting Features but with none seen from ground or features seen only very limited potential. Examples include (but are not limited to); loose/lifted bark, shallow splits exposed to elements or upward facing holes.	No further survey required but a precautionary working method statement may be appropriate.
Negligible/No potential	Negligible/no habitat features likely to be used by roosting bats	None.

2.5 Landscape Evaluation

Ecological survey results were evaluated to determine the significance of identified features located in the study area on an importance scale ranging from international-national-county-local (from NRA, 2009) The local scale is approximately equivalent to one 10km square but can be operationally defined to reflect the character of the area of interest. Because most sites will fall within the local scale, this is sub-divided into two categories: local importance (higher value) and local importance (lower value).

3. RESULTS

3.1 General Activity Survey

The results of the bat survey carried out in September 29th 2021 are summarized in Table 5 with the complete dataset of bat species identified in real time in the field using the Elekon Batlogger M detector presented in Appendix B. A map outlining the locations of the bat calls is shown as Figure 4. The presence denotes activity/passes as opposed to individual bats.

In total three species of bat were detected. A moderate rate of bat activity was recorded which was expected with the high bat landscape suitability score assigned and presence of a mature treelines throughout the site and mainly on the outer boundaries.

Table 5 Bat Results Summary Data – 29th September 2021

Species Name – Common	Species Name – Latin	Number of Passes	Peak Frequency (kHz)
Common Pipistrelle	*Pipistrellus pipistrellus*	15	46.5
Soprano Pipistrelle	*Pipistrellus pygmaeus*	12	55.5
Leisler's Bat	*Nyctalus leisleri*	5	26.9

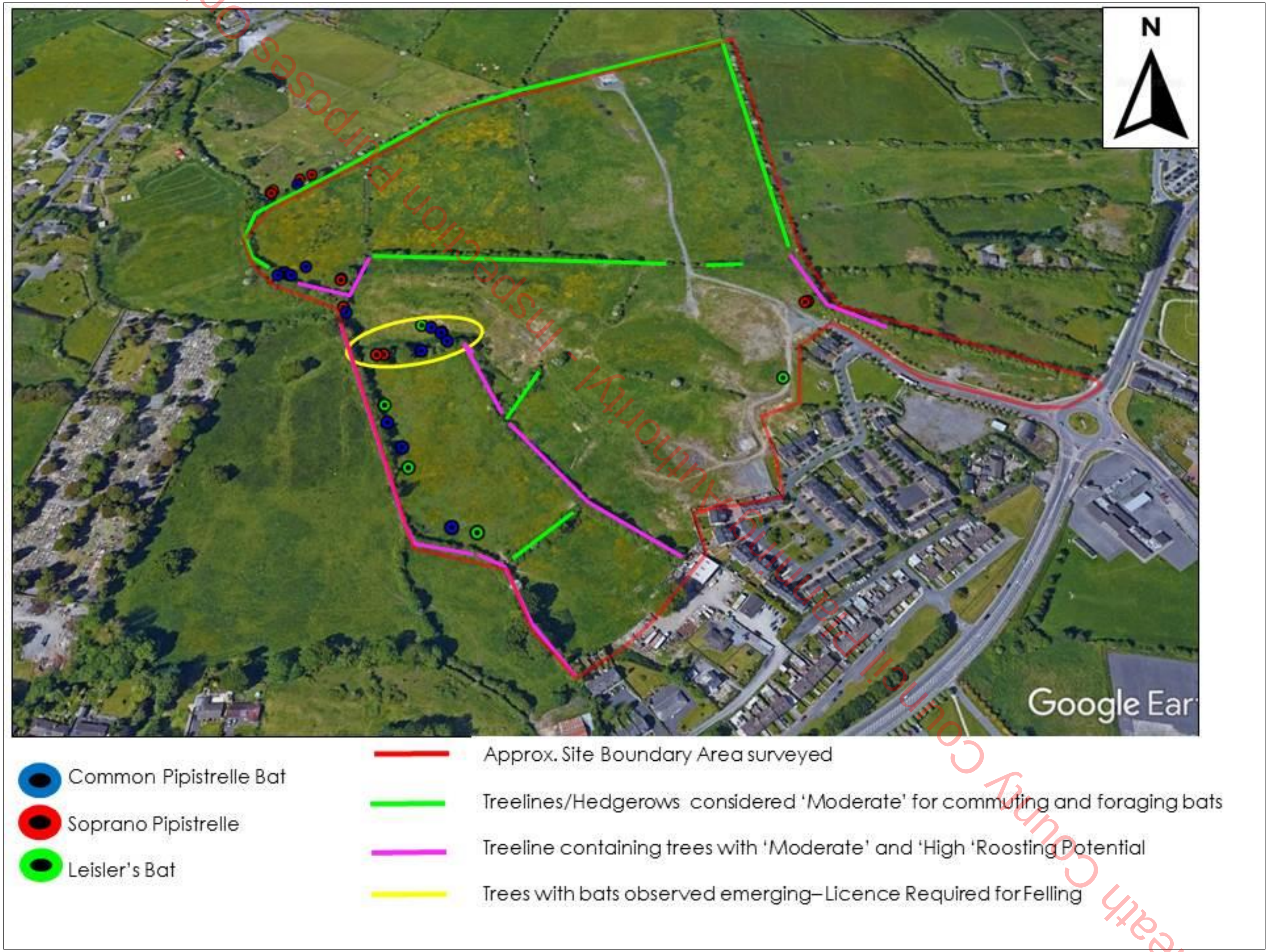


Figure 4 Bat Activity Map with Legend

3.2 Bat Potential Tree Assessment

The site contained mature trees with 'Moderate' and 'High' bat roosting potential along field boundaries, see Figure 4, as they a high cover of ivy or cracks, holes and crevices. Treeline ratings were assigned visually from a distance.

Beech trees (circled in yellow on Figure 4) had Pipistrelle Bat emerge (and potentially Soprano Pipistrelle although not directly observed) from these trees during the survey (see plates in Appendix A). If these trees need to be felled then a bat derogation licence from the NPWS is required (justification required).

3.3 Landscape Evaluation

The landscape is considered of local importance (Higher value) for bats due to a High score for landscape suitability for bats. The treelines and hedgerows radiating out from the site provide commuting and foraging corridors to other important habitats for bats in the wider landscape and are considered to be of 'Moderate' habitat value (see Table 3).

4. RECOMMENDATIONS

4.1 Tree Removal

Beech trees circled in yellow on Figure 4 had bats emerge and therefore are considered to be 'confirmed roosts' (see Table 4). In that regard a Licence (see Section 1.4) from the National Parks and Wildlife services will be required should these trees need to be felled (with justification required).

The treelines along the field boundaries contained the areas with most bat activity and these trees should therefore be retained for commuting, foraging and potentially roosting bats with the design layout incorporating them where possible. To ensure continuity of hedgerows and treelines for commuting and foraging bats a gap of less than 10m should be used. Gaps over 10m may negatively impact on bat flight dynamics.

Where the occasional mature tree needs to be felled then a bat tree assessment for their individual bat roost suitability should be undertaken rating them as as 'Negligible', 'Low', 'Moderate,' 'Moderate-High' or 'High' bat roosting potential. .

- Tree-felling should be undertaken in the period late August to late October/early November. During this period bats are capable of flight and this may avoid risks associated with tree-felling.

- Felling during the winter months should be avoided as this creates the additional risk that bats may be in hibernation and thus unable to escape from a tree that is being felled. Additionally, disturbance during winter may reduce the likelihood of survival as the bats' body temperature is too low and they may have to consume too much body fat to survive.

- Tree-felling should be undertaken using heavy plant and chainsaw. There is a wide range of machinery available with the weight and stability to safely fell a tree. Normally trees are pushed over, with a need to excavate and sever roots in some cases. In order to ensure the optimum warning for any roosting bats that may still be present, an affected tree will be pushed lightly two to three times, with a pause of approximately 30 seconds between each nudge to allow bats to become active. Any affected trees should then be pushed to the ground slowly and should remain in place for a period of at least 48 hours to allow bats/other wildlife to escape. Trees felled should NEVER be sawn up or mulched immediately in case protected wildlife is present.

- A pre-felling bat survey should be undertaken the night before felling by a Bat specialist and a derogation licence from the National Parks and Wildlife Services (NPWS) acquired if bats are observed flying out of other High Potential bat trees the night prior to felling. Depending on the number of trees to be felled, numerous surveys may be required. The surveys should be carried out at the appropriate time of year.

- Trees used for future landscaping should comprise of a high percentage of semi-mature native Irish species.

4.2 Lighting for Bats

Bats are nocturnal animals, adapted to low-light conditions. This means that most bat species find artificial lighting to be very disturbing. We know that some bat species will not cross lines of street lights.[20] Such light acts as a barrier, disrupting flight paths and restricting access to otherwise suitable habitat. In addition, lighting close to roost access points disturbs bats within a roost, delays emergence times and may result in the abandonment and loss of roosts.

With smarter lighting, rather than less lighting, it is possible to reduce the effects of light pollution. Lighting should only be erected where it is needed, illuminated during the time period it will be used, and only to levels that enhance visibility. Artificial light shining on bat roosts, their access points and the flight paths leading to and from the roost must always be avoided.

In order to preserve the commuting potential of the treelines/hedgerows and to minimise disturbance to bats utilising the site in general, the lighting and layout of the proposed development should be designed to minimise light-spill onto habitats used by the local bat population foraging or commuting. This can be achieved by ensuring that the design of lighting accords with guidelines presented in the Bat Conservation Trust & Institute of Lighting Engineers '*Bats and Lighting in the UK - Bats and Built Environment Series*', the Bat Conservation Trust '*Artificial Lighting and Wildlife Interim Guidance*' and the Bat Conservation Trust '*Statement on the impact and design of artificial light on bats*'.

The activity within the site is mainly along the mature field boundaries (see Figure 3). These areas should not be illuminated however where lighting is unavoidable the design strategy should reduce the potential impact of lighting on bats to include the following:

- The avoidance of direct lighting of existing trees or proposed areas of habitat creation / landscape planting.

[20] Stone, E.L., Jones, G., & Harris, S. 2009. Street lighting disturbs commuting bats.Current Biology 19:1-5

- Do not provide excessive lighting. Use only the minimum amount of light needed for safety.
- Minimise light spill. Eliminate any bare bulbs and any upward pointing light. The spread of light should be kept near to or below the horizontal. Flat cut-off lanterns are best.
- Use narrow spectrum bulbs to lower the range of species affected by lighting. Use light sources that emit minimal ultra-violet light and avoid the white and blue wavelengths of the light spectrum to avoid attracting lots of insects. Lighting regimes that attract lots of insects result in a reduction of insects in other areas like parks and gardens that bats may be using for foraging.
- Lights should peak higher than 550 nm[21] or use glass lantern covers to filter UV light. White LED lights do not emit UV but have still been shown to disturb slow-flying bat species.[22]
- Reduce the height of lighting columns. Light at a low level reduces impact. However, higher mounting heights allow lower main beam angles, which can assist in reducing glare.
- For pedestrian lighting, use low level lighting that is as directional as possible and below 3 lux at ground level but preferably below 1 lux.
- Increase the spacing of lanterns.
- Use embedded lights to illuminate paths.
- Limit the times that lights are on to provide some dark periods.
- Use lighting design software and professional lighting designers to predict where light spill will occur.
- Avoid using reflective surfaces under lights.

4.3 Future Roosting Opportunities

4.3.1 Bat Boxes

Providing bat boxes can increase opportunities for roosting and they are often used as enhancement features. However, it may take a long time for bats to make use of them and in some cases they may never be used. Therefore bat boxes have limited relevance in mitigation schemes and should not be considered in this context as they are rarely able to replicate the roost conditions that will have been lost. In that regard trees recommended for removal that are considered 'High' Roosting Potential should be retained if possible and if not a series of bat boxes should be erected around the site with input from a bat ecologist after the layout is finalised.

Microclimate within a new roost is a very important factor in terms of increasing the chance of successful uptake by bats. Bat boxes should be draught-proof and made from a thermally stable material such as untreated wood, woodcrete, brick or stone. If possible, it is better to provide several internal chambers so that the bats can move around as their needs change. All boxes should have a small entry slit at the bottom (20 mm in width) with a roughened landing strip to allow the bats

[21]Van Langevelde, F eta l. 2011. Effect of spectral composition of artificial light on the attraction of moths. Biol. Conserv. doi:10.1016/j.biocon.2011.06.004
[22] Stone, E.L., Jones, G., & Harris, S. 2012. Conserving energy at a cost to biodiversity? Impacts of LED lighting on bats. Global Change Biology doi: 10.1111/j.1365-2486.2012.02705.x

to crawl up into the box. The entry slit should be positioned so that accumulated bat waste can drop out the box or be pushed out as bats emerge.

Although it can take bats a long time to make use of artificial roosts, roost location seems to be the most important factor influencing successful uptake.

4.3.2 Bat box positioning considerations

Orientation

One of the most important ways to optimise internal roost microclimate is to carefully locate the new roost. In general, bats seek warm spaces to help them with rearing young. For this reason, bat boxes should be located where they will receive full/partial sunlight. In the northern hemisphere this will be a southerly orientation (facing south, south-west or south-east). However, it is helpful to install bat boxes in more than one orientation to allow for a choice of roosting conditions.

Height

Position the bat boxes a minimum of 2m above ground, although 5-7m is better to prevent disturbance from people and/or predators. Avoid placing boxes above windows, doors and climbing plants, or other features that might provide access for cats. Keeping boxes away from windows and doors also prevents bat droppings from accumulating and reduces the chances of learner fliers entering open windows or doors. Position near the eaves or gable apex of a building to minimise disturbance.

Surrounding habitat

To increase the chances of bats roosting in a bat box, it should be placed adjacent to vegetation features such as hedges and treelines. Some bat species use these features for navigation between their roosting site and feeding grounds and to avoid flying in open and exposed areas. Bats will be more likely to discover the artificial roost if it is placed close to an existing flight path.

A series of 10+ bat boxes around the site should be erected during the operational phase, and possibly prior to this phase if derogation licence is required for tree felling (depending on licence requirements). The type recommended is the 2F Schwegler Bat Box.[23]

5. CONCLUSION

On the basis of the findings of the preliminary bat survey it is concluded that the overall impact on bats, arising from the Proposed Development, will most likely be negligible for bats if:

- Existing mature trees and treelines are retained. If occasional trees are removed then to ensure the continuity of hedgerows and treelines for

[23] Available here: https://www.nhbs.com/search?q=bat+boxes&qtview=158629

commuting and foraging bats a gap of less than 10m should be used. Gaps over 10m may negatively impact on bat flight dynamics.

- A soft tree felling procedure outlined in Section 4.1 should be carried out for any trees for removal.
- If the beech trees circled in yellow on Figure 4 are to be felled then this will require a Derogation Licence from the NPWS as bats were observed emerging from same.
- A bat tree assessment of any mature trees for removal should be undertaken rating them as 'Negligible', 'Low', 'Moderate,' 'Moderate-High' or 'High' bat roosting potential.
- A pre-felling tree survey of any 'Moderate' to 'High' Bat Roost Potential trees should be undertaken in September/October prior their removal to ascertain any bat usage and a bat derogation licence applied for from the National Parks and Wildlife Services (justification required). <u>Numerous surveys many be required given the size of the site.</u> There should also be supplementary planting of semi-mature trees (to include native Irish species) to compensate for any tree removal.
- The lighting and layout of the proposed development should be designed to minimise light-spill onto habitats used by the local bat population foraging or commuting (along existing and internal site boundaries, along the woodland fringes to the centre). The proposed layout and lighting design should ensure a bat friendly lighting design is implemented with input from a bat ecologist. Guidelines for lighting and bats should be taken into account for the lighting layout.
- Bat boxes should be erected on suitable substrates e.g. on trees during the operational phase (or prior to this if any licences are required for tree felling).
- Works should cease if bats are uncovered at any stage during works and a Derogation Licence acquired from the NPWS.

APPENDICES

APPENDIX A

Plate 1 General site photos.

Plate 2 General site photos.

Plate 3 General site photos.

Plate 4 General site photos.

Plate 5 Area of trees with Bat Emergence. Licence required if they are to be felled, see Figure 4.

Plate 6 Example of High Bat Potential tree onsite with crevices.

Plate 7 Trees where bats were observed emerging. High Activity levels; see Figure 4. Licence required for if they are require felling.

APPENDIX B

29/09/2021	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temperature [°C]	Latitude [WGS84]	Longitude [WGS84]
19:23:10	Common Pipistrelle	4	47.4	54.2	47	6	100	14	53.43664	-7.91005
19:25:34	Soprano Pipisrelle	1	54.7	56.3	53.8	3.3	246	14	53.43664	-7.91004
19:26:12	Leisler's Bat	1	28.2	28.4	26.2	6.2	179	14	53.4362	-7.90601
19:35:29	Leisler's Bat	2	27.2	28.4	26.2	6.2	179	14	53.43492	-7.90938
19:35:59	Common Pipistrelle	1	43.6	44.5	43.6	7.2	0	14	53.43496	-7.90965
19:37:53	Leisler's Bat	1	28.2	28.4	26.2	6.2	179	14	53.43542	-7.91019
19:38:21	Common Pipistrelle	1	43.9	44.8	43.5	5	399	14	53.43559	-7.91029
19:39:27	Common Pipistrelle	2	45.8	62.2	45.2	5	95	14	53.4358	-7.9105
19:41:52	Leisler's Bat	2	27.2	28.4	26.2	6.2	179	14	53.43595	-7.91057
19:43:58	Soprano Pipisrelle	1	53.4	56.4	53.1	3.3	0	14	53.43642	-7.91077
19:44:37	Soprano Pipisrelle	4	54.1	58.3	53.9	3.5	353	14	53.43642	-7.91069
19:50:30	Common Pipistrelle	1	46.2	50.1	45.1	7.8	214	14	53.43646	-7.91025
19:51:19	Common Pipistrelle	2	46.6	49.2	45.8	2.8	738	14	53.43655	-7.90996
19:53:55	Leisler's Bat	1	27.5	28.7	25.3	5.9	0	14	53.43671	-7.9103
19:55:35	Common Pipistrelle	1	47.8	52.5	47.4	3	90	14	53.43669	-7.91018
19:56:21	Common Pipistrelle	17	46.1	60	45.9	5	93	14	53.43684	-7.91125
19:58:47	Sorpano Pipistrelle	1	52.8	55.5	52.8	3.3	0	14	53.4369	-7.9113

29/09/2021	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temperature [°C]	Latitude [WGS84]	Longitude [WGS84]
20:05:26	Sorpano Pipistrelle	13	53.7	67.5	53.5	5	80	13	53.43719	-7.91141
20:07:47	Common Pipistrelle	22	44.8	62	44.5	4	90	13	53.4372	-7.91141
20:11:47	Common Pipistrelle	17	46.7	65.1	46.5	5	90	13	53.43734	-7.91189
20:22:25	Common Pipistrelle	3	45.6	50.4	45.1	8.7	135	13	53.43725	-7.91208
20:23:42	Common Pipistrelle	11	46.7	58.4	46.3	4	90	13	53.43724	-7.91222
20:29:50	Common Pipistrelle	19	46.8	64.8	46.5	5	90	13	53.43724	-7.91205
20:34:58	Sorpano Pipistrelle	28	52.3	69.1	52.1	5	84	13	53.43822	-7.91264
20:36:23	Sorpano Pipistrelle	1	54.3	58	54	3.9	0	13	53.43823	-7.91266
20:45:04	Common Pipistrelle	11	46.4	55.4	45.8	5	145	13	53.43834	-7.91233
20:48:19	Sorpano Pipistrelle	18	51.1	66	50.8	5	85	13	53.43841	-7.91231
20:50:55	Common Pipistrelle	19	44	58.5	43.6	6	95	13	53.43728	-7.91214
20:56:34	Sorpano Pipistrelle	47	52.1	65.1	51.6	6	80	13	53.43827	-7.91263
21:08:42	Sorpano Pipistrelle	18	54.6	64.2	54.3	6	80	12	53.43847	-7.91217
21:10:38	Sorpano Pipistrelle	34	50.2	65.4	49.8	7	85	12	53.43696	-7.90557
21:13:12	Sorpano Pipistrelle	44	54.9	69	54.6	5	80	12	53.43695	-7.9056

August 2022

Bat Survey Report For a Residential Scheme

Cornamaddy, Athlone Co. Westmeath

ASH Ecology & Environmental

CIEEM REGISTERED PRACTICE 2022-2023

ASH Ecology & Environmental

Business All-Ireland Pollinator Plan 2021-2025 Supporter

Aisling Walsh M.Sc MCIEEM Trading as Ash Ecology & Environmental Ltd.
Tel: 089 4991181 / Company Reg: 630819 /
Office: Monine Kilfinane, Co. Limerick / Full membership of the CIEEM

Contents

1. INTRODUCTION

1.1 Purpose of the Report

Ash Ecology and Environmental Ltd (AEE) was commissioned to carry out a bat survey on behalf of Enviroguide Consulting during September 2021 and July 2022 as part of a proposed residential development at a site located in Cornamaddy, Athlone, Co. Westmeath, (Grid Ref 53.436974, -7.906666); see Figure 1. An aerial photo with existing layout and surrounding landscape is shown as Figure 2. A proposed site layout is shown as Figure 3. There are no affected buildings on the site.

Figure 1 Site Location Map.

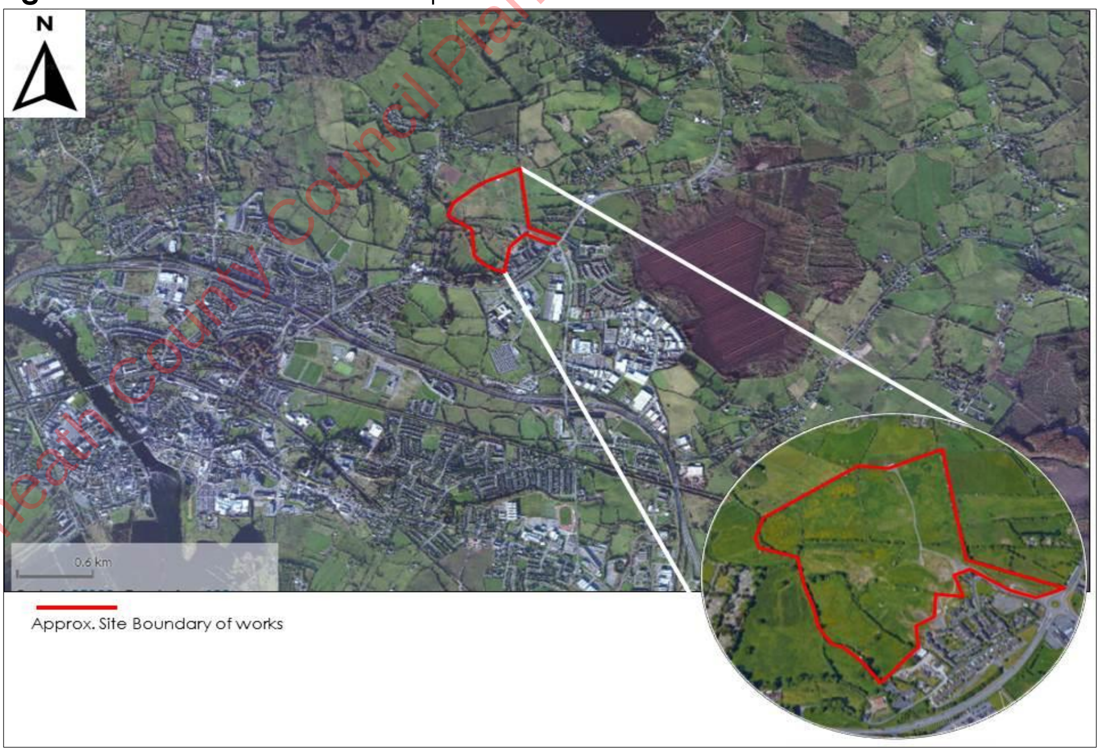


Figure 2 Aerial Photo of Site showing existing layout and surrounding landscape.

Figure 3 Proposed Site Layout.

1.2 Competency of Assessor

This report has been prepared by Ash Ecology & Environmental Ltd (AEE) whose managing director and leading ecologist is Aisling Walsh who is a full member of the Chartered Institute of Ecological & Environmental Management (CIEEM) while the company, AEE, is a Registered Practice by the CIEEM.

Aisling's qualifications include M.Sc. (Dist) in Biodiversity and Conservation (TCD) and B.Sc. (Hons) Zoology (NUIG), a diploma in Applicated Aquatic Science (GMIT) and a Certificate in Applied Biology (GMIT). Aisling has over 15 years of experience providing environmental consultancy and environmental assessment services. Aisling has written numerous Ecological Impact Assessments (EcIA), Screening for Appropriate Assessment Stage I and Stage II Natura Impact Statements, chapters for Environmental Impact Assessments/Statements (EIAR), Badger Surveys, Bat Surveys, Bird and Habitat Surveys.

Aisling is a licenced bat ecologist (example of recent: DER/BAT 2020 – 46 EUROPEAN, DER/BAT 2020 – 48 EUROPEAN, DER/BAT 2021 – 89 EUROPEAN, DER/BAT 2022 – 12 EUROPEAN)and a member of Bat Conservation Ireland. In addition she has completed several bat courses to continue her training and CPD with the most recently (May 2021) a Lantra-accredited course, developed by the Bat Conservation Trust and supported by the Arboricultural Association to access bat tree roost features. Over the past 15 years Aisling has completed 100s of bat surveys providing her with more than adequate experience in the profession.

1.3 Bat Legislation

All bat species are protected under the Wildlife Act 1976 to 2021 which make it an offence to wilfully interfere with or destroy the breeding or resting place of these species; however, the Acts permit limited exemptions for certain kinds of situations.

Section 23 of the Wildlife Act 1976 to 2021 contains several exemptions to the protection given to the species listed for protection on Schedule 5 (e.g. for agriculture or construction). In 2005 a further amendment through the European Communities (Natural Habitats) (Amendment) Regulations 2005 (S.I. No. 378 of 2005) removed all of the exemptions provided in Section 23(7) of the Wildlife Act 1976 to 2021 insofar as they relate to Annex IV species, including all species of bats. Those 2005 Regulations were revoked in 2011 except for Regulation 2 which brings about this strengthened protection for bats (and other Annex IV species). All species of bats in Ireland are listed on Schedule 5 of the 1976 Act, and are therefore subject to the provisions of Section 23, which make it an offence to:

- Intentionally kill, injure or take a bat;
- Wilfully interfere with the breeding or resting place of a bat

The Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora ("the Habitats Directive") seeks to protect rare and vulnerable species, including all species of bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All species of bat found in Ireland are listed on Annex IV of the Directive. Member States are required to put in place a system of strict protection (as outlined in Article 12) for species listed on Annex IV ('European protected species'). The lesser horseshoe bat is further protected under Annex II. This Annex relates to the designation of Special Areas of Conservation (SACs). The Habitats Directive is transposed into Irish law by the European Communities (Birds & Natural Habitats Regulations) 2011 (S.I. No. 477 of 2011) ("the Habitats Regulations"). Under the Habitats Regulations (2011), all bat species are listed on the First Schedule and Regulation 51 makes it an offence to:

- Deliberately capture or kill a bat;
- Deliberately disturb a bat particularly during the period of breeding, hibernating or migrating;
- Damage or destroy a breeding site or resting place of a bat;
- Keep, sell, transport, exchange, offer for sale or offer for exchange any bat taken in the wild.

Across Europe, bats are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (CMS, Bonn Convention 1979) was instigated to protect migrant species across all European boundaries. EUROBATS (a daughter Agreement under CMS) is of particular relevance in relation to cooperation across international borders for the conservation of bats, many of which are known to migrate long distances. The Irish government has ratified both of these conventions as well as the EUROBATS Agreement.

1.4 Derogation licences

It is an offence, under Regulation 51 of the European Communities (Birds and Natural Habitats) Regulations, 2011 ('the 2011 Regulations') to:

a) Deliberately capture or kill a bat in the wild;
b) Deliberately disturb a bat particularly during the period of breeding, rearing, hibernation and migration;
c) Damage or destroy a bat's breeding site or resting place, or;
d) Keep, transport, sell, exchange, offer for sale or offer for exchange any bat taken in the wild, other than those taken legally before the Habitats Directive before the Habitats Directive was implemented.

A person may apply to the Minister under Regulation 54 of the 2011 Regulations for a derogation licence to carry out one or more of these prohibited activities. But, the Minister may only grant such a derogation licence if three criteria are met.

Firstly the Minister may only grant a derogation licence if it is for one of the following specified reasons listed in Regulation 54:

a) In the interests of protecting wild fauna and flora and conserving natural habitats;
b) To prevent serious damage, in particular to crops, livestock, forests, fisheries and water and other types of property;
c) In the interests of public health and public safety, or for other imperative reasons of overriding public interest, including those of a social or economic nature and the beneficial consequences of primary importance for the environment;
d) For the purpose of research and education, of repopulating and introducing these species and for the breeding operations necessary for these purposes, including the artificial propagation of plats, or;
e) To allow, under strictly supervised conditions, on a selective basis and to a limited extent, the taking or keeping of bats.

Secondly, the Minister may only issue a derogation if there is no alternative to carrying out the prohibited activity. The first aim of the developer, whether from a private company or a public authority, working with professional advice, should be to entirely avoid any potential impact of a proposed development on bats and their breeding and resting places. Alternatives may involve redesigning a development so that bat roosts, and associated commuting routes and feeding areas are kept intact and that bats are not disturbed, for example by inappropriate lighting. It should be noted that the European Commission has a specific understanding of satisfactory alternative solution. "An alternative solution cannot be deemed unsatisfactory merely because it would cause greater inconvenience or compel a change in behaviour" (European Commission, 2021, page 13)[1]. Decisions about what solution is satisfactory must be science-based and should solve the problem of how to strictly protect the bats in light of the development.

Thirdly the Minister may only grant a derogation if it is not detrimental to the maintenance of the populations of bats at a favourable conservation status (FCS)

[1] https://op.europa.eu/en/publication-detail/-/publication/bbc7ace0-27e2-11ec-bd8e-01aa75ed71a1/language-en

in their natural range. There is case law from the Court of Justice of the European Union (CJEU) to back this up. One example is the Finnish Wolf Case C-674/17. The ruling establishes that the Member State must "clearly and precisely" identify in the derogation what the objectives of the derogation are. It must also establish that the derogation is capable of achieving those objectives and demonstrate that there is no satisfactory alternative. Cumulative effects of derogations must be taken into account when issuing derogations. The maximum number of all derogations must not be detrimental to the maintenance or restoration of the population at FCS. Consideration must be given to other human causes of mortality. Any risk to FCS must be ruled out by detailed conditions based on the level of population, its conservation status and its biological characteristics. The conditions must be precisely defined and they must be monitored to ensure they are implemented.

If any of these three criteria are not satisfied, the Minister cannot issue a derogation licence. It must never be assumed that a derogation licence will automatically be granted.

In summary, it is clear that a developer must first look to avoid all impacts on bats. This may mean looking at alternative solutions and redesigning the project accordingly. If this is not possible, the developer needs to check whether there are grounds to apply for a derogation licence, based on the reasons given in Regulation 54 of the Habitats Regulations. When applying for a derogation licence the developer must clearly state the reason and describe in detail all alternative solutions which were given serious consideration. Any mitigation intended to ensure that there is no impact or minimal impact on the bats must be clearly described in detail, giving examples of how it worked in other places.

If a derogation licence has been refused by the Minister, any aspect of the development for which the derogation licence was sought, must not go ahead, no matter what other permissions are in place.

A derogation licence is required when on the basis of survey information and specialist knowledge, it appears that:

- The site in question is a breeding site or resting place for bats and/or;
- The proposed activity could impact on a breeding site or resting place of a bat.

No licence is required if the proposed activity is unlikely to result in an offence. The advice given in this document (and see also Mullen et al. 2021)[2] should assist the proponent, or those acting on their behalf, in arriving at a decision on this matter, though it must be recognised that determining whether a particular site is used as a breeding or resting place can be problematic for such mobile animals as bats. Determining whether an activity undertaken near to a roost might impact on that roost (e.g. by removing important flight lines or foraging areas) will also require specialist assessment. Note that if the proposed activity can be timed, organised and carried out so as to avoid committing an offence then no licence is required.

[2] Mullen, E., Marnell, F & Nelson, B. (2021) Strict protection of animal species. Guidance for public authorities on the application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a public authority. Unpublished Report, National Parks and Wildlife Service. Department of Housing, Local Government and Heritage, Dublin. https://npws.ie/sites/default/files/files/article-12- guidance-final.pdf

Examples of works that are likely to need a licence because they may result in the destruction of a breeding or resting place and/or disturbance of bats include:

- Demolition of buildings known to be used by bats;
- Conversion of barns or other buildings known to be used by bats;
- Restoration of ruined or derelict buildings;
- Maintenance and preservation of heritage buildings;
- Introduction of artificial lighting inside a roost or near a roost entrance;
- Change of use of buildings resulting in increased ongoing disturbance;
- Removal of trees known to be used by bats;
- Significant alterations to roof voids known to be used by bats.

Examples of works that, if carefully planned, may not need a licence include:

- Works near to or at roosts (e.g. re-roofing) if carried out while bats are not present and the access points and roosting area are not affected;
- Remedial timber treatment, carried out with the correct (non-toxic to bats) chemicals while bats are not present.

2. METHODOLOGY

2.1 Information Sources

A desk-based review of information sources was completed. Information contained on the websites of the National Parks and Wildlife Service (NPWS)[3] and the National Biodiversity Data Centre (NBDC)[4] was reviewed. The following publications and websites were also reviewed and consulted:

- Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.
- Mullen, E., Marnell, F & Nelson, B. (2021) Strict protection of animal species. Guidance for public authorities on the application of Articles 12 and 16 of the EU Habitats Directive to development/works undertaken by or on behalf of a public authority. Unpublished Report, National Parks and Wildlife Service. Department of Housing, Local Government and Heritage, Dublin. https://npws.ie/sites/default/files/files/article-12- guidance-final.pdf
- Bat Conservation Trust (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition
- CIEEM (2021) Bat Mitigation Guidelines - A guide to impact assessment, mitigation and compensation for developments affecting bats
- Bat Conservation Ireland https://www.batconservationireland.org/
- BTHK (2018) Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Exeter: Pelagic Publishing.
- Bat Conservation Trust (2018) Bats and artificial lighting in the UK Bats and the Built Environment series[5]
- Mitchell-Jones, A.J, & McLeish, A.P. (eds). 2004., 3rd Edition Bat Workers' Manual, JNCC, Peterborough, ISBN 1 86107 558 8
- Bat Conservation Ireland (2012) Bats and Appropriate Assessment Guidelines, Version 1, December 2012. Bat Conservation Ireland, www.batconservationireland.org[6]
- Bat Conservation Ireland (2010) Bats & Lighting Guidance Notes for: Planners, engineers, architects and developers[7]
- Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes (National Roads Authority, 2005).
- Guidelines for the Treatment of Bats during the Construction of National Road Schemes (National Roads Authority, 2005).
- Bats and Lighting in the UK – Bats and the Built Environment Series (Institute of Lighting Professionals, September 2011
- Guidance Notes for the Reduction of Obtrusive Light GN01 (Institute of Lighting Professionals, 2011.

[3] The National Parks and Wildlife Services map viewer http://webgis.npws.ie/npwsviewer/
[4] The National Biodiversity Data Centre www.NBDC.ie
[5] https://www.theilp.org.uk/documents/guidance-note-8-bats-and-artificial-lighting/
[6]https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIreland-AA-Guidelines_Version1.pdf
[7]https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIrelandGuidelines_Lighting.pdf

- Bats and Lighting – Guidance Notes for Planners, Engineers, Architects and Developers (Bat Conservation Ireland);
- The Eurobats Mitigation of Lighting Document
- Tree Removals Plan (Charles McCorkell, 2020)

2.2 Desk Study

2.2.1 Previous Records

A desktop review was carried out to identify the previous records of Bat species within the Proposed Development Site and its environs. The study area occurs in $10km^2$ Grid Square N04. The website the NBDC (www.nbdc.ie) was accessed on 01/08/2022 to establish any previous bat records and shown below in Table 1.

Table 1 Historical Bat Records in $10km^2$ Grid Square N04 (NBDC website www.nbdc.ie accessed 01/08/2022)

Species Name - Common	*Species Name - Latin*	Last Documented Record N04
Brown Long-eared Bat	*Plecotus auritus*	03/04/2002
Daubenton's Bat	*Myotis daubentonii*	29/07/2009
Leisler's Bat	*Nyctalus leisleri*	29/07/2009
Common Pipistrelle	*Pipistrellus pipistrellus*	21/08/2013
Soprano Pipistrelle	*Pipistrellus pygmaeus*	21/08/2013

2.2.2 Species Background

Ireland had ten known bat species until February 2013, when a single live greater horseshoe bat (*Rhinolophus ferrumequinum)* was found roosting in Co. Wexford[8]. On 8th June 2020, a single audio recording was confirmed in the Glendaough area, Co. Wicklow. It was found on two more occasions in the same area in early July 2020 (Bat Conservation Ireland, July 2020).

The ten species (excluding the greater horseshoe) are briefly described overleaf. For a more comprehensive overview see McAney, 2006.[9]

The dependence of Irish bat species on insect prey has left them vulnerable to habitat destruction, land drainage, agricultural intensification and increase use of pesticides. Also, their reliance on buildings as roosting sites has made them particularly vulnerable to renovation works and the use of timber chemical treatment. Buildings are highly important as roosting sites for bats and all Irish bat species use buildings for all roost types. Most significant in terms of roosts in houses are maternity roosts, but cellars and even attics may serve as hibernation sites for bats. Roosts within buildings can far exceed the numbers encountered in trees, bridges, caves or cliffs and roosts of over 1,000 bats have been recorded in buildings.[10]

[8] National Biodiversity Data Centre http://www.biodiversityireland.ie/new-bat-species-found-in-ireland/

[9] McAney, K. (2006) *A Conservation Plan for Irish Vesper Bats.* Irish Wildlife Manual No.20. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government.

[10] NRA (2005) Guidelines for the Treatment of Bats Prior to the Construction of National Road Schemes. National Roads Authority, Dublin

2.2.2.1 Family Vespertilionidae:

Common pipistrelle *Pipistrellus pipistrellus*
This species was only recently separated from its sibling, the soprano or brown pipistrelle P. pygmaeus[11], which is detailed below. The common pipistrelle's echolocation calls peak at 45 kHz. The species forages along linear landscape features such as hedgerows and treelines as well as within woodland.

Soprano pipistrelle *Pipistrellus pygmaeus*
The soprano pipistrelle's echolocation calls peak at 55 kHz, which distinguishes it readily from the common pipistrelle on detector. The pipistrelles are the smallest and most often seen of our bats, flying at head height and taking small prey such as midges and small moths. Summer roost sites are usually in buildings, but tree holes and heavy ivy are also used. Roost numbers can exceed 1,500 animals in mid-summer.

Nathusius' pipistrelle *Pipistrellus nathusii*
Nathusius' pipistrelle is a recent addition to the Irish fauna and has mainly been recorded from the north-east of the island in Counties Antrim and Down[12] and also in Fermanagh, Longford and Cavan. It has also recently been recorded in Counties Cork and Kerry.[13] However, the known resident population is enhanced in the autumn months by an influx of animals from Scandinavian countries. The status of the species has not yet been determined.

Leisler's bat *Nyctalus leisleri*
This species is Ireland's largest bat, with a wingspan of up to 320mm; it is also the third most common bat, preferring to roost in buildings, although it is sometimes found in trees and bat boxes. It is the earliest bat to emerge in the evening, flying fast and high with occasional steep dives to ground level, feeding on moths, caddisflies and beetles. The echolocation calls are sometimes audible to the human ear being around 15 kHz at their lowest. The audible chatter from their roost on hot summer days is sometimes an aid to location. This species is uncommon in Europe and as Ireland holds the largest national population the species is considered as Near Threatened here.

Brown long-eared bat *Plecotus auritus*
This species of bat is a 'gleaner', hunting amongst the foliage of trees and shrubs, and hovering briefly to pick a moth or spider off a leaf, which it then takes to a sheltered perch to consume. They often land on the ground to capture their prey. Using its nose to emit its echolocation, the long-eared bat 'whispers' its calls so that the insects, upon which it preys, cannot hear its approach (and hence, it needs oversize ears to hear the returning echoes). As this is a whispering species, it is extremely difficult to monitor in the field as it is seldom heard on a bat detector. Furthermore, keeping within the foliage, as it does, it is easily overlooked. It prefers to roost in old buildings.

[11] Barratt, E. M., Deauville, R., Burland, T. M., Bruford, M. W., Jones, G., Racey, P. A., & Wayne, R. K. (1997) *DNA Answers the Call of Pipistrelle Bat Species. Nature* 387: 138 - 139.
[12] Richardson, P. (2000) *Distribution Atlas of Bats in Britain and Ireland 1980 - 1999*. The Bat Conservation Trust, London, England.
[13] Kelleher, C. (2005) *International Bat Fieldcraft Workshop, Killarney, Co. Kerry*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government.

Natterer's bat *Myotis nattereri*
This species has a slow to medium flight, usually over trees but sometimes over water. It usually follows hedges and treelines to its feeding sites, consuming flies, moths, caddisflies and spiders. Known roosts are usually in old stone buildings but they have been found in trees and bat boxes. The Natterer's bat is one of our least studied species and further work is required to establish its status in Ireland.

Daubenton's bat *Myotis daubentonii*
This bat species feeds close to the surface of water, either over rivers, canals, ponds, lakes or reservoirs but it can also be found foraging in woodlands. Flying at 15 kilometres per hour, it gaffs insects with its over-sized feet as they emerge from the surface of the water - feeding on caddis flies, moths, mosquitoes, midges etc. It is often found roosting beneath bridges or in tunnels and also makes use of hollows in trees.

Whiskered bat *Myotis mystacinus*
This species, although widely distributed, has been rarely recorded in Ireland. It is often found in woodland, frequently near water. Flying high, near the canopy, it maintains a steady beat and sometimes glides as it hunts. It also gleans spiders from the foliage of trees. Whiskered bats prefer to roost in buildings, under slates, lead flashing or exposed beneath the ridge beam within attics. However, they also use cracks and holes in trees and sometimes bat boxes. The whiskered bat is one of our least studied species and further work is required to establish its status in Ireland.

Brandt's bat *Myotis brandtii*
This species is known from five specimens found in Counties Wicklow (Mullen, 2007), Cavan, and Clare in 2003, a specimen in Kerry in 2005[14] and another in Tipperary in 2006.[15] No maternity roosts have yet been found. It is very similar to the whiskered bat and cannot be separated by the use of detectors. Its habits are similar to its sibling.

2.2.2.2 Family Rhinolophidae:

Lesser horseshoe bat *Rhinolophus hipposideros*

This species is the only representative of the Rhinolophidae or horseshoe bat family in Ireland. It differs from our other species in both habits and looks, having a unique nose leaf with which it projects its echolocation calls. It is also quite small and, at rest, wraps its wings around its body. Lesser horseshoe bats feed close to the ground, gleaning their prey from branches and stones. It often carries its prey to a perch to consume, leaving the remains beneath as an indication of its presence.

The echolocation call of this species is of constant frequency and, on a heterodyne bat detector, sounds like a melodious warble. The species is confined to six counties along the Atlantic seaboard: Mayo, Galway, Clare, Limerick, Kerry and Cork. The current Irish national population is estimated at 12,500 animals. This species is listed on Annex II of the EC Habitats Directive and 41 Special Areas of Conservation have

[14] Kelleher, C. 2006a Nathusius pipistrelle Pipistrellus nathusii and Brandt's Bat Myotis brandtii - New Bat Species to Co. Kerry – Irish Naturalists' Journal 28: 258.
[15] Kelleher, C. 2006b Brandt's Bat Myotis brandtii, New Bat Species to Co. Tipperary. Irish Naturalists' Journal 28: 345.

been designated in Ireland for its protection. Where it occurs, it is often found roosting within farm buildings.

2.2.3 *Landscape Suitability*

The National Biodiversity Data Centre (NBDC) maps landscape suitability bats based on Lundy *et al.* (2011). The maps are a visualisation of the results of the analyses based on a 'habitat suitability' index. The index ranges from 0 to 100 with 0 being least favourable and 100 most favourable for bats. On average for all bat species the highest range is between 36.44 - 58.56. The overall assessment of bat habitats for the current study area is given as '41.22', deemed 'HIgh' by the author.

Table 2 gives the suitability of the study area for the bat species found in the study area (based on NBDC) along with their Irish Red List Status (from Marnell *et al.*, 2019).[16]

Table 2 Suitability of the study area for the bat species found in the Cornamaddy area (based on the NBDC data) with Irish Red list status indicated

Common name	Scientific name	Suitability index	Irish red list status
All bats	-	41.22	Least Concern
Soprano pipistrelle	*Pipistrellus pygmaeus*	52	Least Concern
Brown long-eared bat	*Plecotus auritus*	53	Least Concern
Common pipistrelle	*Pipistrellus pipistrellus*	58	Least Concern
Lesser-horseshoe bat	*Rhinolophus hipposideros*	3	Least Concern
Leisler's bat	*Nyctalus leisleri*	55	Least Concern
Whiskered bat	*Myotis mystacinus*	29	Least Concern
Daubenton's bat	*Myotis daubentonii*	43	Least Concern
Nathusius' pipistrelle	*Pipistrellus nathusii*	30	Least Concern
Natterer's bat	*Myotis nattereri*	48	Least Concern

2.2.4 *Bat Roosts*

Bats were originally cave and tree dwelling animals but many now find buildings just as suitable for their needs. Bats are social animals and most species congregate in large colonies during summer. These colonies consist mostly of females of every reproductive class, with some juvenile males from the previous year. Male bats normally roost individually or in small groups meeting up with the females in the late autumn-early winter, when it is time to mate. In summer, bats seek warm dry buildings in which they can give birth and suckle their young. In winter, they seek out places with a constant low temperature and high humidity where they can become torpid and hibernate during adverse weather conditions. However, bats do not hibernate continuously during winter and will awake and hunt during mild nights when there are insects available, and it is energetically advantageous to forage.

[16] Marnell, F., Looney, D. & Lawton, C. (2019) Ireland Red List No. 12: Terrestrial Mammals. National Parks and Wildlife Service, Department of the Culture, Heritage and the Gaeltacht, Dublin, Ireland.

2.2.4.1 Maternity Roosts

Maternity roosts are the most significant roosts and they are predominantly all-female aggregations that are formed from late May onwards and remain as a relatively cohesive unit until mid to late August. Not all female bats give birth annually. These females that do bear young in a given year avail of a suitable building, tree and sometimes cave (or equivalent). The young are flightless for several weeks and hence are vulnerable to dangers such as tree felling and restoration, reinforcement or demolition of structures such as buildings and bridges.

2.2.4.2 Mating Roosts

Most bat species mate in autumn but pregnancy does not occur until the following spring. During this time males will take possession of a cavity in a building, tree, bridge, cave or mine and attract females to these sites to establish a harem. Male bats call both from a perch and in flight in much the same manner that male birds sing.

2.2.4.3 Hibernation Roosts

Bats have a high metabolic rate and in temperate countries, such as Ireland, flying insects are not available in sufficient numbers during winter to sustain bats. Therefore, bats hibernate during winter. In hibernation sites, bats are often completely inactive for several days and are extremely vulnerable to disturbance by human activities due to the time taken for them to become sufficiently active to allow escape. Hibernation may extend from November to the end of March, during which time bat activity will take place sporadically.

2.2.4.4 Night Roosts

These are roosts which are used as resting places for bats between foraging bouts. They also provide retreats for bats from predators or during inclement weather conditions. They also function as feeding perches and may be important for socialising.

2.3 Bat Survey Methodology

The guidance used for the bat emergence surveys and activity surveys followed Marnell et al (2022)[17] for the July 2022 survey and the older 2006[18] guidelines for the September survey in 2021. The Bat Conservation Trust (2016)[19] Guidelines were used for both September 2021 and July 2022 surveys.

[17] Marnell, F., Kelleher, C. & Mullen, E. (2022) Bat mitigation guidelines for Ireland v2. Irish Wildlife Manuals, No. 134. National Parks and Wildlife Service, Department of Housing, Local Government and Heritage, Ireland.

[18] Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

[19] The Bat Conservation Trust (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines 3rd edition

A preliminary general bat activity survey was also undertaken on the 29th September 2021 from 18.45 to 21.15 (sunset was 19.13). A follow up survey was completed during the more optimal time of 28th July 2022 from 21.05 to 23.30 (sunset was 21.35) by walking the Site field boundaries where accessible. The weather was optimal for a bat survey with temperatures on the night was 12-14°C with a gentle breeze in September 2021 and 15°C in July 2022 in calm cloudy conditions. Rain arrived at the end of the survey in September 2021. Bat activity and emergence surveys are best carried out from April to end-September in suitable weather conditions[20] which these surveys were.

The equipment used included an Elekon Bat Logger M detector. Visual observations were taken with the aid of a powerful L.E.D. torch (AP Pros-Series 220 Lumens High Performance Spotlight).

The BCT guidelines were followed for the assessment rating[21] and classified using Table 4.1 of the BCT guidelines (2016) which is shown as Table 3 overleaf for grading foraging and commuting habitats. General Site photos are contained in Appendix A from July 2022.

[20] Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
[21] *Bat Surveys for Professional Ecologists, Good Practice Guidelines (2016)*

Table 3 Guidelines for assessing the potential suitability of proposed development sites for bats, based on the presence of roost features within the landscape, to be applied using professional judgement.

Suitability	Description Roosting habitats	Commuting and foraging habitats
Negligible	Negligible habitat features on site likely to be used by roosting bats.	Negligible habitat features on site likely to be used by commuting or foraging bats.
Low	A structure with one or more potential roost sites that could be used by individual bats opportunistically. However, these potential roost sites do not provide enough space, shelter, protection, appropriate conditions[a] and/or suitable surrounding habitat to be used on a regular basis or by larger numbers of bats (i.e. unlikely to be suitable for maternity or hibernation[b]). A tree of sufficient size and age to contain PRFs but with none seen from the ground or features seen with only very limited roosting potential.[c]	Habitat that could be used by small numbers of commuting bats such as a gappy hedgerow or unvegetated stream, but isolated, i.e. not very well connected to the surrounding landscape by other habitat. Suitable, but isolated habitat that could be used by small numbers of foraging bats such as a lone tree (not in a parkland situation) or a patch of scrub.
Moderate	A structure or tree with one or more potential roost sites that could be used by bats due to their size, shelter, protection, conditions[a] and surrounding habitat but unlikely to support a roost of high conservation status (with respect to roost type only – the assessments in this table are made irrespective of species conservation status, which is established after presence is confirmed).	Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens. Habitat that is connected to the wider landscape that could be used by bats for foraging such as trees, scrub, grassland or water.
High	A structure or tree with one or more potential roost sites that are obviously suitable for use by larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter, protection, conditions[a] and surrounding habitat.	Continuous, high-quality habitat that is well connected to the wider landscape that is likely to be used regularly by commuting bats such as river valleys, streams, hedgerows, lines of trees and woodland edge. High-quality habitat that is well connected to the wider landscape that is likely to be used regularly by foraging bats such as broadleaved woodland, tree-lined watercourses and grazed parkland. Site is close to and connected to known roosts.

[a] For example, in terms of temperature, humidity, height above ground level, light levels or levels of disturbance.
[b] Evidence from the Netherlands shows mass swarming events of common pipistrelle bats in the autumn followed by mass hibernation in a diverse range of building types in urban environments (Korsten *et al.*, 2015). This phenomenon requires some research in the UK but ecologists should be aware of the potential for larger numbers of this species to be present during the autumn and winter in large buildings in highly urbanised environments.
[c] This system of categorisation aligns with BS 8596:2015 Surveying for bats in trees and woodland (BSI, 2015).

2.4 Bat Roost Potential Tree Assessment

Trees that may provide a roosting space for bats were classified using the Bat Tree Habitat Key (BTHK, 2018)[22] and the classification system adapted from Collins (2016). The Potential Roost Features (PRFs) listed in BTHK (2018) were used to determine the PBR value of trees, see Table 4. Consideration was also given to the classification of trees according to the British Standard BS8956 - Surveying for bats in trees and woodland, see Table 5.

A Phase 1 inspection was undertaken to make a list of trees within the proposed development site that may be suitable as roosting sites for bats. Inspections were undertaken visually with the aid of a strong torch beam (AP Pros-Series 220 Lumens High Performance Spotlight) and Celestron12x56 Prism Binoculars during the daytime searching for PRFs, if visible. To aid this Phase 1 inspection, tree reports, where available, were consulted to supplement the data collected. A RIDGID 36848 Micro CA-150 Hand-Held Borescope for inspection of any accessible crevices on trees (3m from ground).

During the survey, the features listed below on the affected trees were sought as they may provide suitable roost sites for bats:

- Natural holes (e.g. knot holes) arising from naturally shed branches or branches previously pruned back to a branch collar.
- Man-made holes (e.g. cavities that have developed from flush cuts or cavities created by branches tearing out from parent stems).
- Cracks/splits in stems or braches (horizontal and vertical).
- Partially detached, loose or bark plates.
- Cankers (caused by localised bark death) in which cavities have developed.
- Other hollows or cavities, including butt rots.
- Compression of forks with included bark, forming potential cavities.
- Crossing stems or branches with suitable roosting space between.
- Ivy stems with diameters in excess of 50mm with suitable roosting space behind (or where roosting space can be seen where a mat of thinner stems has left a gap between the mat and the trunk).
- Bat or bird boxes.
- Other suitable places of rest or shelter.

Certain factors such as orientation of the feature, height from the ground, the direct surroundings and its location in respect to other features may enhance or reduce the potential value.

[22] BTHK (2018) Bat Roosts in Trees – A Guide to Identification and Assessment for Tree-Care and Ecology Professionals. Exeter: Pelagic Publishing.

Table 4 Classification and Survey Requirements for Bats in Trees[23]

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey Work / Actions
Confirmed Roost	Evidence of roosting bats in the form of live / dead bats, droppings, urine staining, mammalian fur oil staining, etc.	A National Parks and Wildlife (NPWS) derogation licence application will be required if the tree or roost site is affected by the development or proposed arboricultural works. This will require a combination of aerial assessment by roped access bat workers (where possible, health and safety constraints allowing) and nocturnal survey during appropriate periods (e.g. nocturnal survey - May to August) to inform on the licence. Works to tree undertaken under supervision in accordance with the approved good practice method statement provided within the licence. However, where confirmed roost site(s) are not affected by works, work under a precautionary good practice method statement may be possible.
High Potential – Category 1	A tree with one or more Potential Roosting Features that are obviously suitable for larger numbers of bats on a more regular basis and potentially for longer periods of time due to their size, shelter protection, conditions (height above ground level, light levels, etc) and surrounding habitat. Examples include (but are not limited to); woodpecker holes, larger cavities, hollow trunks, hazard beams, etc.	Aerial assessment by roped access bat workers (if appropriate) and / or nocturnal survey during appropriate period (May to August). Following additional assessments, tree may be upgraded or downgraded based on findings. If roost sites are confirmed and the tree or roost is to be affected by proposals a licence from the NPWS will be required. After completion of survey work (and the presence of a bat roost is

[23] Bat Surveys for Professional Ecologists: Good Practice Guidelines (J., Collins (Bat Conservation Trust), 2016).

Classification of Tree	Description of Category and Associated Features (based on Potential Roosting Features listed above)	Likely Further Survey Work / Actions
		discounted), a precautionary working method statement may still be appropriate.
Moderate Potential – Category 2	A tree with Potential Roosting Features which could support one or more potential roost sites due to their size, shelter protection, conditions (height above ground level, light levels, etc) and surrounding habitat but unlikely to support a roost of high conservation status (i.e. larger roost, irrespective of wider conservation status). Examples include (but are not limited to); woodpecker holes, rot cavities, branch socket cavities, etc.	A combination of aerial assessment by roped access bat workers and / or nocturnal survey during appropriate period (May to August). Following additional assessments, tree may be upgraded or downgraded based on findings. After completion of survey work (and the presence of a bat roost is discounted), a precautionary working method statement may still be appropriate. If a roost site/s is confirmed a licence from the NPWS will be required.
Low Potential – Category 3	A tree of sufficient size and age to contain Potential Roosting Features but with none seen from ground or features seen only very limited potential. Examples include (but are not limited to); loose/lifted bark, shallow splits exposed to elements or upward facing holes.	No further survey required but a precautionary working method statement may be appropriate.
Negligible/No potential – Category 4	Negligible/no habitat features likely to be used by roosting bats	None.

Table 5 Classification of Trees for Risk of Bat Roost Presence

Tree category and description (following scoping survey)	Secondary (non-specialist) survey recommendations	Secondary (specialist) survey recommendations
Known or confirmed roost	Initially consider if work to tree(s) can be avoided. If not, a specialist bat roost assessment should be undertaken to establish bat species, numbers and the nature of the roost.	
High/medium risk Trees with a suitable potential roost feature, or with several features with some bat roost potential.	• Secondary (non-specialist) assessment to examine potential roost features previously identified. If roosts cannot reasonably be ruled out a bat specialist should be consulted. • Following this assessment the tree could be up-graded or down-graded (see column 1 categories.	• Specialist bat roost assessment should be undertaken if work to a tree cannot be avoided. • Assessment to include techniques such as endoscope use and dusk/pre-dawn surveys should be undertaken. • Following this assessment the tree could be up-graded or down-graded.
Low risk Trees of sufficient size and age to contain bat roosts but with no obvious potential roost features seen during the scoping survey, or features seen with limited roosting potential only, e.g. small amounts of ivy.	No further assessment is required unless sufficient new evidence is found to upgrade the category.	None
Negligible/no risk Trees with apparently no potential to support bats.		

NOTE Risk equates to the likelihood of bat roost presence.

The Tree Removal Plan (Charles McCorkell, 2022) identifies 18 trees for removal, see Figure 4. Enviroguide advised AEE that a further 6 trees, plus a tree group will be removed to facilitate the proposed works. See Table 6 below for list assessed for bat roost potential in July 2022. Photos of the affected trees onsite are contained in Appendix A.

The categories in Table 6 correspond to the 'BS5837: 2012 - Category Retention Rating':

- Category A Trees - Trees of high quality/value with a min. of 40 years life expectancy.
- Category B Trees – Trees of moderate quality/value with a min. of 20 years life expectancy.
- Category C Trees - Trees of low quality/value with a min. of 10 years life expectancy.
- Category U Trees - Trees in such a condition that any existing value would be lost within 10 years or being recommended for removal sound arboricultural practice.

Table 6 Affected Tree List

Species	Tree No.	Category	Shown on Figure 4 as Shaded
Ash	T881	C2	Yes
Ash	T879	C2	Yes
Ash	T880	C2	Yes
Ash	T878	C2	Yes
Ash	T877	C2	Yes
Ash	T876	C2	Yes
Ash	T875	C2	Yes
Ash	T874	C2	Yes
Ash	T872	C2	Yes

Haw	T915	C2	Yes
Beech	T914	U	Yes
Sycamore	T913	C2	Yes
Ash	T912	C2	Yes
Ash	T911	C2	Yes
Ash	T908	U	Yes
Ash	T885	C2	Yes
Ash	T886	C2	Yes
Ash	T887	C2	Yes
Beech	T864	B2	Additional
Beech	T865	B2	Additional
Ash	T840	C2	Additional
Beech	T839	B2	Additional
Beech	T838	C2	Additional
Ash	T837	C2	Additional
Group - Haw, Hazel, Elder	G843	B2	Additional

Trees, if identified as Potential Bat Roosts, were inspected during the daytime, where possible, for evidence of bat usage. Evidence of bat usage is in the form of actual bats (visible or audible), bat droppings, urine staining, grease marks (oily secretions from glands present) and claw marks. In addition, the presence of bat fly pupae (bat parasite) also indicated that bat usage of a crevice, for example, has occurred in the past.

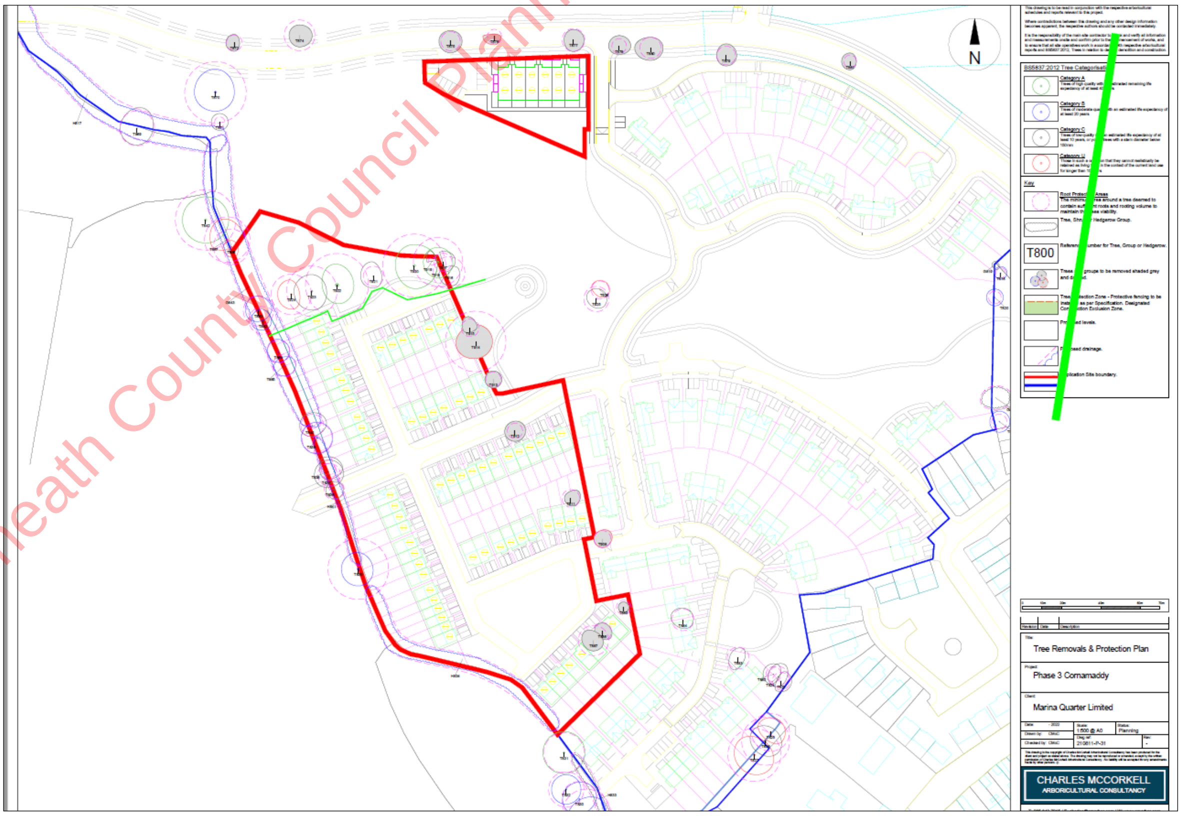


Figure 4 Tree Removal Plan (Charles McCorkell, 2022)

2.5 Landscape Evaluation

Ecological survey results were evaluated to determine the significance of identified features located in the study area on an importance scale ranging from international-national-county-local (from NRA, 2009) The local scale is approximately equivalent to one 10km square but can be operationally defined to reflect the character of the area of interest. Because most sites will fall within the local scale, this is sub-divided into two categories: local importance (higher value) and local importance (lower value).

3. RESULTS

3.1 Bat Activity Survey

In total three species of bat were detected during September 2021 and July 2022. The tabulated results are summarized in Table 7, with the complete dataset of bat species identified in real time in the field using the Elekon Batlogger M detector presented in Appendix B.

The visual results of the bat surveys (September 29th 2021 & 28th July 2022) are shown as Figures 5 and 6. The activity during the surveys could be considered Moderate-High given the optimal weather conditions on both occasions.

The passes are indicative of bat activity, and not absolute bat number. Bats tended to passed up and down repeatedly along a treeline which can suggest there are more bats present than is the case.

Table 7 Bat Results Summary Data– September 29th 2021 and July 28th 2022

Species Name – Common	Species Name – Latin	Number of Passes	Peak Frequency (kHz)
September 29th 2021			
Common Pipistrelle	*Pipistrellus pipistrellus*	15	46.5
Leisler's Bat	*Nyctalus leisleri*	5	26.9
Soprano Pipistrelle	*Pipistrellus pygmaeus*	12	56.5
July 28th 2022			
Common Pipistrelle	*Pipistrellus pipistrellus*	19	46.5
Leisler's Bat	*Nyctalus leisleri*	6	26.9
Soprano Pipistrelle	*Pipistrellus pygmaeus*	22	56.5

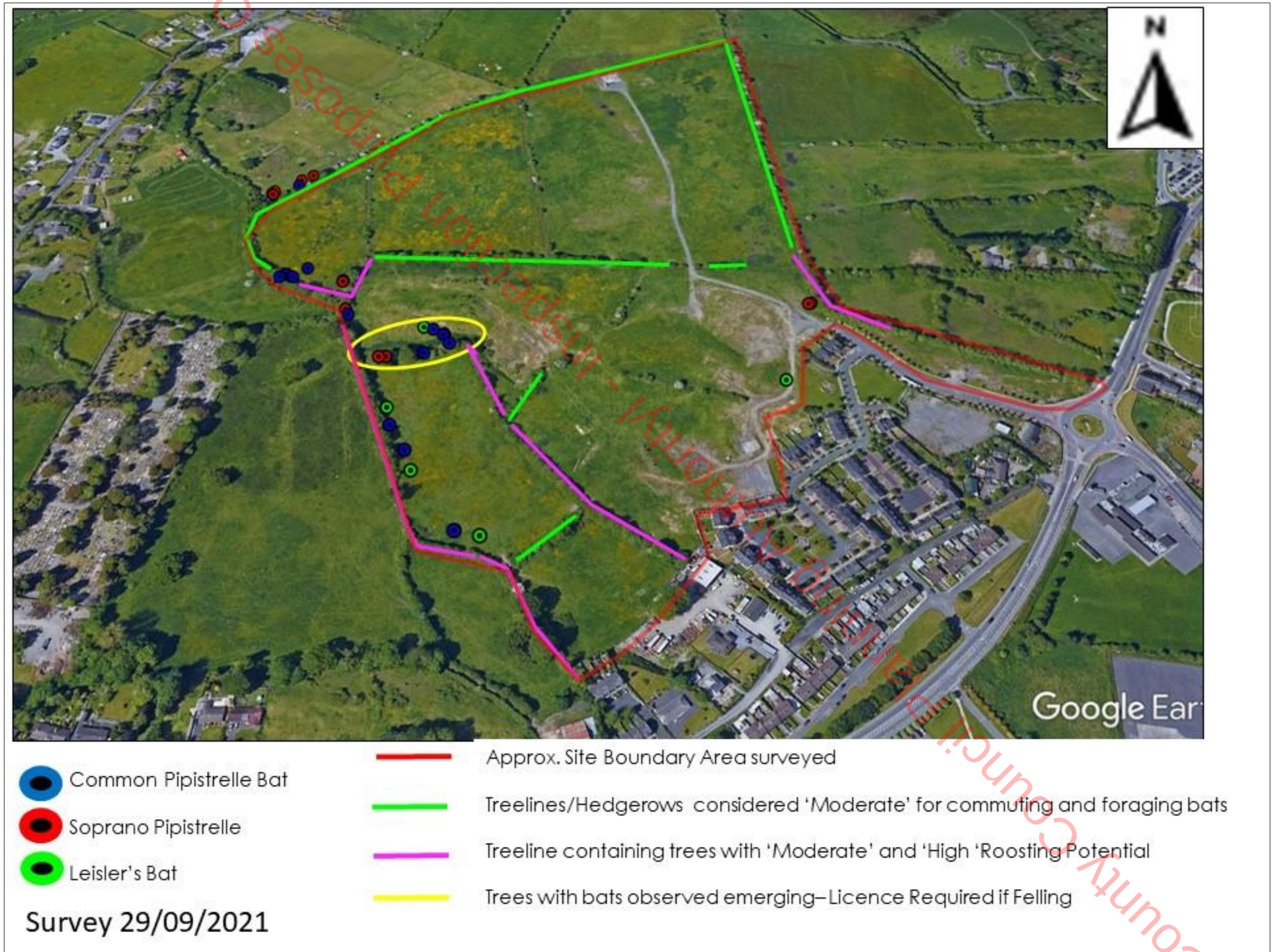


Figure 5 Bat Results with Legend – September 29th 2021

Figure 6 Bat Results with Legend – July 28th 2022

3.2 Bat Potential Tree Assessment

The 24 x Trees and Tree Group affected by the development are mature. These were assessed July 28th 2022 for their bat roost potential features along with risk for same and classified as per Tables 8 and 9. Photos of the affected trees and tree group are shown in Appendix A. Figure 7 gives a visual breakdown.

Trees to be retained but noted as having bats emerge, or being trees with high roost potential are shown in Plates Appendix, notably Trees T916, T917, T918, T919, T920, T921, T922, T923 and T924. In the survey of September 2021 Tree T922 was noted with Soprano Pipistrelle bat emerging. This tree is to be retained according to recent site layout.

Tree T914 was noted as having Soprano and Common Pipistrelle emerge during July 28th 2022. The tree alongside it, T915 was noted as High Bat roost potential and bats emerging may have been missed. It is recommended a Licence is acquired for both T914 and T915 if justification is found for their removal.

Table 8 Assessment of Affected Trees for Bats, see Tables 4 & 5

No.	Tree No.	Photo Number	Category	Bat Roost Potential	Classification of Trees for Risk of Bat Roost Presence as per Table 5
1	T881	1	C2	Negligible	No Risk
2	T879	2	C2	Negligible	No Risk
3	T880	3	C2	Low	Low Risk
4	T878	4	C2	Negligible	No Risk
5	T877	5	C2	Negligible	No Risk
6	T876	6	C2	Negligible	No Risk
7	T875	7	C2	Negligible	No Risk
8	T874	8	C2	Low	Low Risk
9	T872	9	C2	Low	Low Risk
10	T915	10	C2	High	High Risk
11	**T914**	**11**	**U**	**Bat Roost**	**High Risk**
12	T913	12	C2	Negligible	No Risk
13	T912	13	C2	Negligible	No Risk
14	T911	14	C2	Negligible	No Risk
15	T908	15	U	Negligible	No Risk
16	T885	16	C2	Low	Low Risk
17	T886	17	C2	Low	Low Risk
18	T887	17	C2	Low	Low Risk
19	T864	18	B2	Low	Low Risk
20	T865	18	B2	Low	Low Risk
21	T840	19	C2	Low	Low Risk
22	T839	20	B2	Moderate	Medium/High Risk
23	T838	21	C2	Low	Low Risk
24	T837	21	C2	Low	Low Risk
25	G843	22	B2	Negligible	No Risk

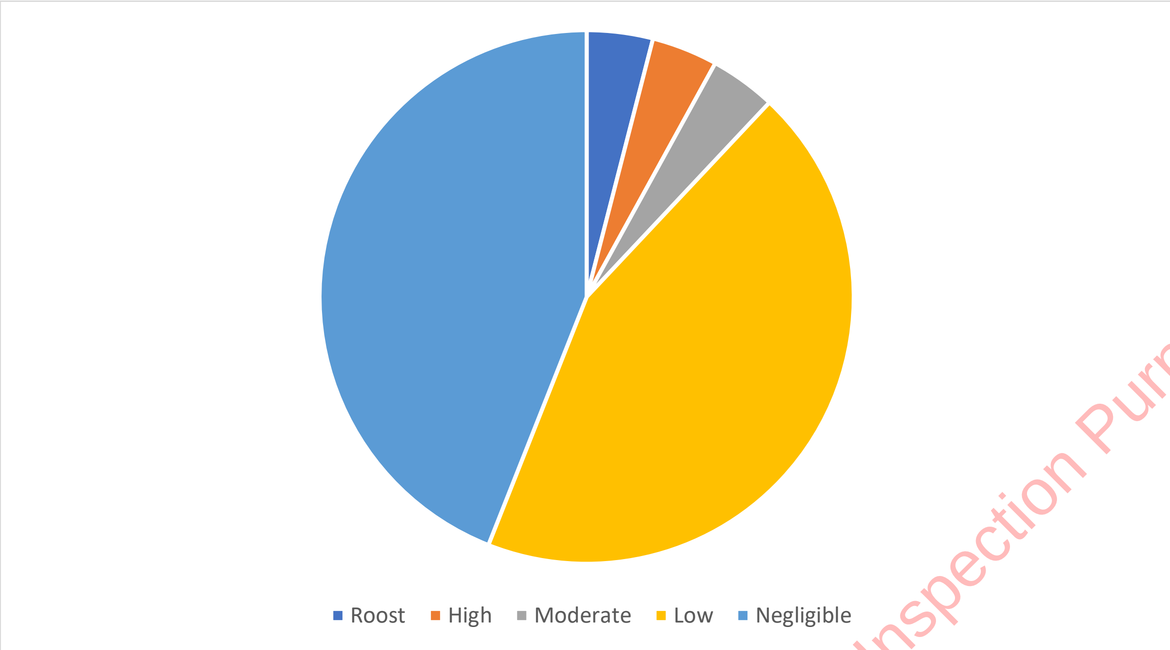


Figure 7 Pie Chart of Bat Roost Potential (n = 25 to include Tree Group G843 as 1 entity)

3.3 Landscape Evaluation

The landscape is considered of local importance (Higher value) for bats a 'High' score for landscape suitability for bats. The treelines and hedgerows radiating out from the site provide commuting and foraging corridors to other important habitats for bats in the wider landscape and are considered to be of 'Moderate' habitat value (see Table 3).

4. RECOMMENDATIONS

4.1 Lighting for Bats

In order to minimise disturbance to bats utilising the site in general, the lighting and layout of the proposed development should be designed to minimise light-spill onto habitats used by the local bat population foraging or commuting. This can be achieved by ensuring that the design of lighting accords with guidelines presented in the Bat Conservation Trust & Institute of Lighting Engineers '*Bats and Lighting in the UK - Bats and Built Environment Series*', the Bat Conservation Trust '*Artificial Lighting and Wildlife Interim Guidance*' and the Bat Conservation Trust '*Statement on the impact and design of artificial light on bats*'. Therefore, where possible, the lighting scheme should include the following:

- The avoidance of direct lighting of proposed areas of habitat creation / landscape planting, or on trees planted.
- Retained treelines should not incur an increase in the current lux level due to the new development.
- Unnecessary light spill controlled through a combination of directional lighting and hooded / shielded luminaires or strategic planting to provide screening vegetation.
- Lights should be of low intensity. It is better to use several low intensity lights than one strong light spilling light across the entire area.
- Narrow spectrum lighting should be used with a low UV component. Glass also helps reduce the UV component emitted by lights.
- The colour rendering of the selected light fitting should be 3000k making the LED fittings a warmer light, helping to further minimize the impact on the local wildlife
- Where lighting is necessary, it shall be of limited height and targeted downwards to prevent overspill.
- A Bat Ecologist (with lighting expertise) should assess the lighting report for the area contained trees which are identified roosts e.g., the area containing Trees T916 to T924, and T914 and T915 to ensure no lighting disturbance to roosts, or potential bat roost trees. They should advise further lighting mitigation as required.

4.2 Bat Roost Potential Tree Assessment

Tree felling protocol should include the following:

- A dedicated bat survey of Tree T915 is required to assess if there is bat usage. Inspection at height may be required.
- A Bat Derogation licence is required for T914. If this is granted conditions for felling will be stated within. The Tree T914 will also need a dedicated bat

emergence survey to assess level of bat usage for the licence application. Inspection at height may be required.

- Tree-Felling of trees with Low, Moderate and High Bat Roost Potential should be undertaken during September and October. During this period bats are capable of flight and this may avoid risks associated with tree-felling. It is also outside the bird nesting season. Felling in the winter months creates the additional risk that bats may be in hibernation and thus unable to escape from a tree that is being felled. Additionally, disturbance during winter may reduce the likelihood of survival as the bats' body temperature is too low and they may have to consume too much body fat to survive.
- Tree-felling should be undertaken using heavy plant and chainsaw. There is a wide range of machinery available with the weight and stability to safely fell a tree. Normally trees are pushed over, with a need to excavate and sever roots in some cases. In order to ensure the optimum warning for any roosting bats that may still be present, an affected tree should be pushed lightly two to three times, with a pause of approximately 30 seconds between each nudge to allow bats to become active. Any affected trees should then be pushed to the ground slowly and should remain in place for a period of 48 hours to allow bats/other wildlife to escape.
- Trees felled should NEVER be sawn up or mulched immediately in case protected wildlife is present.
- Trees used for future landscaping should comprise of semi-mature native Irish species.
- If bats are found to be using any affected trees as a roost, a derogation licence from the National Parks and Wildlife and Services (NPWS) will be required and any felling postponed until a licence is acquired.

Table 9 below summaries recommendations for affected trees identified.

Table 9 Summary of Recommendations for Affected Trees

No.	Presence of Bat Potential Features as per Table 4	Classification of Trees for Risk of Bat Roost Presence as per Table 5	Recommendation
T881	Negligible	No Risk	Trees should ideally be removed as per Section 40 of the Wildlife Act 1976 - 2021 (as amended)
T879			
T878			
T877			
T876			
T875			
T913			
T912			
T911			
T908			
G843			
T880	Low	Low Risk	Pre-Felling Bat Survey the night before and trees to be soft felling between September and October. Trees to be left lie for 48 hours.
T874			
T872			
T885			
T886			
T887			

No.	Presence of Bat Potential Features as per Table 4	Classification of Trees for Risk of Bat Roost Presence as per Table 5	Recommendation
T864			
T865			
T840			
T838			
T837			
T839	Moderate	Medium Risk	
T915	High	High Risk	A further dedicated survey to assess if there is bat usage is recommended. Inspection at height may be required.
T914	Bat Roost	Derogation Licence from NPWS Required for felling	Needs a dedicated survey to assess level of bat usage for the licence application. Inspection at height may be required.

4.3 Bat Roosting Opportunities

The design of the Proposed Development should incorporate integrated 10 x bat boxes spread across the site over 4m high (if possible) onto retained mature trees. The trees in which they are placed should not be illuminated. See Appendix C for examples.

5. CONCLUSION

The site was surveyed twice, during September 2021 and July 2022. Three species of bats were detected with a moderate amount of activity, especially in the area contained the mature Beech trees to the west of the site, shown on Figures 5 and 6. In this area there were several trees with High Bat Roost potential and T922 was noted to have bats emerge in September 2021 (Tree T922) and T914 was noted to have bats (approx. 10 recordings) emerge in July 2022. A derogation licence will be required from the NPWS to fell Tree T914. Tree T922 will be retained.

Positive impacts for bats will be via the supplementary planting of native Irish species and the erection of bat boxes around the site. It was noted that certain areas of the site had higher levels of bat activity and this is possibly attributed to a selection of over mature, standing dead and veteran specimen trees being present which have high bat potential due to features such as hollow cavities and thick ivy growth. For affected trees with 'Low' and 'Moderate' Bat Roost Potential, it is recommended they have a bat survey performed the night before to ensure no bats are using these trees. For the tree with High Bat Roost Potential T915 (beside T914) a further dedicated survey to assess if there is bat usage is recommended. Inspection at height may be required. Finally, in order to preserve the roost potential of the treelines/hedgerows to be retained on site and to minimise disturbance to bats utilising the site in general, the lighting and layout of the proposed works will be designed to minimise light-spill onto habitats both within and adjacent to it that are used by the local bat population foraging or commuting. In that regard the guidelines[24] for lighting and bats will be taken into account for the lighting layout.

[24] Bat Conservation Trust (2018) Bats and artificial lighting in the UK Bats and the Built Environment series

APPENDICES

APPENDIX A

Plate 1 Tree T881 (Negligible Bat Roost Potential (BRP) **Plate 2** Tree T879 (Negligible BRP)

Plate 3 Tree T880 (Low BRP)

Plate 4 Tree T878 (Negligible BRP)

Plate 5 Tree T877 (Negligible BRP)

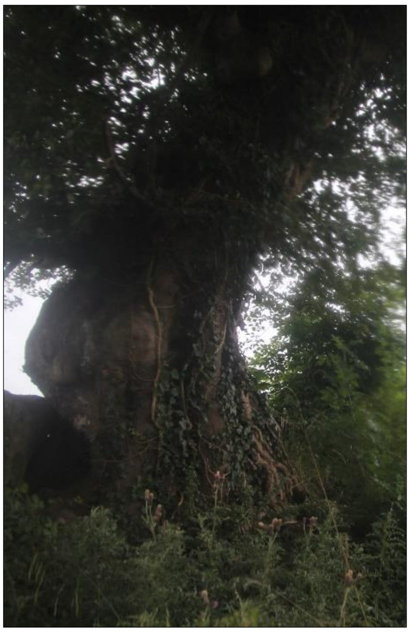
Plate 6 Tree T876 (Negligible BRP)

Plate 7 Tree T875 (Negligible BRP)

Plate 8 Tree T874 (Low BRP)

Plate 9 Tree T872 (Low BRP)

Plate 10 Tree T915 (High BRP)



Plates 11 Tree T914 (Bat Tree Roost, Licence Required for Felling)

Plate 12 Tree T913 (Negligible BRP)

Plate 13 Tree T912 (Negligible BRP)

Plate 14 Tree T911 (Negligible BRP)

Plate 15 Tree T908 (Negligible BRP)

Plate 16 Tree T885 (Low BRP)

Plate 17 Tree T886 and T887 (Low BRP)

Plate 18 Tree T865 and T864 (Low BRP)

Plate 19 Tree T840 (Low BRP)

Plate 20 Tree T839 (Moderate BRP)

Plate 21 Tree T838 and T837 (Low BRP)

Plate 22 Group G843 (Negligible BRP)

Trees with High BRP or Tree Roosts (Retained), Trees T916-T924

Plate 23 Trees with High BRP (to be retained)

Plate 24 Trees with High BRP (to be retained)

Plate 25 Tree T922 Bat Tree Roost (to be retained)

General Site Photos (July 2022)

Plates 26 General Site Photos.

APPENDIX B

29/09/2021	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temperat ure [°C]	Latitude [WGS84]	Longitude [WGS84]
19:23:10	Common Pipistrelle	4	47.4	54.2	47	6	100	14	53.43664	-7.91005
19:25:34	Soprano Pipisrelle	1	54.7	56.3	53.8	3.3	246	14	53.43664	-7.91004
19:26:12	Leisler's Bat	1	28.2	28.4	26.2	6.2	179	14	53.4362	-7.90601
19:35:29	Leisler's Bat	2	27.2	28.4	26.2	6.2	179	14	53.43492	-7.90938
19:35:59	Common Pipistrelle	1	43.6	44.5	43.6	7.2	0	14	53.43496	-7.90965
19:37:53	Leisler's Bat	1	28.2	28.4	26.2	6.2	179	14	53.43542	-7.91019
19:38:21	Common Pipistrelle	1	43.9	44.8	43.5	5	399	14	53.43559	-7.91029
19:39:27	Common Pipistrelle	2	45.8	62.2	45.2	5	95	14	53.4358	-7.9105
19:41:52	Leisler's Bat	2	27.2	28.4	26.2	6.2	179	14	53.43595	-7.91057
19:43:58	Soprano Pipisrelle	1	53.4	56.4	53.1	3.3	0	14	53.43642	-7.91077
19:44:37	Soprano Pipisrelle	4	54.1	58.3	53.9	3.5	353	14	53.43642	-7.91069
19:50:30	Common Pipistrelle	1	46.2	50.1	45.1	7.8	214	14	53.43646	-7.91025
19:51:19	Common Pipistrelle	2	46.6	49.2	45.8	2.8	738	14	53.43655	-7.90996
19:53:55	Leisler's Bat	1	27.5	28.7	25.3	5.9	0	14	53.43671	-7.9103
19:55:35	Common Pipistrelle	1	47.8	52.5	47.4	3	90	14	53.43669	-7.91018
19:56:21	Common Pipistrelle	17	46.1	60	45.9	5	93	14	53.43684	-7.91125
19:58:47	Sorpano Pipistrelle	1	52.8	55.5	52.8	3.3	0	14	53.4369	-7.9113
20:05:26	Sorpano Pipistrelle	13	53.7	67.5	53.5	5	80	13	53.43719	-7.91141
20:07:47	Common Pipistrelle	22	44.8	62	44.5	4	90	13	53.4372	-7.91141

29/09/2021	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temperature [°C]	Latitude [WGS84]	Longitude [WGS84]
20:11:47	Common Pipistrelle	17	46.7	65.1	46.5	5	90	13	53.43734	-7.91189
20:22:25	Common Pipistrelle	3	45.6	50.4	45.1	8.7	135	13	53.43725	-7.91208
20:23:42	Common Pipistrelle	11	46.7	58.4	46.3	4	90	13	53.43724	-7.91222
20:29:50	Common Pipistrelle	19	46.8	64.8	46.5	5	90	13	53.43724	-7.91205
20:34:58	Sorpano Pipistrelle	28	52.3	69.1	52.1	5	84	13	53.43822	-7.91264
20:36:23	Sorpano Pipistrelle	1	54.3	58	54	3.9	0	13	53.43823	-7.91266
20:45:04	Common Pipistrelle	11	46.4	55.4	45.8	5	145	13	53.43834	-7.91233
20:48:19	Sorpano Pipistrelle	18	51.1	66	50.8	5	85	13	53.43841	-7.91231
20:50:55	Common Pipistrelle	19	44	58.5	43.6	6	95	13	53.43728	-7.91214
20:56:34	Sorpano Pipistrelle	47	52.1	65.1	51.6	6	80	13	53.43827	-7.91263
21:08:42	Sorpano Pipistrelle	18	54.6	64.2	54.3	6	80	12	53.43847	-7.91217
21:10:38	Sorpano Pipistrelle	34	50.2	65.4	49.8	7	85	12	53.43696	-7.90557
21:13:12	Sorpano Pipistrelle	44	54.9	69	54.6	5	80	12	53.43695	-7.9056

28/07/2022	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temperature [°C]	Latitude [WGS84]	Longitude [WGS84]
21:22:21	Common Pipistrelle	7	43	52.7	38.7	2	90	15	53.43625	-7.9096
21:23:07	Soprano Pipistrelle	11	53.1	53.8	52.3	7	90	15	53.43627	-7.9096
21:30:30	Common Pipistrelle	4	48.7	50.5	48	5.9	365	15	53.43646	-7.9104
21:31:25	Common Pipistrelle	13	45.3	53.2	44.7	3	144	15	53.43644	-7.9104
21:32:47	Leisler's Bat	2	29.1	30.8	27.9	4.9	164	15	53.43922	-7.911
21:33:02	Common Pipistrelle	7	46.5	60	42	2	132	15	53.43544	-7.9084
21:35:25	Common Pipistrelle	9	43.6	43.9	42.9	8	262	15	53.43629	-7.9096
21:36:50	Common Pipistrelle	8	46.5	50.6	45.8	5	257	15	53.43606	-7.9107
21:37:08	Soprano Pipistrelle	32	56.4	67.3	55.8	4	84	15	53.43604	-7.9106
21:44:34	Common Pipistrelle	5	46.8	47.9	46.2	7	131	15	53.43623	-7.9096
21:47:53	Soprano Pipistrelle	14	57.3	70.8	56.5	3	80	15	53.43596	-7.9106
21:50:32	Soprano Pipistrelle	25	56.5	67	56	3	80	15	53.43494	-7.9099
21:51:07	Soprano Pipistrelle	2	48.6	55.8	48	6.9	84	15	53.43613	-7.9107
21:52:43	Common Pipistrelle	3	45.9	47.7	45.1	7	800	15	53.43622	-7.9096
21:53:32	Common Pipistrelle	9	46.4	51.3	45.6	6	395	15	53.43627	-7.9096

28/07/2022	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temperature [°C]	Latitude [WGS84]	Longitude [WGS84]
21:54:26	Soprano Pipistrelle	16	55	67.9	53.6	4	90	15	53.43624	-7.9096
21:56:14	Leisler's Bat	2	24.4	24.7	23.3	15.4	473	15	53.43446	-7.9099
21:56:21	Common Pipistrelle	12	45.3	53.2	44.7	3	148	15	53.43637	-7.9109
21:59:04	Common Pipistrelle	5	46.8	47.9	46.2	7	131	15	53.43636	-7.9108
21:59:59	Common Pipistrelle	9	43.6	43.9	42.9	8	262	15	53.43638	-7.9106
22:02:11	Common Pipistrelle	3	45.9	47.7	45.1	7	800	15	53.43484	-7.9094
22:02:47	Soprano Pipistrelle	18	55.1	55.6	54.3	6	270	15	53.43661	-7.9099
22:03:02	Leisler's Bat	2	29.1	30.8	27.9	4.9	164	15	53.43491	-7.9098
22:23:31	Soprano Pipistrelle	1	58.3	59.5	56.4	12.5	0	15	53.43637	-7.9108
22:25:19	Soprano Pipistrelle	1	58.6	58.9	56.4	9.2	0	15	53.43637	-7.9108
22:25:36	Soprano Pipistrelle	26	58.7	71	57.8	4	80	15	53.43637	-7.9109
22:27:00	Soprano Pipistrelle	20	55.5	59.7	54.7	6	100	15	53.43636	-7.9108
22:29:41	Common Pipistrelle	7	41.8	56.9	37.8	2	199	15	53.43635	-7.9107
22:30:31	Common Pipistrelle	44	42.8	44.3	42.2	7	104	15	53.43642	-7.9104
22:31:01	Common Pipistrelle	34	47.1	55.9	46.1	3	85	15	53.43645	-7.9104
22:32:32	Common Pipistrelle	2	43.5	44.8	43	7.2	363	15	53.43657	-7.9099
22:34:32	Soprano Pipistrelle	23	54.7	62.2	54.1	5	95	15	53.43624	-7.9096
22:36:59	Leisler's Bat	1	24.4	26.5	22.6	3.3	160	15	53.4381	-7.9109

28/07/2022	Species Text	Calls [#]	Mean Peak Frequency [kHz]	Mean Max Frequency [kHz]	Mean Min Frequency [kHz]	Mean Call Length [ms]	Mean Call Distance [ms]	Temperature [°C]	Latitude [WGS84]	Longitude [WGS84]
22:37:34	Soprano Pipistrelle	1	54.9	55.2	54.6	13.1	80	15	53.43626	-7.9096
22:38:15	Soprano Pipistrelle	24	55.1	65.7	54.2	6	83	15	53.43626	-7.9096
22:40:24	Soprano Pipistrelle	30	54.4	64.8	53.3	5	80	15	53.43627	-7.9097
22:42:22	Soprano Pipistrelle	10	55.5	68.9	54.8	5	80	15	53.43713	-7.9103
22:43:55	Soprano Pipistrelle	23	55.5	66.8	54.9	3	80	15	53.43644	-7.9105
22:55:59	Soprano Pipistrelle	14	57.2	77.6	56.2	3	125	15	53.43639	-7.9106
23:00:11	Soprano Pipistrelle	18	57.1	66.7	56.5	3	80	15	53.43614	-7.9107
23:06:20	Soprano Pipistrelle	1	54.3	56.1	51.2	13.1	84	15	53.43621	-7.9107
23:10:03	Soprano Pipistrelle	3	54.9	55.5	54.6	5.2	197	15	53.43858	-7.912
23:13:15	Soprano Pipistrelle	14	58.1	71.3	56.7	4	85	15	53.43913	-7.911
23:14:31	Common Pipistrelle	8	49.6	72.1	42.4	3	107	15	53.43642	-7.9104
23:15:36	Common Pipistrelle	13	45.3	53.2	44.7	3	144	15	53.43638	-7.9109
23:16:39	Leisler's Bat	1	23.5	24.1	23.2	11.1	200	15	53.43718	-7.9055
23:30:10	Leisler's Bat	2	23.8	23.9	23.2	10.2	36	15	53.43721	-7.9055

APPENDIX C

Woodcrete 1FF Bat Box x 10 - To placed be on retained trees in a unlit area over 4m high

Optional - Example of a 4m Pole Mounted Double Large Colony Bat Box, could be placed in an area of open space in a dark area with limited potential for disturbance.

Optional - Integrated Bat brick could be incorporated into the building design

All currently available on www.nhbs.com (August 2022)

APPENDIX 6.5 – MAPS

Legend:

- Proposed Phase 3 Redline
- Overall Assessment Area

Project:

Proposed Residential Development, Phase 3, Cornamaddy, Athlone, Co.Westmeath

Client:

Marina Quarter Limited

Title:

Bing Aerial Map

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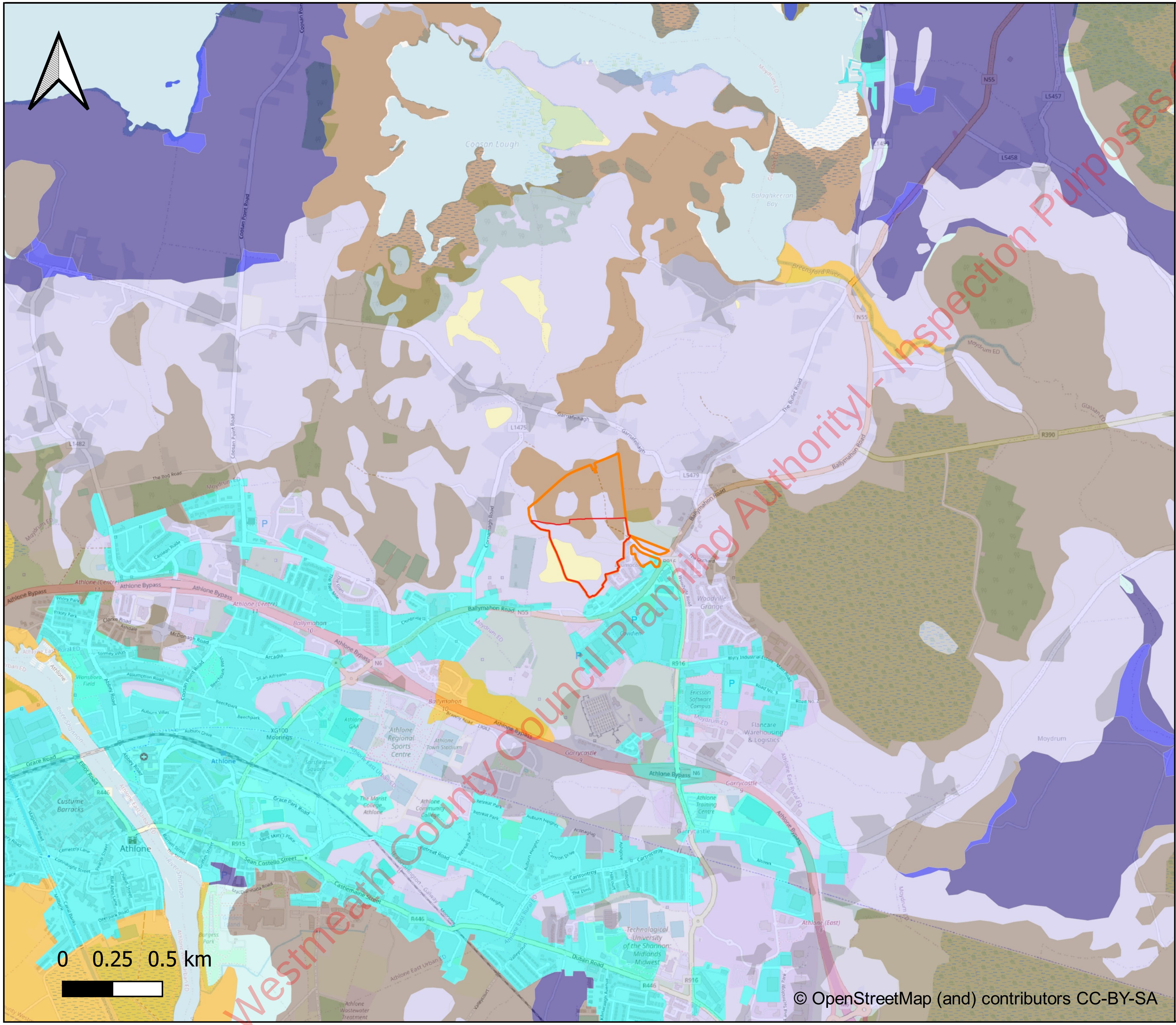
Drawn By: SM	Projection: IRENET95 / Irish Transverse Mercator
Checked: CC	Scale @ A4: 1:4000
Date: 23/11/2022	

Notes:

Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries



Legend:

- Proposed Phase 3 Redline
- Overall Assessment Area

TEAGASC Soils

- BminDW - Deep well drained mineral (Mainly basic)
- BminPD - Mineral poorly drained (Mainly basic)
- BminPDPT - Peaty poorly drained mineral (Mainly basic)
- BminSW - Shallow well drained mineral (Mainly basic)
- BminSP - Shallow poorly drained mineral (Mainly basic)
- BminSRPT - Shallow, rocky, peaty/ non-peatymineral complexes (Mainly basic)
- FenPt - Fen peat
- Cut - Cutover/cutaway peat
- AlluvMIN - Alluvial (mineral)
- Lac - Lacustrine type soils
- Made - Made ground
- Water - Water

OSM Standard

Proposed Residential Development, Phase 3, Cornamaddy, Athlone, Co.Westmeath

Client:

Marina Quarter Limited

Title:

Teagasc Soils

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Checked: GC	**Scale @ A4:** 1:25000
Date: 23/11/2022	

Notes:

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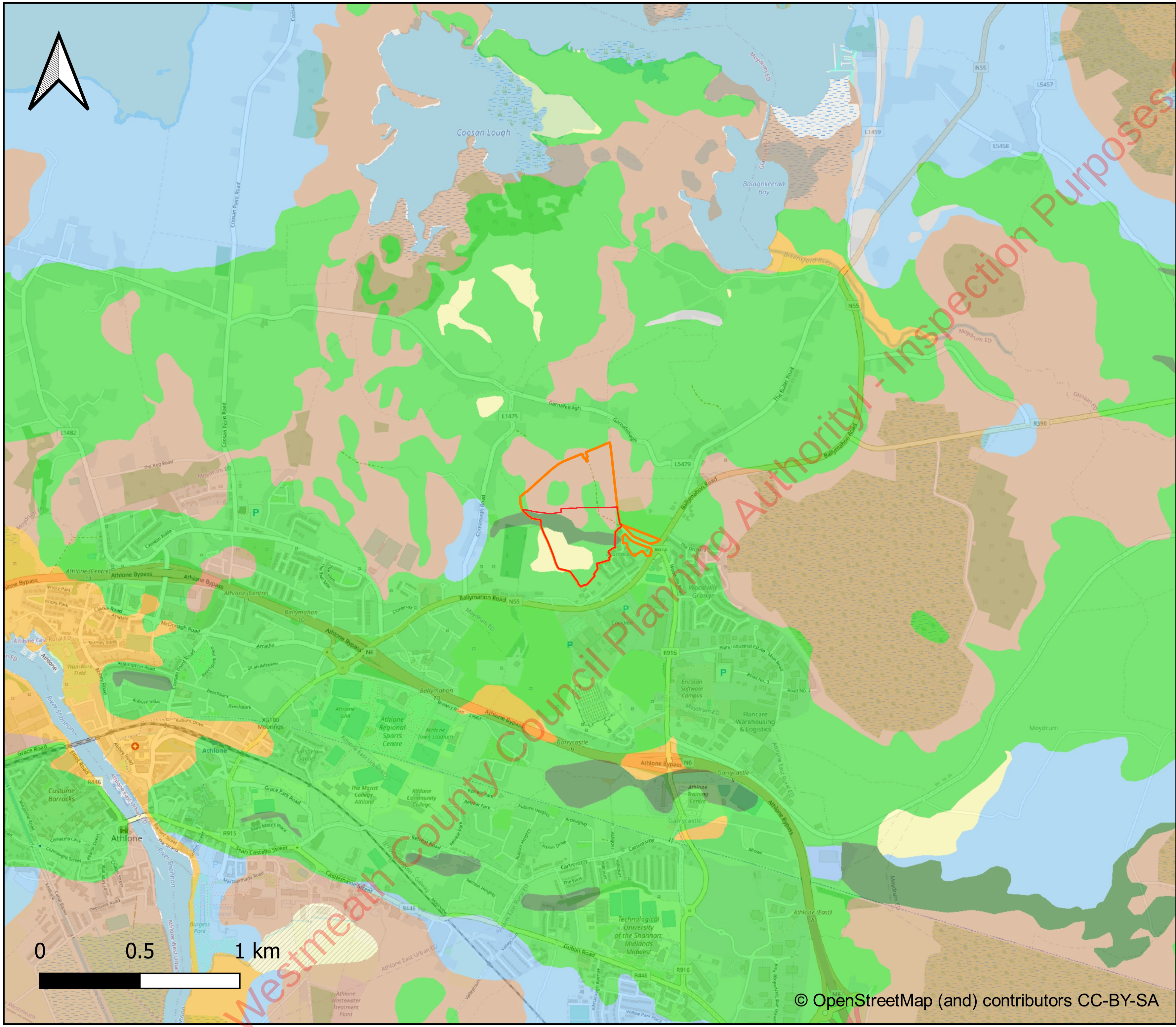

Legend:

- Proposed Phase 3 Redline
- Overall Assessment Area
- A, Alluvium
- BasEsk, Eskers comprised of gravels and basic reaction
- Cut, Cut over Raised Peat
- FenPt, Fen Peat
- GLs, Gravels derived from Limestone
- L, Lacustrine sediments
- TLS, Till derived from Limestone

Project:

Proposed Residential Development, Phase 3, Cornamaddy, Athlone, Co.Westmeath

Client:

Marina Quarter Limited

Title:

Quaternary Geology

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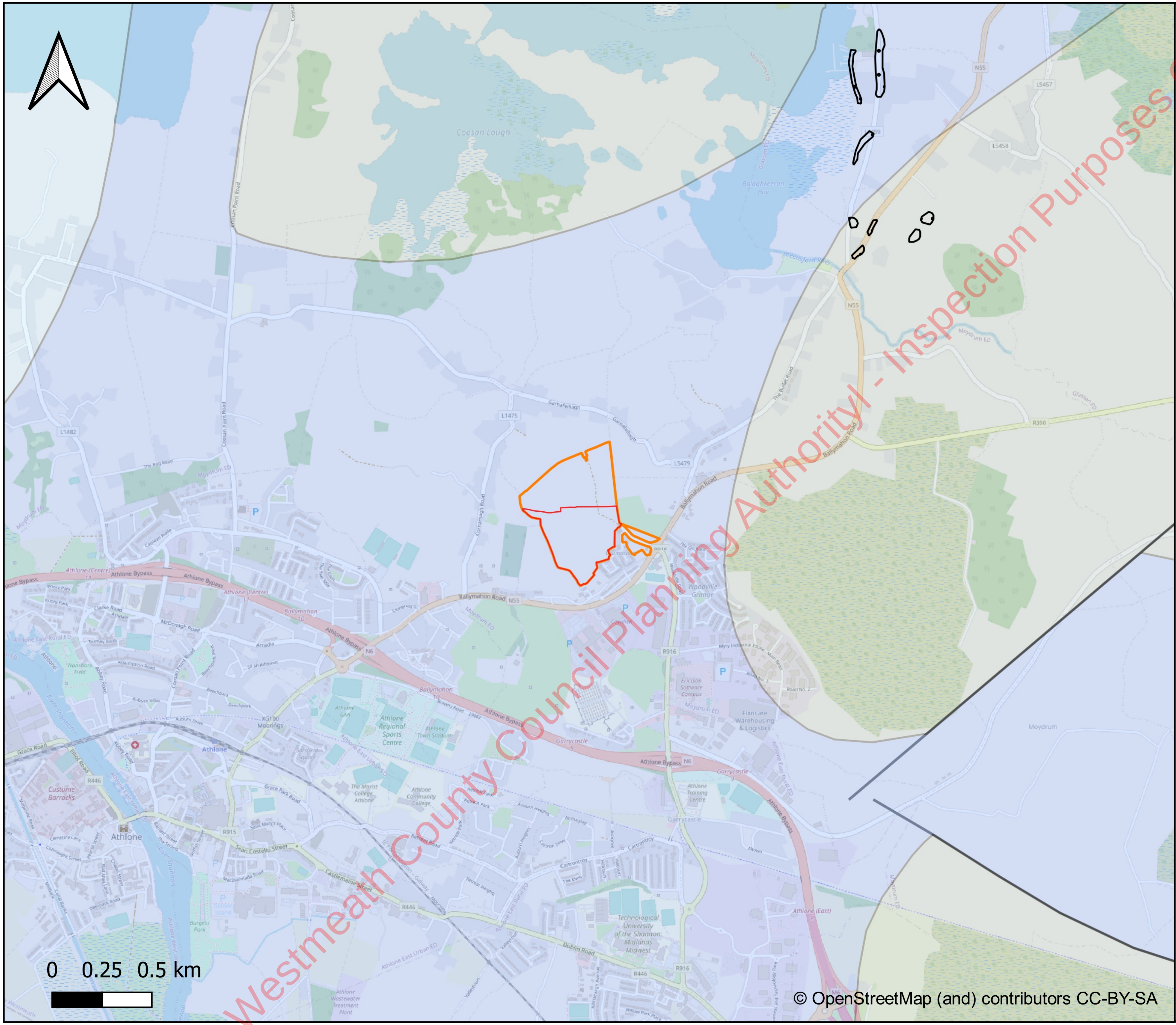
Checked: CC	Scale @ A4: 1:25000
Date: 23/11/2022	

Notes:

Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries



Legend:

- Proposed Phase 3 Redline
- Overall Assessment Area

Bedrock Geology

- Bedrock Outcrops

Bedrock Units

- Lucan Formation
- Visean Limestones (undifferentiated)
- Waulsortian Limestones

Bedrock Linework

- Fault

Project:

Proposed Residential Development, Phase 3, Cornamaddy, Athlone, Co.Westmeath

Client:

Marina Quarter Limited

Title:

Bedrock Geology

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Checked: GC	Scale @ A4: 1:25000
Date: 23/11/2022	

Notes:

Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries

Legend:

- Proposed Phase 3 Redline
- Overall Assessment Area
- Geoheritage Audited Sites

Project:

Proposed Residential Development, Phase 3, Cornamaddy, Athlone, Co.Westmeath

Client:

Marina Quarter Limited

Title:

Geohertiage Sites

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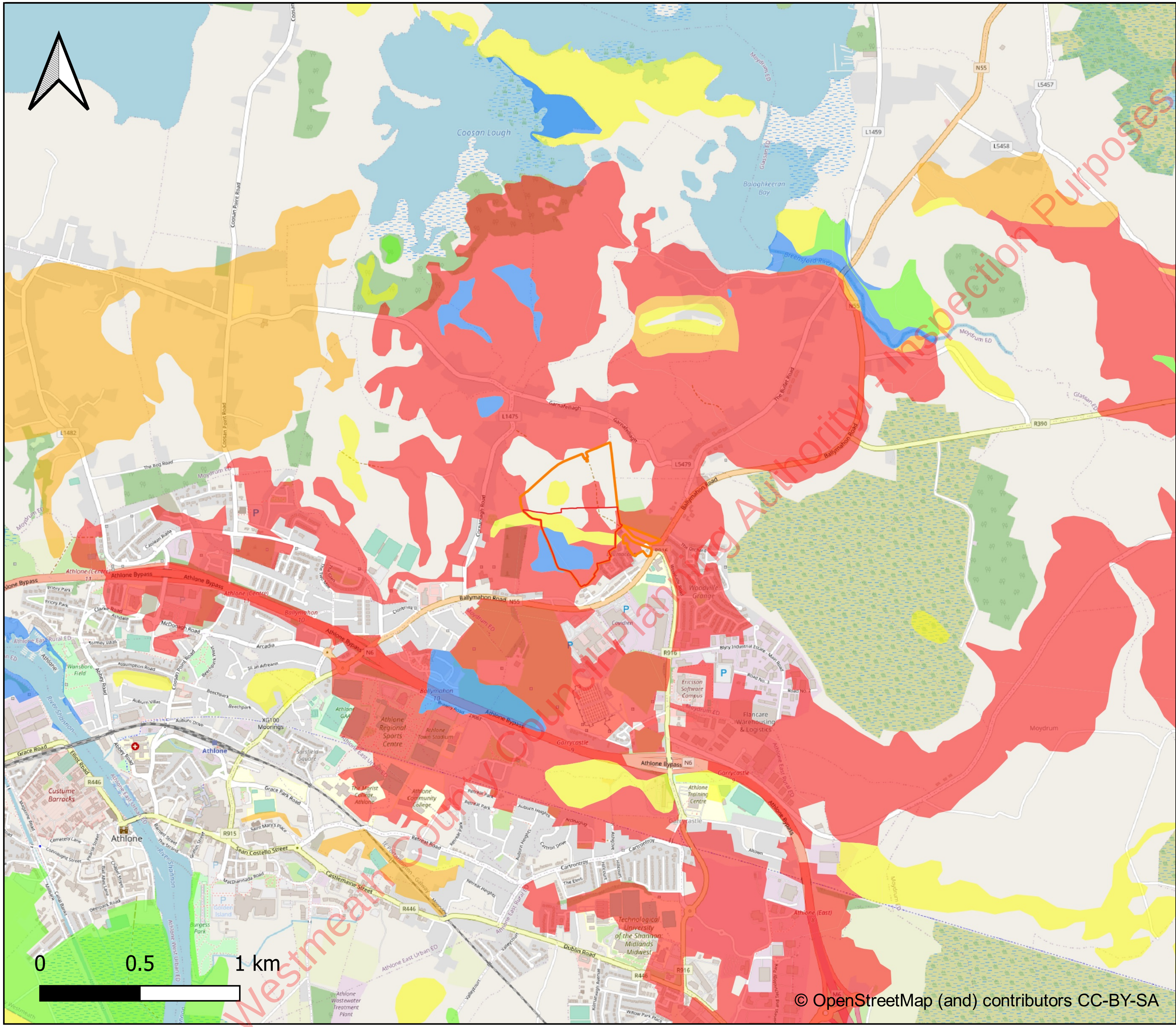
Drawn By: SM	Projection: IRENET95 / Irish Transverse Mercator
Checked: CC	Scale @ A4: 1:25000
Date: 23/11/2022	

Notes:

Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries



Legend:

Proposed Phase 3 Redline

Overall Assessment Area

Granular Aggregate Final Scores

- Very High potential
- High potential
- Moderate potential
- Low potential
- Very Low potential

Project:

Proposed Residential Development, Phase 3, Cornamaddy, Athlone, Co.Westmeath

Client:

Marina Quarter Limited

Title:

Granular Aggregate Potential

Enviroguide CONSULTING
a 3D Core C, Block 71, The Plaza Park West, Dublin 12 D12F9TN
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Drawn By: SM	Projection: IRENET95 / Irish Transverse Mercator
Checked: CC	Scale @ A4: 1:25000
Date: 23/11/2022	

Notes:

Site boundaries shown are for illustration purposes only and do not represent legal or exact boundaries

APPENDIX 9.1 – TRAFFIC IMPACT ASSESSMENT

21129-04-001

PROPOSED RESIDENTIAL DEVELOPMENT AT ATHLONE, Co. WESTMEATH

Traffic Impact Assessment

for

Marina Quarter Limited

December 2022

ROADPLAN CONSULTING

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Kilkenny.
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1 INTRODUCTION

1 Introduction

1.1 INTRODUCTION

Roadplan Consulting were commissioned by Brock McClure Planning and Development Consultants on behalf of Marina Quarter Limited to prepare a Traffic Impact Assessment for a proposed residential development at Cornamaddy, Athlone, Co. Westmeath.

In preparing this report, Roadplan Consulting has made reference to:

- The Westmeath County Development Plan 2021 - 2027.
- The Institute of Highways and Transportation Guidelines on the Preparation of Traffic Impact Assessments.
- The TII Transport Assessment Guidelines.
- The TII National Traffic Model.

1.2 OBJECTIVES

The objective of this report is to examine the traffic implications of the proposed residential development in terms of how it can integrate with existing traffic in the area. The report will determine and quantify the extent of additional trips generated by the development, and the impact of such trips on the operational performance of the local road network and junctions, in particular the existing N55 / R916 / L8048 roundabout.

1.3 STUDY METHODOLOGY

The methodology adopted for this report is summarised as follows:

- A traffic count was undertaken by IDASO on Thursday 30th of September 2021 during a 12-hour period (07:00 to 19:00). Count information was obtained at the existing N55 / R916 / L8048 roundabout.
- Existing Traffic Assessment – A spreadsheet model was created which contains the base year DO-NOTHING traffic count data described above. The traffic count data was used to develop an ARCADY model of the existing N55 / R916 / L8048 roundabout.
- Future Year Assessment – The estimated future year traffic volumes on the study area road network, as a result of the increase in background traffic and the additional development related traffic was used to assess the future operational performance of the junctions both at the year of opening of the development, 5 and 15 years after opening.
- Parking Requirements – Car parking provision for the proposed development was assessed against the parking standards as set out in the Westmeath County Development Plan.

1.4 STRUCTURE OF REPORT

Following this introduction, the report is set out as follows:

- Chapter 2 provides details of the proposed development;
- Chapter 3 provides an overview of the existing traffic conditions and the local road network, identifying any existing issues related to traffic flow or road infrastructure;
- Chapters 4 and 5 outline the analysis as described in the Study Methodology above. The analysis examines trip generation, distribution and resulting junction operational performance with the development in place;
- Chapter 6 establishes the parking requirements for the development using the county development plan; and
- Chapter 7 presents the conclusions of the report.

2 PROPOSED DEVELOPMENT

2 Proposed Development

2.1 SITE LOCATION

The proposed residential development is located at Cornamaddy, Athlone, Co. Westmeath. The proposed development is bounded by un-developed lands to the north, south, east and west as shown on Figure 2.1 'Site Location Map'.

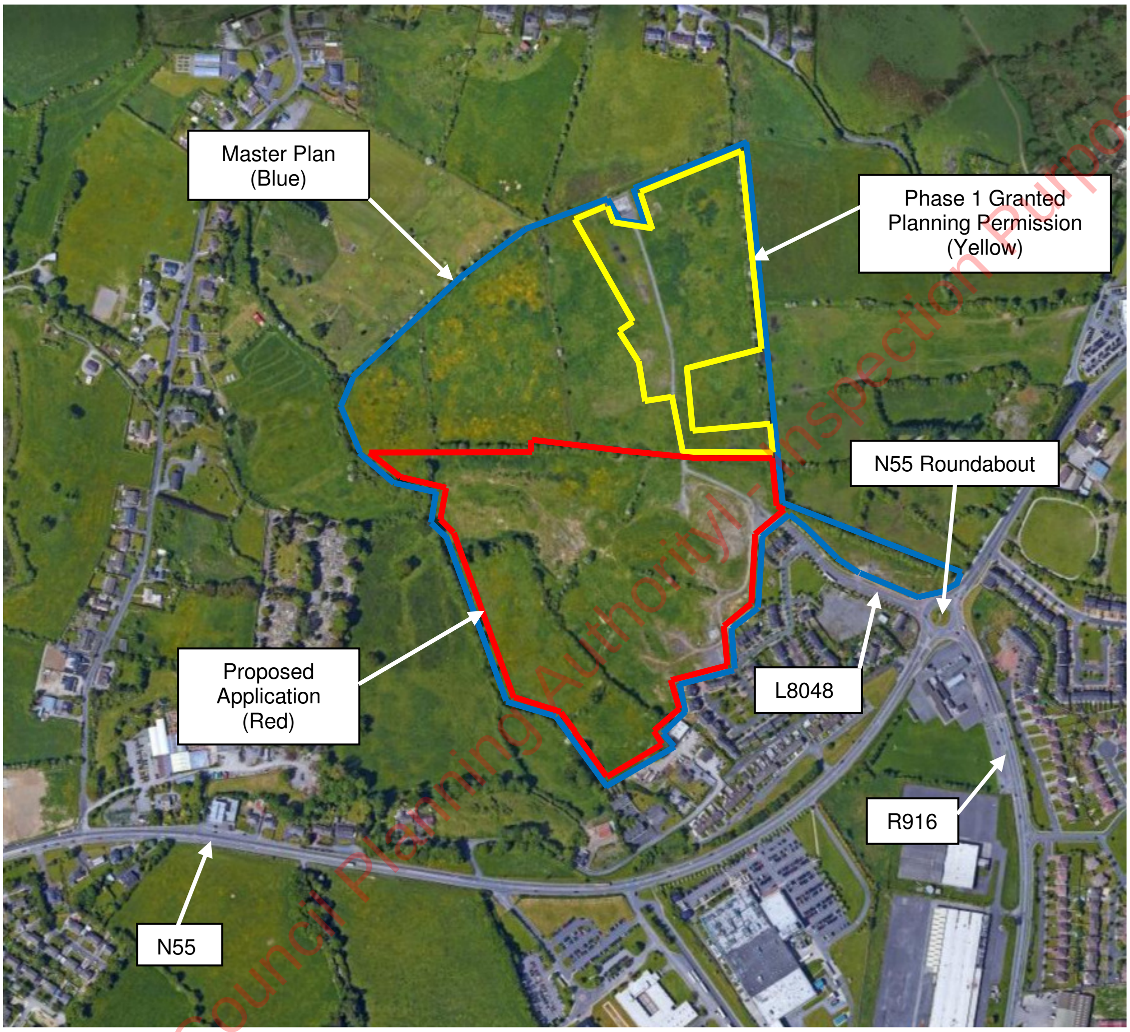


Figure 2.1: Site Location Map

2.2 DESCRIPTION OF PROPOSED DEVELOPMENT

The proposed development consists of 70 residential housing units as shown in table 2.1 *Development Schedule*.

Item	Unit	Quantity
Houses	No.	70

Access to the proposed residential development will be via the existing roundabout onto the N55 national road. A layout of the proposed development and its access point are shown on the Architect's drawing which is contained in Appendix A – Drawings.

3 EXISTING AND PROPOSED TRAFFIC CONDITIONS

3 Existing and Proposed Traffic Conditions

3.1 EXISTING TRAFFIC FLOWS

A traffic count was undertaken during a 12-hour period (07:00 to 19:00) on Thursday 30th of September 2021. The count data is provided in Appendix B – Traffic Counts. Count information was obtained at the following junction:

- N55 / R916 / L8048 roundabout

The traffic flows during the AM and PM peak hours were abstracted from the surveyed data and are shown in the following tables:

N55 / R916 / L8048 Roundabout

AM Peak Existing (08:00 – 09:00)

From / To	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	274	474	1	**749**
R916	197	8	179	10	**394**
N55 (south)	284	113	2	7	**406**
L8048	7	14	24	0	**45**
Totals	**488**	**409**	**679**	**18**	**1594**

PM Peak Existing (17:00 – 18:00)

From / To	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	1	202	296	1	**500**
R916	364	5	115	14	**498**
N55 (south)	511	136	0	9	**656**
L8048	1	6	3	0	**10**
Totals	**877**	**349**	**414**	**24**	**1664**

A summary of the count data for the peak hour flows is contained in Appendix C – Traffic Flow Sheets.

3.2 EXISTING ROAD NETWORK

The N55 travels in a south / north direction and provides a link between Athlone and Cavan town. The N55 / R916 / L8048 roundabout has the following characteristics at the location of the access to the residential development:

- It's a 4-arm roundabout with an ICD of 48m.
- It's a 2-lane circulating carriageway with a carriageway width of approximately 10m.
- Street lighting is provided at the roundabout and on all approaches to the roundabout.
- The speed limit on the N55 is 50km/h.

The L8048 will provide access to the proposed development. The L8048 has the following characteristics:

- It's a single carriageway road that is approximately 7.5m wide.
- There are 1.5m wide on-road cycle lane located on either side of the carriageway.
- There is a 2m wide footpath located on either side of the carriageway.
- Street lighting is provided along the L8048.

3.3 ROAD COLLISIONS

Information on road collisions was taken from the Road Safety Authority website and is provided hereunder in Figure 3.1.

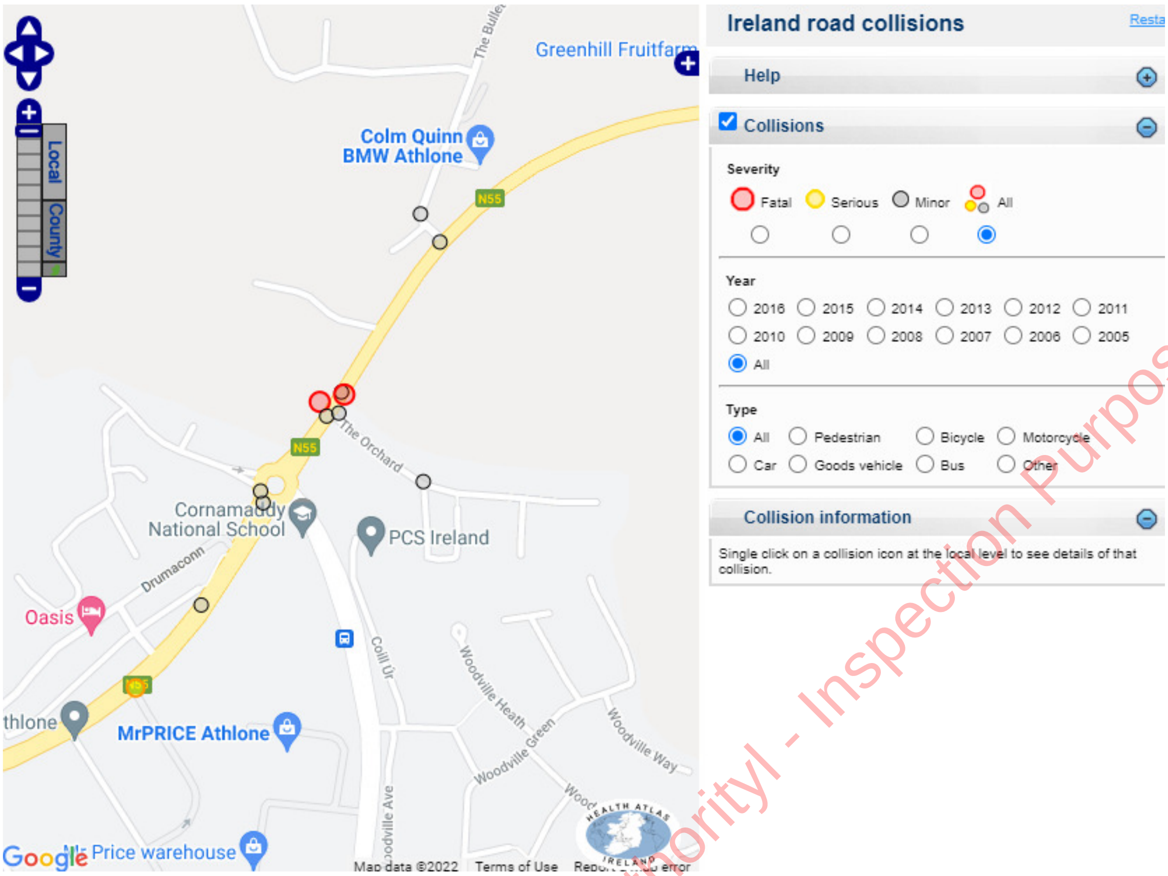


Fig 3.1: Road collisions

There two number collisions recorded at the existing N55 / R916 / L8048 roundabout which provides access to the proposed residential development in the period of twelve years (from 2005 to 2016).

4 TRAFFIC GENERATION & TRIP DISTRIBUTION

4 Traffic Generation and Trip Distribution

4.1 DEVELOPMENT TRIP GENERATION

The TRICS database has been used to predict the trip generation to and from the proposed residential development for the AM and PM peak periods. Full details of the TRICS information used for the assessments are provided in Appendix D - TRICS information.

4.1.1 House Dwellings

The category of “Residential – Houses Privately Owned” has been assessed as the most appropriate development type category for this part of the development and the trip rates for the AM and PM peak periods are shown below:

Trip rates per number of Units

	Trip rate to development	Trip rate from development
AM Peak	0.168	0.433
PM Peak	0.399	0.241

For the proposed 70 dwellings, this would give the following trips to and from the proposed development:

Trip Generation – 70 Residential Dwellings

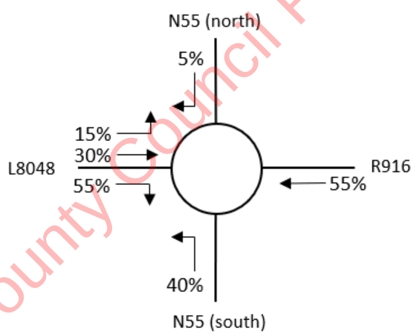
	Trip rate to development	Trip rate from development
AM Peak	12	30
PM Peak	28	17

4.2 TRIP DISTRIBUTION

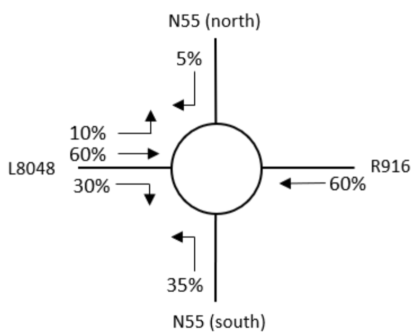
The access to the proposed development will be via the existing N55 / R916 / L8048 roundabout.

The following diagrams show the existing and proposed traffic distribution percentage for the AM and PM peak at the existing N55 / R916 / L8048 roundabout.

AM Peak - Development Trip Distribution (Percentage)

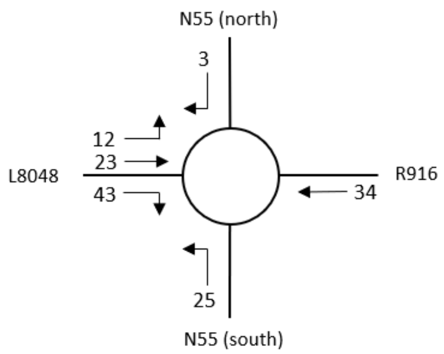


PM Peak - Development Trip Distribution (Percentage)

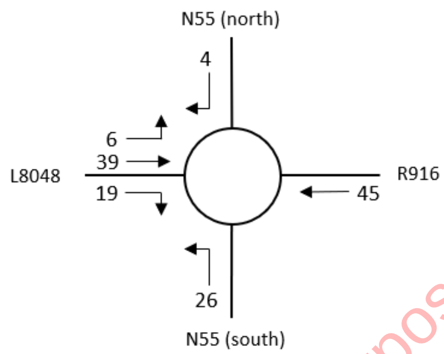


Using the proposed directional splits shown above and the trips generated by the proposed development outlined in 4.1, the following diagrams show the turning movements of predicted development traffic at the existing N55 / R916 / L8048 roundabout during the AM and PM peak hours:

AM Peak - Development Flows



PM Peak - Development Flows



4.3 COMMITTED DEVELOPMENTS

A planning application for 75 dwellings has recently been granted planning permission (planning ref: 22/253) by Westmeath County Council. Therefore, a capacity assessment has been undertaken to determine the impact that the committed development will have on the existing existing N55 / R916 / L8048 roundabout, when the proposed development and the committed development is fully operational.

The predicted trips to and from the committed development have been extracted from the granted planning application and the proposed trips generated by the development are shown below:

Trip Generation – 75 Residential Dwellings

	Trip rate to development	Trip rate from development
AM Peak	13	33
PM Peak	30	18

The above committed development flows have been added to the year of opening, five year and fifteen-year capacity assessments using the percentage distribution splits outlined in 4.2 above. Full details of the predicted traffic flows are provided in Appendix C – Traffic Flow Sheets.

4.4 FUTURE DEVELOPMENTS

There are lands adjacent to the proposed development which form part of the overall masterplan for the proposed development. Access to the future residential development would be via the existing N55 / R916 / L8048 roundabout. For this reason, a capacity assessment has been undertaken to determine the impact that the future developments will have on the existing N55 / R916 / L8048 roundabout, when the development is fully operational.

TRICS database has been used to predict trip generation to and from the proposed development for the AM and PM peak periods. The future residential lands will cater for an additional 280 residential dwellings and a creche.

Residential - Houses Privately Owned has been used as most appropriate category for the future residential developments, and the trip rates for the AM and PM peak periods are shown below:

Trip rates per number of Units

	Trip rate to development	Trip rate from development
AM Peak	0.168	0.433
PM Peak	0.399	0.241

For the proposed 280 dwellings, this would give the following trips to and from the proposed development:

Trip Generation – 280 Residential Dwellings

	Trip rate to development	Trip rate from development
AM Peak	47	121
PM Peak	112	67

4.4.1 Creche

The category of "Education – Creche" has been assessed as the most appropriate development type category for this part of the development and the trip rates for the AM and PM peak periods are shown below:

Trip rates per Sqm

	Trip rate to development	Trip rate from development
AM Peak	6.629	5.181
PM Peak	5.211	5.861

For the proposed creche of 680sqm, this would give the following trips to and from the proposed development:

Trip Generation – 680sqm

	Trip rate to development	Trip rate from development
AM Peak	45	35
PM Peak	35	40

4.4.2 Total Development Trip Generation Summary

To summarise, the trips that are predicted to be generated by the proposed development (residential and creche) are shown in the table below:

Trip Generation – Total Development

	Trip rate to development	Trip rate from development	Total
AM peak	92	156	248
PM peak	147	107	254

The above future development flows for the future developments have been added to the 2039 Sensitivity Tests using the percentage distribution splits outlined in 4.2 above. Full details of the predicted traffic flows are provided in Appendix C – Traffic Flow Sheets.

4.4 FUTURE YEAR TRAFFIC GROWTH

The TII issues a range of forecasts: low growth, medium growth and high growth. The implementation of policies relating to Smarter Travel and to public transport will act as a deterrent to high growth in car-based travel. Low growth factors are however likely to be equally unrealistic at present in the Athlone area, so we have used medium growth factors in our assessment.

The zone in which the site is located is numbered 296 in the TII National Traffic Model. The growth factors are as follows:

Zone	2021 Existing	2024 development completion	2029 5 years after dev. completion	2039 15 years after dev. completion
296	1	3.95%	10.89%	15.79%

These percentages have been used to predict the increase in background traffic that will occur in future years. Full summary tables and predicted future traffic flows for 2024, 2029 and 2039 future years are included in Appendix C – Traffic Flow Sheets.

5 OPERATIONAL ASSESSMENTS

5 Operational Assessments

5.1 INTRODUCTION

Traffic generated by the proposed development will have some effect on the local road network surrounding the site. The following junction was assessed:

- the existing N55 / R916 / L8048 roundabout

5.2 N55 / R916 / L8048 ROUNDABOUT

Capacity assessments have been undertaken using the computer program PICADY for the AM and PM peak hours.

The following table summarises the existing situation and the effects that the proposed development will have on this junction in 2024, 2029 and 2039 using the existing and predicted traffic flows shown in Appendix C – Traffic Flow Sheets. Full ARCADY printouts are provided in Appendix E – ARCADY Results.

The parameters shown in the table are defined as follows:

Ratio of Flow to Capacity (RFC) is a factor indicating the flow on a junction arm relative to its capacity. An RFC of 1.0 means the junction has reached its ultimate capacity and an RFC of 0.85 means that the junction has reached its reserve capacity.

Avg. Queue is the average number of vehicles queued over the time period on the junction approach.

Queue delay is the average number of seconds delay to each vehicle in the time period.

N55 / R916 / L8048 Roundabout – Capacity Assessment

Year	Period	Approach	Predicted RFC value	Avg Queue (vehicles)	Queue delay (secs./veh.)
2021 Base Flows	AM Peak	N55 (north)	0.54	1	5
		R916	0.38	1	5
		N55 (south)	0.30	0	3
		L8048	0.05	0	4
	PM Peak	N55 (north)	0.36	1	4
		R916	0.43	1	5
		N55 (south)	0.53	1	6
		L8048	0.01	0	5
2024 No Development	AM Peak	N55 (north)	0.57	1	6
		R916	0.40	1	5
		N55 (south)	0.31	1	4
		L8048	0.05	0	4
	PM Peak	N55 (north)	0.38	1	4
		R916	0.45	1	5
		N55 (south)	0.55	1	6
		L8048	0.02	0	5
2024 With Development + Committed Development	AM Peak	N55 (north)	0.58	1	6
		R916	0.42	1	6
		N55 (south)	0.32	1	4
		L8048	0.12	0	4
	PM Peak	N55 (north)	0.38	1	4
		R916	0.48	1	6
		N55 (south)	0.58	1	7
		L8048	0.07	0	5

Year	Period	Approach	Predicted RFC value	Avg Queue (vehicles)	Queue delay (secs./veh.)
2029 No Development	AM Peak	N55 (north)	0.61	2	6
		R916	0.43	1	6
		N55 (south)	0.34	1	4
		L8048	0.06	0	4
	PM Peak	N55 (north)	0.40	1	4
		R916	0.48	1	6
		N55 (south)	0.60	2	7
		L8048	0.02	0	5
2029 With Development + Committed	AM Peak	N55 (north)	0.62	2	7
		R916	0.46	1	6
		N55 (south)	0.35	1	4
		L8048	0.13	0	4
	PM Peak	N55 (north)	0.41	1	4
		R916	0.52	1	6
		N55 (south)	0.63	2	7
		L8048	0.07	0	6
2039 No Development	AM Peak	N55 (north)	0.63	2	7
		R916	0.46	1	6
		N55 (south)	0.35	1	4
		L8048	0.06	0	4
	PM Peak	N55 (north)	0.42	1	4
		R916	0.51	1	6
		N55 (south)	0.63	2	7
		L8048	0.02	0	6
2039 With Development + Committed Development	AM Peak	N55 (north)	0.65	2	7
		R916	0.48	1	7
		N55 (south)	0.36	1	4
		L8048	0.13	0	4
	PM Peak	N55 (north)	0.43	1	4
		R916	0.54	1	6
		N55 (south)	0.66	2	8
		L8048	0.08	0	6
2039 With Development + Committed Development + Future Development	AM Peak	N55 (north)	0.70	2	9
		R916	0.57	1	8
		N55 (south)	0.40	1	4
		L8048	0.31	0	5
	PM Peak	N55 (north)	0.46	1	5
		R916	0.63	2	8
		N55 (south)	0.75	3	12
		L8048	0.26	0	8

The summary predictions shown in the table above indicate that currently the existing N55 / R916 / L8048 roundabout operates within capacity with small queues and delays during the AM and PM peak period.

In 2024, 2029 and 2039 with no residential development in place and an increase in background flows only the roundabout will operate within capacity with small queues and delays with a maximum RFC value of 0.63 during the AM peak hour in 2039.

In 2024, 2029 and 2039 with the residential development operational and an increase in background flows the roundabout will operate within capacity with small queues and delays with a maximum RFC value of 0.67 during the PM peak hour in 2039.

In 2039 with the residential development operational, the future residential developments operational and an increase in background flows the roundabout will operate within capacity with small queues and delays with a maximum RFC value of 0.75 during the AM peak hour in 2039.

5.3 OPERATIONAL ASSESSMENT CONCLUSIONS

Junction analyses to assess the effects of traffic generated by the proposed development have been undertaken for the existing N55 / R916 / L8048 roundabout. The analysis shows that:

- The existing N55 / R916 / L8048 roundabout currently operates within capacity with small queues and delays during the AM and PM peak hours.

- The existing N55 / R916 / L8048 roundabout will continue to operate within capacity with small queues and delays when the proposed residential development and the committed development is completed in 2024, year of opening, 2029, five years after opening and in 2039, fifteen years after opening.

- The existing N55 / R916 / L8048 roundabout will continue to operate within capacity with small queues and delays when the proposed residential development, the committed development and the future residential developments are complete in 2039, fifteen years after opening.

6 PARKING

6 Parking

6.1 CAR PARKING PROVISION

A total of 107 parking spaces will be provided to cater for the proposed residential development as shown on the architect's drawing contained in Appendix A – Drawings.

6.2 CAR PARKING REQUIREMENTS FROM DEVELOPMENT PLAN

The *'Westmeath County Development Plan 2021-2027'* lists standard provision for car parking and the table below sets out those requirements in relation to the proposed development.

Car parking requirements from the Westmeath County Development Plan 2021 – 2027

Parking Standards for Residential Development – Phase 3			
Land-use	Requirements	Quantity	Parking
Residential Dwellings	1 space per dwellings	70 Dwellings	70 spaces
Visitor Parking for Residential Dwellings	1 space per 3 dwellings	70 Dwellings	23 spaces
		Total	**93**

The Westmeath County Development Plan indicates that the number of parking spaces required for the proposed residential development is 93 parking spaces. The proposed residential development will provide 107 parking spaces.

7 CONCLUSIONS

7 Conclusions

The main conclusions of this study are summarised as follows:

- The development flows to and from the proposed development have been predicted using the TRICS database.

- The existing N55 / R916 / L8048 roundabout currently operates within capacity with small queues and delays during the AM and PM peak hours.

- The existing N55 / R916 / L8048 roundabout will continue to operate within capacity with small queues and delays when the proposed residential development and the committed development is completed in 2024, year of opening, 2029, five years after opening and in 2039, fifteen years after opening.

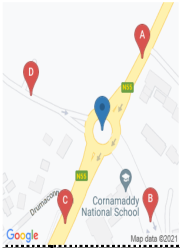
- The existing N55 / R916 / L8048 roundabout will continue to operate within capacity with small queues and delays when the proposed residential development, the committed development and the future residential developments are complete in 2039, fifteen years after opening.

- The development provides adequate car parking spaces as set-out in Chapter 6 above. Facilities for pedestrians are included in the internal layout.

APPENDICES

APPENDIX A – DRAWINGS

APPENDIX B – TRAFFIC COUNTS

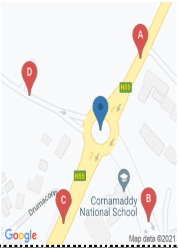


IDASO

Survey Name: 160 21362 Athlone
Site: Site 1
Location: N55 / R916 Drumaconn
Date: Thu 30-Sep-2021

	A => A										A => B									
TIME	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
07:00	0	0	0	0	0	0	0	0	0	0	0	0	27	0	8	2	3	0	40	44.9
07:15	0	0	0	0	1	0	0	0	1	1	1	0	25	0	4	0	3	0	33	36.1
07:30	0	0	0	0	0	0	0	0	0	0	0	0	34	0	10	2	2	0	48	51.6
07:45	0	0	0	0	0	0	0	0	0	0	0	0	65	0	10	3	4	0	82	88.7
H/TOT	0	0	0	0	1	0	0	0	1	1	1	0	151	0	32	7	12	0	203	221.3
08:00	0	0	0	0	0	0	0	0	0	0	1	0	85	0	12	3	1	2	104	108
08:15	0	0	0	0	0	0	0	0	0	0	0	0	80	0	15	0	3	1	99	103.9
08:30	0	0	0	0	0	0	0	0	0	0	2	0	39	0	10	2	3	0	56	59.3
08:45	0	0	0	0	0	0	0	0	0	0	0	0	49	0	13	2	4	0	68	74.2
H/TOT	0	0	0	0	0	0	0	0	0	0	3	0	253	0	50	7	11	3	327	345.4
09:00	0	0	0	0	0	0	0	0	0	0	0	0	41	0	4	4	2	0	51	55.6
09:15	0	0	0	0	0	0	0	0	0	0	0	0	50	0	6	6	1	0	63	67.3
09:30	0	0	0	0	0	0	0	0	0	0	0	0	44	0	4	3	1	0	52	54.8
09:45	0	0	0	0	0	0	0	0	0	0	0	0	37	0	6	3	2	0	48	52.1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	172	0	20	16	6	0	214	229.8
10:00	0	0	0	0	0	0	0	0	0	0	0	0	43	0	4	6	1	0	54	58.3
10:15	0	0	0	0	0	0	0	0	0	0	0	0	29	0	3	1	3	0	36	40.4
10:30	0	0	0	0	0	0	0	0	0	0	0	0	34	0	3	0	2	0	39	41.6
10:45	0	0	0	0	0	0	0	0	0	0	0	0	38	0	9	3	2	0	52	56.1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	144	0	19	10	8	0	181	196.4
11:00	0	0	0	0	0	0	0	0	0	0	0	0	36	0	5	2	3	0	46	50.9
11:15	0	0	0	0	0	0	0	0	0	0	0	0	29	0	7	3	1	0	40	42.8
11:30	0	0	0	0	0	0	0	0	0	0	0	0	23	0	5	2	2	0	32	35.6
11:45	0	0	0	0	0	0	0	0	0	0	0	0	34	1	10	7	2	0	54	60.1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	122	1	27	14	8	0	172	189.4
12:00	0	0	1	0	0	0	0	0	1	1	0	0	31	0	3	3	4	0	41	47.7
12:15	0	0	0	0	0	0	0	0	0	0	0	0	44	0	7	2	3	0	56	60.9
12:30	0	0	0	0	0	0	0	0	0	0	0	0	27	0	4	2	3	0	36	40.9
12:45	0	0	0	0	0	0	0	0	0	0	0	0	33	0	9	3	2	0	47	51.1
H/TOT	0	0	1	0	0	0	0	0	1	1	0	0	135	0	23	10	12	0	180	200.6
13:00	0	0	0	0	0	0	0	0	0	0	0	0	33	0	7	2	1	0	43	45.3
13:15	0	0	0	0	0	0	0	0	0	0	0	0	34	1	5	5	3	0	48	54.4
13:30	0	0	0	0	0	0	0	0	0	0	0	0	34	0	5	1	5	1	46	54
13:45	0	0	0	0	0	0	0	0	0	0	1	0	35	0	5	4	0	0	45	46.2
H/TOT	0	0	0	0	0	0	0	0	0	0	1	0	136	1	22	12	9	1	182	199.9
14:00	0	0	0	0	0	0	0	0	0	0	0	0	31	0	4	2	0	0	37	38
14:15	0	0	0	0	0	0	0	0	0	0	0	0	43	0	12	2	2	0	59	62.6
14:30	0	0	0	0	0	0	0	0	0	0	0	0	48	0	7	1	1	0	57	58.8
14:45	0	0	0	0	0	0	0	0	0	0	0	0	43	0	5	4	2	0	54	58.6
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	165	0	28	9	5	0	207	218
15:00	0	0	0	0	0	0	0	0	0	0	0	0	46	0	5	3	2	2	58	64.1
15:15	0	0	0	0	0	0	0	0	0	0	0	1	48	0	3	4	0	2	58	61.4
15:30	0	0	0	0	0	0	0	0	0	0	0	0	47	1	6	3	7	1	65	76.6
15:45	0	0	0	0	0	0	0	0	0	0	0	0	33	0	5	3	2	0	43	47.1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	1	174	1	19	13	11	5	224	249.2
16:00	0	0	1	0	0	0	0	0	1	1	0	0	44	1	5	1	2	0	53	56.1
16:15	0	0	1	0	0	0	0	0	1	1	0	0	42	0	11	1	1	0	55	56.8
16:30	0	0	0	0	0	0	0	0	0	0	0	0	47	0	8	1	4	0	60	65.7
16:45	0	0	0	0	0	0	0	0	0	0	1	0	43	0	10	0	0	1	55	55.2
H/TOT	0	0	2	0	0	0	0	0	2	2	1	0	176	1	34	3	7	1	223	233.8
17:00	0	0	0	0	0	0	0	0	0	0	0	0	30	0	7	2	3	0	42	46.9
17:15	0	0	0	0	0	0	0	0	0	0	0	1	42	0	5	1	2	0	51	53.5
17:30	0	0	0	0	0	0	0	0	0	0	1	0	58	0	4	1	1	0	65	66
17:45	0	0	0	0	1	0	0	0	1	1	0	0	40	0	5	1	0	0	46	46.5
H/TOT	0	0	0	0	1	0	0	0	1	1	1	1	170	0	21	5	6	0	204	212.9
18:00	0	0	0	0	0	0	0	0	0	0	0	0	52	0	7	1	4	0	64	69.7
18:15	0	0	0	0	0	0	0	0	0	0	0	0	50	0	10	2	0	0	62	63
18:30	0	0	0	0	0	0	0	0	0	0	0	0	37	0	2	0	2	0	41	43.6
18:45	0	0	0	0	0	0	0	0	0	0	0	0	22	0	3	1	1	0	27	28.8
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	161	0	22	4	7	0	194	205.1
12 TOT	0	0	3	0	2	0	0	0	5	5	7	2	1959	4	317	110	102	10	2511	2701.8

	A => C										A => D									
TIME	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
07:00	0	0	22	0	6	0	0	0	28	28	0	0	0	0	0	0	0	0	0	0
07:15	0	0	41	0	6	1	1	2	51	54.8	0	0	0	0	0	0	0	0	0	0
07:30	0	0	49	0	8	0	5	1	63	70.5	0	0	2	0	0	0	0	0	2	2
07:45	0	0	51	2	14	4	3	1	75	81.9	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	163	2	34	5	9	4	217	235.2	0	0	2	0	0	0	0	0	2	2
08:00	1	0	63	0	8	1	2	2	77	81.3	0	0	0	0	0	0	0	0	0	0
08:15	0	0	123	1	10	2	2	3	141	147.6	0	0	0	0	1	0	0	0	1	1
08:30	0	0	102	0	10	1	1	1	115	117.8	0	0	0	0	0	0	0	0	0	0
08:45	0	0	98	1	13	1	3	0	116	120.4	0	0	0	0	0	0	0	0	0	0
H/TOT	1	0	386	2	41	5	8	6	449	467.1	0	0	0	0	1	0	0	0	1	1
09:00	0	0	82	0	15	3	2	0	102	106.1	0	0	0	0	0	0	0	0	0	0
09:15	0	0	84	0	6	2	0	0	92	93	0	0	0	0	0	0	0	0	0	0
09:30	0	0	45	0	9	2	1	0	57	59.3	0	0	1	0	0	0	0	0	1	1
09:45	0	0	59	1	6	3	1	0	70	72.8	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	270	1	36	10	4	0	321	331.2	0	0	1	0	0	0	0	0	1	1
10:00	0	0	40	0	2	3	1	0	46	48.8	0	0	0	0	0	0	0	0	0	0
10:15	0	0	48	0	6	5	0	0	59	61.5	0	0	0	0	0	0	0	0	0	0
10:30	0	0	48	0	3	1	0	0	52	52.5	0	0	0	0	0	0	0	0	0	0
10:45	0	0	48	0	5	2	1	0	56	58.3	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	184	0	16	11	2	0	213	221.1	0	0	0	0	0	0	0	0	0	0
11:00	0	0	54	0	4	4	1	1	64	68.3	0	0	0	0	0	0	0	0	0	0
11:15	0	0	50	0	5	0	0	0	55	55	0	0	0	0	0	0	0	0	0	0
11:30	0	0	39	0	4	2	1	0	46	48.3	0	0	0	0	0	0	0	0	0	0
11:45	0	0	44	1	3	2	1	0	51	53.3	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	187	1	16	8	3	1	216	224.9	0	0	0	0	0	0	0	0	0	0
12:00	0	0	51	0	3	3	4	0	61	67.7	0	0	0	0	0	0	0	0	0	0
12:15	0	0	65	1	4	0	2	0	72	74.6	0	0	0	0	0	0	0	0	0	0
12:30	0	1	46	0	5	3	2	0	57	60.5	0	0	0	0	0	0	0	0	0	0
12:45	0	0	44	2	4	3	3	0	56	61.4	0	0	0	0	0	0	0	0	0	0
H/TOT	0	1	206	3	16	9	11	0	246	264.2	0	0	0	0	0	0	0	0	0	0
13:00	1	0	44	0	6	1	1	0	53	54	0	0	0	0	0	0	0	0	0	0
13:15	0	0	45	1	6	4	2	0	58	62.6	0	0	0	0	0	0	0	0	0	0
13:30	0	0	49	2	10	0	0	0	61	61	0	0	0	0	0	0	0	0	0	0
13:45	0	0	34	1	3	2	2	2	44	49.6	0	0	1	0	1	0	0	0	2	2
H/TOT	1	0	172	4	25	7	5	2	216	227.2	0	0	1	0	1	0	0	0	2	2
14:00	0	0	46	0	3	3	1	0	53	55.8	0	0	0	0	0	0	0	0	0	0
14:15	0	0	53	1	5	3	0	0	62	63.5	0	0	1	0	0	0	0	0	1	1
14:30	0	0	48	0	7	0	0	0	55	55	0	0	2	0	0	0	0	0	2	2
14:45	1	0	77	0	11	3	4	2	98	105.9	0	0	0	0	0	0	0	0	0	0
H/TOT	1	0	224	1	26	9	5	2	268	280.2	0	0	3	0	0	0	0	0	3	3
15:00	0	0	69	0	10	3	1	0	83	85.8	0	0	5	0	0	0	0	0	5	5
15:15	0	0	63	0	5	1	0	0	69	69.5	0	0	0	0	0	0	0	0	0	0
15:30	0	0	52	0	10	1	1	1	65	67.8	0	0	0	0	0	0	0	0	0	0
15:45	0	0	52	0	5	0	0	1	58	59	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	236	0	30	5	2	2	275	282.1	0	0	5	0	0	0	0	0	5	5
16:00	0	0	56	1	5	2	0	0	64	65	0	0	1	0	0	0	0	0	1	1
16:15	0	0	55	1	8	2	0	0	66	67	0	0	0	0	0	0	0	0	0	0
16:30	0	0	62	0	4	1	0	0	67	67.5	0	0	0	0	0	0	0	0	0	0
16:45	0	0	51	0	11	0	0	0	62	62	0	0	0	0	1	0	0	0	1	1
H/TOT	0	0	224	2	28	5	0	0	259	261.5	0	0	1	0	1	0	0	0	2	2
17:00	0	0	68	2	10	0	2	0	82	84.6	0	0	0	0	0	0	0	0	0	0
17:15	0	0	60	0	9	1	1	0	71	72.8	0	0	0	0	0	0	0	0	0	0
17:30	0	0	63	1	11	3	1	0	79	81.8	0	0	0	0	0	0	0	0	0	0
17:45	0	0	62	0	2	0	0	0	64	64	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	253	3	32	4	4	0	296	303.2	0	0	0	0	0	0	0	0	0	0
18:00	0	0	74	1	5	0	0	0	80	80	0	0	0	0	0	0	0	0	0	0
18:15	0	0	50	1	6	2	0	0	59	60	0	0	0	0	0	0	0	0	0	0
18:30	0	0	63	1	4	0	0	0	68	68	0	0	0	0	0	0	0	0	0	0
18:45	0	0	58	0	4	1	1	0	64	65.8	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	245	3	19	3	1	0	271	273.8	0	0	0	0	0	0	0	0	0	0
12 TOT	3	1	2750	22	319	81	54	17	3247	3371.7	0	0	13	0	3	0	0	0	16	16

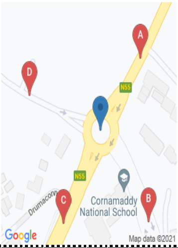


B => A									
P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
0	0	9	0	3	4	0	0	16	18
0	0	9	0	3	0	1	0	13	14.3
0	0	14	0	4	0	0	0	18	18
0	0	11	0	8	3	2	0	24	28.1
0	0	43	0	18	7	3	0	71	78.4
0	0	17	1	9	1	2	1	31	35.1
0	0	22	1	6	1	1	3	34	38.8
0	0	40	1	4	1	4	2	52	59.7
0	0	42	0	4	4	3	2	55	62.9
0	0	121	3	23	7	10	8	172	196.5
0	0	39	0	13	2	2	0	56	59.6
0	0	24	0	5	3	1	0	33	35.8
0	0	20	0	3	2	1	0	26	28.3
0	0	21	2	7	1	1	0	32	33.8
0	0	104	2	28	8	5	0	147	157.5
0	0	22	0	7	2	2	0	33	36.6
0	0	13	1	5	4	0	0	23	25
0	0	17	0	7	5	3	0	32	38.4
0	0	33	0	3	4	1	0	41	44.3
0	0	85	1	22	15	6	0	129	144.3
0	0	25	0	2	4	2	0	33	37.6
0	0	25	0	5	2	6	0	38	46.8
0	0	22	0	5	2	1	0	30	32.3
0	0	39	2	6	0	5	0	52	58.5
0	0	111	2	18	8	14	0	153	175.2
0	0	35	0	6	1	1	0	43	44.8
0	0	38	0	2	2	2	0	44	47.6
0	0	32	0	3	1	4	0	40	45.7
0	0	31	1	4	2	2	0	40	43.6
0	0	136	1	15	6	9	0	167	181.7
0	0	31	0	7	3	2	0	43	47.1
0	0	28	1	8	2	1	0	40	42.3
0	0	38	0	3	1	3	0	45	49.4
0	0	47	0	5	2	3	0	57	61.9
0	0	144	1	23	8	9	0	185	200.7
0	0	43	0	7	1	2	0	53	56.1
0	0	39	0	5	1	1	0	46	47.8
0	0	45	0	5	2	1	0	53	55.3
2	0	43	0	3	2	1	1	52	53.7
2	0	170	0	20	6	5	1	204	212.9
0	0	48	0	9	2	0	0	59	60
0	0	49	0	13	2	2	0	66	69.6
0	0	66	0	9	5	5	0	85	94
4	0	46	2	13	1	2	2	70	71.9
4	0	209	2	44	10	9	2	280	295.5
0	0	54	1	8	2	4	2	71	79.2
1	0	60	1	9	1	5	0	77	83.2
0	0	64	0	13	3	1	0	81	83.8
0	0	72	0	7	2	2	0	83	86.6
1	0	250	2	37	8	12	2	312	332.8
0	0	78	0	9	1	0	0	88	88.5
1	0	74	1	10	1	1	0	88	89
0	0	94	0	11	1	2	0	108	111.1
0	0	71	0	8	1	0	1	81	82.5
1	0	317	1	38	4	3	1	365	371.1
0	0	66	1	8	1	3	2	81	87.4
1	0	61	0	2	2	3	0	69	73.1
0	0	40	0	8	1	2	0	51	54.1
0	0	41	0	9	0	0	0	50	50
1	0	208	1	27	4	8	2	251	264.6
9	0	1898	16	313	91	93	16	2436	2611.2

B => B									
P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
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	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	1	0	0	0	0	0	1	1
0	0	1	0	0	0	0	0	1	1
0	0	7	0	0	0	0	0	7	7
0	0	23	0	0	0	0	0	23	23
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0
0	0	30	0	0	0	0	0	30	30
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	1
0	0	2	0	0	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0
0	0	3	0	0	0	0	0	3	3
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0
0	0	2	0	0	0	0	0	2	2
0	0	3	0	0	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
0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	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	0	2	2
0	0	1	0	0	0	0	0	1	1
0	0	4	0	1	0	0	0	5	5
0	0	7	0	1	0	0	0	8	8
0	0	6	0	0	0	0	0	6	6
0	0	1	1	0	0	0	0	2	2
0	0	3	0	0	0	0	0	3	3
0	0	13	0	2	0	0	0	15	15
0	0	23	1	2	0	0	0	26	26
0	0	14	0	0	0	0	0	14	14
0	0	2	0	0	0	0	0	2	2
0	0	2	0	0	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0
0	0	18	0	0	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
0	0	0	0	0	0	1	0	1	2.3
0	0	1	0	1	0	0	0	2	2
0	0	1	0	1	0	1	0	3	4.3
0	0	2	0	0	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	1	1
0	0	1	0	0	0	1	0	2	3.3
0	0	3	0	1	0	1	0	5	6.3
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	1
0	0	2	0	0	0	0	0	2	2
0	0	91	1	6	0	2	0	100	102.6

B => C									
P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
0	0	8	0	0	0	0	0	8	8
0	0	17	1	3	0	2	0	23	25.6
1	0	19	0	1	1	1	0	23	24
1	0	29	0	4	0	0	0	34	33.2
2	0	73	1	8	1	3	0	88	90.8
1	0	10	0	3	0	0	3	17	19.2
0	0	33	1	7	2	0	1	44	46
0	0	33	0	5	2	0	2	42	45
0	0	35	2	4	1	0	2	44	46.5
1	0	111	3	19	5	0	8	147	156.7
0	0	47	0	1	0	1	0	49	50.3
2	0	59	0	5	0	1	1	68	68.7
0	0	19	0	3	0	0	1	23	24
0	0	20	1	3	0	0	1	25	26
2	0	145	1	12	0	2	3	165	169
2	0	21	1	2	1	0	0	27	25.9
0	0	19	0	1	0	0	0	20	20
0	0	14	2	5	0	0	1	22	23
0	0	19	1	5	2	0	1	28	30
2	0	73	4	13	3	0	2	97	98.9
0	0	12	0	4	0	0	1	17	18
0	0	18	0	1	0	0	0	19	19
0	0	19	0	1	2	0	1	23	25
0	0	20	0	2	0	0	0	22	22
0	0	69	0	8	2	0	2	81	84
0	0	16	0	1	1	0	1	19	20.5
0	0	24	0	4	0	0	0	28	28
0	0	26	0	4	1	1	1	33	35.8
0	0	32	0	4	0	1	0	37	38.3
0	0	98	0	13	2	2	2	117	122.6
0	0	36	0	5	1	0	2	44	46.5
0	0	22	1	2	1	0	0	26	26.5
0	0	34	0	4	0	0	1	39	40
0	0	26	0	0	0	0	0	26	26
0	0	118	1	11	2	0	3	135	139
0	0	26	0	2	0	0	1	29	30
0	0	22	0	5	1	0	0	28	28.5
0	0	19	0	1	1	0	1	22	23.5
0	0	27	1	3	1	0	0	32	32.5
0	0	94	1	11	3	0	2	111	114.5
0	0	41	2	1	2	0	1	47	49
0	0	39	3	4	1	0	0	47	47.5
0	0	30	0	2	0	0	1	33	34
0	0	24	1	2	0	1	1	29	31.3
0	0	134	6	9	3	1	3	156	161.8
1	0	21	1	5	0	0	1	29	29.2
0	0	21	0	4	0	0	0	25	25
1	0	36	0	8	0	0	0	45	44.2
0	0	32	1	0	0	0	1	34	35
2	0	110	2	17	0	0	2	133	133.4
1	0	29	0	4	0	0	0	34	33.2
0	0	20	1	2	0	0	1	24	25
0	0	30	1	2	0	0	0	33	33
0	0	22	0	1	0	1	1	25	27.3
1	0	101	2	9	0	1	2	116	118.5
1	0	20	0	2	0	0	1	24	24.2
0	0	23	0	3	0	0	0	26	26
0	0	13	1	3	0	0	1	18	19
0	0	20	0	0	0	0	0	20	20
1	0	76	1	8	0	0	2	88	89.2
11	0	1202	22	138	21	9	31	1434	1478.4

B => D									
P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
0	0	0	0	0	0	0	0	0	0
0	0	1	0	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	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	1
0	0	3	0	0	0	0	0	3	3
0	0	3	0	0	0	0	0	3	3
0	0	7	0	0	0	0	0	7	7
0	0	2	0	1	0	0	0	3	3
0	0	2	0	0	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	1
0	0	5	0	1	0	0	0	6	6
0	0	1	0	1	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0
0	0	2	0	1	0	0	0	3	3
0	0	1	0	0	0	0	0	1	1
0	0	1	0	0	0	0	0	1	1
0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0
0	0	3	0	0	0	0	0	3	3
0	0	1	0	0	0	0	0	1	1
0	0	1	0	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	2	0	0	0	0	0	2	2
0	0	1	0	0	0	0	0	1	1
0	0	1	0	0	0	0	0	1	1
0	0	2	0	0	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0
0	0	4	0	0	0	0	0	4	4
0	0	1	0	1	0	0	0	2	2
0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	1	0	0	1	1.5
0	0	2	0	0	0	0	0	2	2
0	0	4	0	1	1	0	0	6	6.5
0	0	3	0	0	0	0	0	3	3
0	0	3	0	0	0	0	0	3	3
0	0	3	0	0	0	0	0	3	3
1	0	1	0	0	0	0	0	2	1.2
1	0	10	0	0	0	0	0	11	10.2
0	0	3	0	0	0	1	0	4	5.3
0	0	1	0	0	0	0	0	1	1
0	0	2	0	0	0	0	0	2	2
0	0	2	0	0	0	0	0	2	2
0	0	8	0	0	0	1	0	9	10.3
0	0	3	0	0	0	0	0	3	3
0	0	3	0	1	0	0	0	4	4
0	0	4	0	0	0	0	0	4	4
0	0	3	0	0	0	0	0	3	3
0	0	13	0	1	0	0	0	14	14
0	0	6	0	0	1	0	0	7	7.5
0	0	1	0	0	0	0	0	1	1
0	0	2	0	1	0	0	0	3	3
0	0	3	0	0	0	0	0	3	3
0	0	12	0	1	1	0	0	14	14.5
1	0	71	0	5	2	1	0	80	81.5



C => A										C => B									
P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
0	0	9	0	2	1	1	0	13	14.8	1	0	6	0	3	0	0	0	10	9.2
0	0	18	0	5	1	0	0	24	24.5	0	0	5	0	0	1	0	0	6	6.5
0	0	24	0	6	1	1	0	32	33.8	0	0	7	0	1	0	1	0	9	10.3
0	0	27	0	6	1	0	0	34	34.5	0	0	20	0	2	2	0	1	25	27
0	0	78	0	19	4	2	0	103	107.6	1	0	38	0	6	3	1	1	50	53
0	0	28	0	6	1	0	0	35	35.5	1	0	16	0	1	0	0	0	18	17.2
0	0	41	0	8	0	0	1	50	51	1	1	12	1	1	3	0	1	20	21.1
0	0	55	1	6	3	3	0	68	73.4	0	0	18	0	3	0	0	0	21	21
0	0	86	0	7	3	2	2	100	106.1	0	0	21	0	5	1	0	0	27	27.5
0	0	210	1	27	7	5	3	253	266	2	1	67	1	10	4	0	1	86	86.8
0	0	51	0	8	3	3	1	66	72.4	1	0	34	0	6	3	0	1	45	46.7
0	0	37	0	3	2	1	0	43	45.3	0	0	30	0	4	0	0	1	35	36
0	0	30	0	4	1	1	1	37	39.8	1	0	14	0	1	1	0	1	18	18.7
0	0	23	0	8	3	1	0	35	37.8	0	0	19	0	5	0	2	0	26	28.6
0	0	141	0	23	9	6	2	181	195.3	2	0	97	0	16	4	2	3	124	130
0	0	30	0	5	1	4	0	40	45.7	0	0	9	0	5	0	0	1	15	16
0	0	27	0	8	3	3	0	41	46.4	0	0	20	0	1	1	1	0	23	24.8
0	0	36	1	3	2	2	0	44	47.6	0	0	18	1	5	2	0	0	26	27
0	0	40	0	4	4	1	0	49	52.3	0	0	13	0	4	2	0	1	20	22
0	0	133	1	20	10	10	0	174	192	0	0	60	1	15	5	1	2	84	89.8
0	0	41	0	6	2	1	0	50	52.3	0	0	15	0	2	1	0	1	19	20.5
0	0	35	0	5	3	4	0	47	53.7	1	0	23	0	3	1	1	1	30	32
1	0	49	1	2	0	1	0	54	54.5	0	0	23	0	5	0	0	0	28	28
0	0	57	1	4	1	1	0	64	65.8	0	0	21	0	5	0	0	1	27	28
1	0	182	2	17	6	7	0	215	226.3	1	0	82	0	15	2	1	3	104	108.5
0	0	61	0	7	3	3	0	74	79.4	2	0	27	0	1	1	0	1	32	31.9
1	0	43	0	2	3	0	0	49	49.7	0	0	11	0	2	2	0	1	16	18
1	0	61	0	5	0	0	0	67	66.2	0	0	27	0	2	2	0	1	32	34
0	0	55	1	9	2	1	0	68	70.3	0	0	28	0	2	0	0	1	31	32
2	0	220	1	23	8	4	0	258	265.6	2	0	93	0	7	5	0	4	111	115.9
0	0	66	0	5	4	4	0	79	86.2	1	0	27	0	4	1	0	0	33	32.7
0	0	63	0	10	1	3	0	77	81.4	0	0	19	0	5	1	0	1	26	27.5
0	0	67	0	4	0	7	0	78	87.1	0	0	30	0	2	0	0	0	32	32
0	0	81	0	5	3	1	0	90	92.8	0	0	49	0	5	0	1	1	56	58.3
0	0	277	0	24	8	15	0	324	347.5	1	0	125	0	16	2	1	2	147	150.5
0	0	61	0	2	5	0	0	68	70.5	0	0	24	0	3	1	0	0	28	28.5
0	1	53	0	8	2	2	0	66	69	0	0	28	0	5	1	0	2	36	38.5
0	0	66	0	8	3	0	0	77	78.5	0	0	25	0	2	0	0	0	27	27
0	0	63	0	4	1	2	1	71	75.1	0	0	27	1	4	1	0	2	35	37.5
0	1	243	0	22	11	4	1	282	293.1	0	0	104	1	14	3	0	4	126	131.5
0	0	66	1	2	2	3	0	74	78.9	1	0	24	1	4	0	0	0	30	29.2
0	0	80	1	6	3	1	0	91	93.8	0	0	21	0	5	3	0	3	32	36.5
0	0	67	0	5	3	0	0	75	76.5	0	0	56	2	2	1	0	1	62	63.5
0	0	69	1	10	4	1	0	85	88.3	0	0	21	0	5	0	0	1	27	28
0	0	282	3	23	12	5	0	325	337.5	1	0	122	3	16	4	0	5	151	157.2
0	1	72	1	9	2	1	2	88	91.7	0	0	54	0	1	0	1	2	58	61.3
0	0	87	1	8	2	3	0	101	105.9	0	0	28	0	5	0	0	0	33	33
0	0	75	2	9	3	3	1	93	99.4	0	0	40	1	1	1	0	1	44	45.5
0	0	92	2	9	1	0	2	106	108.5	0	0	25	0	2	0	0	0	27	27
0	1	326	6	35	8	7	5	388	405.5	0	0	147	1	9	1	1	3	162	166.8
0	0	100	0	17	1	2	0	120	123.1	0	0	27	0	1	0	0	1	29	30
0	0	118	0	12	3	2	0	135	139.1	0	0	28	0	5	2	0	1	36	38
0	0	107	2	15	2	1	0	127	129.3	0	0	35	0	1	0	0	1	37	38
0	0	111	1	15	1	1	0	129	130.8	0	0	29	0	4	0	0	1	34	35
0	0	436	3	59	7	6	0	511	522.3	0	0	119	0	11	2	0	4	136	141
0	0	77	1	11	1	1	0	91	92.8	0	0	24	0	1	0	0	0	25	25
0	0	90	0	7	2	1	0	100	102.3	0	0	23	0	3	0	0	1	27	28
0	0	78	1	4	0	0	0	83	83	0	0	23	0	1	0	0	0	24	24
0	0	65	0	9	1	1	0	76	77.8	0	0	28	0	0	0	0	0	28	28
0	0	310	2	31	4	3	0	350	355.9	0	0	98	0	5	0	0	1	104	105
3	2	2838	19	323	94	74	11	3364	3514.6	10	1	1152	7	140	35	7	33	1385	1436

C => C										C => D									
P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	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	1	0	0	0	0	0	1	1	0	0	0	0	1	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	1	0	0	0	0	0	1	1	0	0	3	0	1	0	0	0	4	4
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	2	0	0	0	0	0	2	2	0	0	3	1	0	0	0	0	4	4
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	2	0	0	0	0	0	2	2	0	0	6	1	0	0	0	0	7	7
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	4	0	0	0	0	0	4	4
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	6	0	1	0	0	0	7	7
0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0	0	0	2	0	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	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	5	5
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	0	0	1	1
0	0	1	0	0	1	0	0	2	2.5	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	1	0	1	2	3.5	0	0	0	0	0	0	0	0	0	0
0	0	1	0	0	2	0	1	4	6	0	0	2	0	1	0	0	0	3	3
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	3
0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0	0	0	7	0	0	0	0	0	7	7
0	0	0	0	0	0	0	0	0	0	0	0	3	0	1	0	0	0	4	4
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1.5
0	0	1	0	0	0	0	0	1	1	0	0	1	0	0	0	0	0	1	1
0	0	1	0	0	0	0	0	1	1	0	0	5	0	1	1	0	0	7	7.5
0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	4	4
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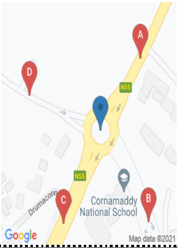
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0	0	0	6	1	3	0	0	0	10	10
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	3
0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	6	6
0	0	0	0	1	0	0	0	1	1	0	0	4	0	0	0	0	0	4	4
0	0	0	0	1	0	0	0	1	1	0	0	14	0	0	0	0	0	14	14
0	0	1	0	0	0	0	0	1	1	0	0	3	0	0	0	0	0	3	3
0	0	2	0	1	0	0	0	3	3	1	0	1	0	0	0	0	0	2	1.2
0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	5	5
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	3	0	1	0	0	0	4	4	1	0	10	0	0	0	0	0	11	10.2
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	5	5
0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	1
0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	9	9
0	0	0	0	0	0	0	0	0	0	0	0	6	0	1	1	0	0	8	8.5
0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	3
0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	2
0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	3	3
0	0	0	0	0	0	0	0	0	0	0	0	14	0	1	1	0	0	16	16.5
0	0	8	0	2	2	0	1	13	15	1	0	87	2	8	2	0	0	100	100.2



D => A										D => B										D => C										D => D									
P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	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	2	0	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	2	0	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
0	0	4	0	0	0	0	0	4	4	0	0	8	0	0	0	0	0	8	8	0	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0
0	0	1	0	2	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0
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0	0	2	0	0	0	0	0	2	2	0	0	3	0	0	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
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APPENDIX C – TRAFFIC FLOW SHEETS

N55 / R916 / L8048 Roundabout - AM Peak Hour Flows

2021 AM Peak - Base Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	274	474	1	**749**
R916	197	8	179	10	**394**
N55 (south)	284	113	2	7	**406**
L8048	7	14	24	0	**45**
Totals	**488**	**409**	**679**	**18**	**1594**

2024 AM Peak - No Development (Base Flows + 3.95%)

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	285	493	1	**779**
R916	205	8	186	10	**410**
N55 (south)	295	117	2	7	**422**
L8048	7	15	25	0	**47**
Totals	**507**	**425**	**706**	**19**	**1657**

AM Peak - Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	0	0	1	**1**
R916	0	0	0	7	**7**
N55 (south)	0	0	0	4	**4**
L8048	4	9	17	0	**30**
Totals	**4**	**9**	**17**	**12**	**42**

AM Peak - Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	0	0	1	**1**
R916	0	0	0	7	**7**
N55 (south)	0	0	0	5	**5**
L8048	5	10	18	0	**33**
Totals	**5**	**10**	**18**	**13**	**46**

2024 AM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	285	493	3	**781**
R916	205	8	186	24	**424**
N55 (south)	295	117	2	16	**431**
L8048	16	34	60	0	**110**
Totals	**516**	**444**	**741**	**44**	**1745**

2029 AM Peak - No Development (Base Flows + 10.89%)

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	304	526	1	**831**
R916	218	9	198	11	**437**
N55 (south)	315	125	2	8	**450**
L8048	8	16	27	0	**50**
Totals	**541**	**454**	**753**	**20**	**1768**

2029 AM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	304	526	3	**833**
R916	218	9	198	25	**451**
N55 (south)	315	125	2	17	**459**
L8048	17	35	62	0	**113**
Totals	**550**	**473**	**788**	**45**	**1856**

2039 AM Peak - No Development (Base Flows + 15.79%)

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	317	549	1	**867**
R916	228	9	207	12	**456**
N55 (south)	329	131	2	8	**470**
L8048	8	16	28	0	**52**
Totals	**565**	**474**	**786**	**21**	**1846**

2039 AM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	317	549	3	**869**
R916	228	9	207	26	**470**
N55 (south)	329	131	2	17	**479**
L8048	17	35	63	0	**115**
Totals	**574**	**493**	**821**	**46**	**1934**

AM Peak - Future Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	0	0	5	**5**
R916	0	0	0	51	**51**
N55 (south)	0	0	0	36	**36**
L8048	23	47	86	0	**156**
Totals	**23**	**47**	**86**	**92**	**248**

2039 AM Peak - Development Flows + Committed Development Flows + Future Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	317	549	8	**874**
R916	228	9	207	77	**521**
N55 (south)	329	131	2	53	**515**
L8048	40	82	149	0	**271**
Totals	**597**	**540**	**907**	**138**	**2182**

N55 / R916 / L8048 Roundabout - PM Peak Hour Flows

2021 PM Peak - Base Flows

	N55 (north)	R916	N55 (south)	L8048	Totals
N55 (north)	1	202	296	1	**500**
R916	364	5	115	14	**498**
N55 (south)	511	136	0	9	**656**
L8048	1	6	3	0	**10**
Totals	**877**	**349**	**414**	**24**	**1664**

2024 PM Peak - No Development (Base Flows + 3.95%)

	N55 (north)	R916	N55 (south)	L8048	Totals
N55 (north)	1	210	308	1	**520**
R916	378	5	120	15	**518**
N55 (south)	531	141	0	9	**682**
L8048	1	6	3	0	**10**
Totals	**912**	**363**	**430**	**25**	**1730**

PM Peak - Development Flows

	N55 (north)	R916	N55 (south)	L8048	Totals
N55 (north)	0	0	0	1	**1**
R916	0	0	0	17	**17**
N55 (south)	0	0	0	10	**10**
L8048	2	10	5	0	**17**
Totals	**2**	**10**	**5**	**28**	**45**

PM Peak - Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	Totals
N55 (north)	0	0	0	2	**2**
R916	0	0	0	18	**18**
N55 (south)	0	0	0	10	**10**
L8048	2	11	5	0	**18**
Totals	**2**	**11**	**5**	**30**	**48**

2024 PM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	Totals
N55 (north)	1	210	308	4	**523**
R916	378	5	120	50	**553**
N55 (south)	531	141	0	29	**702**
L8048	5	27	13	0	**45**
Totals	**916**	**384**	**440**	**83**	**1823**

2029 PM Peak - No Development (Base Flows + 10.89%)

	N55 (north)	R916	N55 (south)	L8048	Totals
N55 (north)	1	224	328	1	**554**
R916	404	6	128	16	**552**
N55 (south)	567	151	0	10	**727**
L8048	1	7	3	0	**11**
Totals	**973**	**387**	**459**	**27**	**1845**

2029 PM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	Totals
N55 (north)	1	224	328	4	**557**
R916	404	6	128	51	**587**
N55 (south)	567	151	0	30	**747**
L8048	5	28	13	0	**46**
Totals	**977**	**408**	**469**	**85**	**1938**

2039 PM Peak - No Development (Base Flows + 15.79%)

	N55 (north)	R916	N55 (south)	L8048	Totals
N55 (north)	1	234	343	1	**579**
R916	421	6	133	16	**577**
N55 (south)	592	157	0	10	**760**
L8048	1	7	3	0	**12**
Totals	**1015**	**404**	**479**	**28**	**1927**

2039 PM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	Totals
N55 (north)	1	234	343	4	**582**
R916	421	6	133	51	**612**
N55 (south)	592	157	0	30	**780**
L8048	5	28	13	0	**47**
Totals	**1019**	**425**	**489**	**86**	**2020**

PM Peak - Future Development Flows

	N55 (north)	R916	N55 (south)	L8048	Totals
N55 (north)	0	0	0	7	**7**
R916	0	0	0	88	**88**
N55 (south)	0	0	0	52	**52**
L8048	11	64	32	0	**107**
Totals	**11**	**64**	**32**	**147**	**254**

2039 PM Peak - Development Flows + Committed Development Flows + Future Development Flows

	N55 (north)	R916	N55 (south)	L8048	Totals
N55 (north)	1	234	343	11	**589**
R916	421	6	133	139	**700**
N55 (south)	592	157	0	82	**832**
L8048	16	92	45	0	**154**
Totals	**1030**	**489**	**521**	**233**	**2274**

APPENDIX D – TRICS INFORMATION

Calculation Reference: AUDIT-464201-190123-0159

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : A - HOUSES PRIVATELY OWNED
VEHICLES

Selected regions and areas:

13	MUNSTER		
	WA	WATERFORD	1 days
15	GREATER DUBLIN		
	DL	DUBLIN	2 days
16	ULSTER (REPUBLIC OF IRELAND)		
	DN	DONEGAL	1 days

Secondary Filtering selection:

Parameter: Number of dwellings
Actual Range: 146 to 280 (units:)
Range Selected by User: 100 to 500 (units:)

Parking Spaces Range: Selected: 16 to 982 Actual: 16 to 982

Percentage of dwellings privately owned: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/10 to 03/09/14

Selected survey days:
Tuesday 2 days
Wednesday 1 days
Friday 1 days

Selected survey types:
Manual count 4 days
Directional ATC Count 0 days

Selected Locations:
Suburban Area (PPS6 Out of Centre) 1
Edge of Town 2
Neighbourhood Centre (PPS6 Local Centre) 1

Selected Location Sub Categories:
Residential Zone 4

Secondary Filtering selection:

Use Class:
C3 4 days

Population within 1 mile:
10,001 to 15,000 2 days
25,001 to 50,000 2 days

Population within 5 miles:
5,001 to 25,000 1 days
50,001 to 75,000 1 days
500,001 or More 2 days

Car ownership within 5 miles:
1.1 to 1.5 4 days

Travel Plan:
No 4 days

PTAL Rating:
No PTAL Present 4 days

LIST OF SITES relevant to selection parameters

1 DL-03-A-03 TERRACED/SEMI-DET. DUBLIN
RAHENY ROAD
DUBLIN
RAHENY
Neighbourhood Centre (PPS6 Local Centre)
Residential Zone
Total Number of dwellings: 206
Survey date: TUESDAY 20/04/10 Survey Type: MANUAL

2 DL-03-A-06 DETACHED DUBLIN
UPPER KILMACUD ROAD
DUBLIN
DUNDRUM
Edge of Town
Residential Zone
Total Number of dwellings: 147
Survey date: FRIDAY 30/04/10 Survey Type: MANUAL

3 DN-03-A-05 DETACHED/SEMI-DETACHED DONEGAL
GORTLEE ROAD
LETTERKENNY
GORTLEE
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 146
Survey date: WEDNESDAY 03/09/14 Survey Type: MANUAL

4 WA-03-A-04 DETACHED WATERFORD
MAYPARK LANE
WATERFORD

Edge of Town
Residential Zone
Total Number of dwellings: 280
Survey date: TUESDAY 24/06/14 Survey Type: MANUAL

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED
VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	195	0.047	4	195	0.187	4	195	0.234
08:00 - 09:00	4	195	0.168	4	195	**0.433**	4	195	0.601
09:00 - 10:00	4	195	0.168	4	195	0.243	4	195	0.411
10:00 - 11:00	4	195	0.168	4	195	0.189	4	195	0.357
11:00 - 12:00	4	195	0.184	4	195	0.227	4	195	0.411
12:00 - 13:00	4	195	0.272	4	195	0.258	4	195	0.530
13:00 - 14:00	4	195	0.241	4	195	0.218	4	195	0.459
14:00 - 15:00	4	195	0.280	4	195	0.263	4	195	0.543
15:00 - 16:00	4	195	0.297	4	195	0.228	4	195	0.525
16:00 - 17:00	4	195	0.308	4	195	0.211	4	195	0.519
17:00 - 18:00	4	195	**0.399**	4	195	0.241	4	195	**0.640**
18:00 - 19:00	4	195	0.298	4	195	0.263	4	195	0.561
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.830			2.961			5.791

Parameter summary

Trip rate parameter range selected:	146 - 280 (units:)
Survey date date range:	01/01/10 - 03/09/14
Number of weekdays (Monday-Friday):	4
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

APPENDIX E – ARCADY RESULTS

Junctions 9

ARCADY 9 - Roundabout 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

The users of this computer program for the solution of an engineering problem are in no way relieved of their responsibility for the correctness of the solution

Filename: Roundabout Junction.j9
Path: S:\Jobs\2021\21129 LSHD x 2 Athlone TIA+RSA\21129-04 Application 3\Reports\Working\ARCADY
Report generation date: 11/11/2022 12:44:32

Summary of junction performance

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	2021							
Arm 1	1.2	5.16	0.54	A	0.6	3.67	0.36	A
Arm 2	0.6	5.05	0.38	A	0.7	4.89	0.43	A
Arm 3	0.4	3.44	0.30	A	1.1	5.58	0.53	A
Arm 4	0.1	3.67	0.05	A	0.0	4.84	0.01	A
	2024 no dev							
Arm 1	1.3	5.45	0.57	A	0.6	3.77	0.38	A
Arm 2	0.7	5.27	0.40	A	0.8	5.10	0.45	A
Arm 3	0.5	3.52	0.31	A	1.2	5.94	0.55	A
Arm 4	0.1	3.74	0.05	A	0.0	5.02	0.02	A
	2024 with dev+ committed							
Arm 1	1.4	5.83	0.58	A	0.6	3.88	0.38	A
Arm 2	0.7	5.61	0.42	A	0.9	5.47	0.48	A
Arm 3	0.5	3.60	0.32	A	1.4	6.47	0.58	A
Arm 4	0.1	4.03	0.12	A	0.1	5.30	0.07	A
	2029 no dev							
Arm 1	1.5	6.06	0.61	A	0.7	3.96	0.40	A
Arm 2	0.8	5.72	0.43	A	0.9	5.52	0.48	A
Arm 3	0.5	3.67	0.34	A	1.5	6.74	0.60	A
Arm 4	0.1	3.87	0.06	A	0.0	5.39	0.02	A
	2029 with dev+ committed							
Arm 1	1.6	6.52	0.62	A	0.7	4.08	0.41	A
Arm 2	0.8	6.12	0.46	A	1.1	5.95	0.52	A
Arm 3	0.5	3.76	0.35	A	1.7	7.43	0.63	A
Arm 4	0.1	4.18	0.13	A	0.1	5.72	0.07	A
	2039 no dev							
Arm 1	1.7	6.55	0.63	A	0.7	4.11	0.42	A
Arm 2	0.8	6.09	0.46	A	1.0	5.82	0.51	A
Arm 3	0.5	3.79	0.35	A	1.7	7.38	0.63	A
Arm 4	0.1	3.96	0.06	A	0.0	5.66	0.02	A
	2039 with dev+ committed							
Arm 1	1.9	7.10	0.65	A	0.8	4.24	0.43	A
Arm 2	0.9	6.55	0.48	A	1.2	6.31	0.54	A
Arm 3	0.6	3.88	0.36	A	1.9	8.22	0.66	A
Arm 4	0.2	4.28	0.13	A	0.1	6.03	0.08	A
	2039 with dev+ Commit+Future Flows							
Arm 1	2.4	8.93	0.70	A	0.8	4.67	0.46	A
Arm 2	1.3	8.35	0.57	A	1.7	8.05	0.63	A
Arm 3	0.7	4.25	0.40	A	2.9	11.56	0.75	B
Arm 4	0.4	5.38	0.31	A	0.3	7.51	0.26	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	07/03/2022
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	2021	AM	ONE HOUR	07:45	09:15	15	✓
D2	2021	PM	ONE HOUR	16:45	18:15	15	✓
D3	2024 no dev	AM	ONE HOUR	07:45	09:15	15	✓
D4	2024 no dev	PM	ONE HOUR	16:45	18:15	15	✓
D5	2024 with dev+ committed	AM	ONE HOUR	07:45	09:15	15	✓
D6	2024 with dev+ committed	PM	ONE HOUR	16:45	18:15	15	✓
D7	2029 no dev	AM	ONE HOUR	07:45	09:15	15	✓
D8	2029 no dev	PM	ONE HOUR	16:45	18:15	15	✓
D9	2029 with dev+ committed	AM	ONE HOUR	07:45	09:15	15	✓
D10	2029 with dev+ committed	PM	ONE HOUR	16:45	18:15	15	✓
D11	2039 no dev	AM	ONE HOUR	07:45	09:15	15	✓
D12	2039 no dev	PM	ONE HOUR	16:45	18:15	15	✓
D13	2039 with dev+ committed	AM	ONE HOUR	07:45	09:15	15	✓
D14	2039 with dev+ committed	PM	ONE HOUR	16:45	18:15	15	✓
D15	2039 with dev+ Commit+Future Flows	AM	ONE HOUR	07:45	09:15	15	✓
D16	2039 with dev+ Commit+Future Flows	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

2021, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	4.65	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	N55 (north)	
2	R916	
3	N55 (south)	
4	L8048	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1	3.20	6.00	40.0	25.0	45.0	8.0	
2	3.20	6.00	25.0	18.0	45.0	20.0	
3	3.20	6.50	30.0	20.0	45.0	12.0	
4	3.40	6.20	15.0	20.0	45.0	27.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.674	1806
2	0.625	1641
3	0.669	1816
4	0.607	1578

The slope and intercept shown above include any corrections and adjustments.

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	2021	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 (%)
1		ONE HOUR	✓	749	100.000
2		ONE HOUR	✓	394	100.000
3		ONE HOUR	✓	406	100.000
4		ONE HOUR	✓	45	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	274	474	1
	2	197	8	179	10
	3	284	113	2	7
	4	7	14	24	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.54	5.16	1.2	A	687	1031
2	0.38	5.05	0.6	A	362	542
3	0.30	3.44	0.4	A	373	559
4	0.05	3.67	0.1	A	41	62

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	564	141	121	1560	0.361	562	366	0.0	0.6	3.597	A
2	297	74	376	1257	0.236	295	307	0.0	0.3	3.739	A
3	306	76	162	1543	0.198	305	509	0.0	0.2	2.905	A
4	34	8	453	1159	0.029	34	14	0.0	0.0	3.198	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	673	168	145	1544	0.436	673	438	0.6	0.8	4.126	A
2	354	89	450	1211	0.293	354	367	0.3	0.4	4.200	A
3	365	91	194	1521	0.240	365	610	0.2	0.3	3.113	A
4	40	10	542	1105	0.037	40	16	0.0	0.0	3.381	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	825	206	177	1522	0.542	823	537	0.8	1.2	5.136	A
2	434	108	551	1148	0.378	433	450	0.4	0.6	5.033	A
3	447	112	237	1492	0.300	447	746	0.3	0.4	3.441	A
4	50	12	664	1031	0.048	49	20	0.0	0.1	3.667	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	825	206	177	1522	0.542	825	537	1.2	1.2	5.159	A
2	434	108	552	1147	0.378	434	450	0.6	0.6	5.047	A
3	447	112	238	1492	0.300	447	748	0.4	0.4	3.444	A
4	50	12	665	1031	0.048	50	20	0.1	0.1	3.668	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	673	168	145	1544	0.436	675	439	1.2	0.8	4.149	A
2	354	89	451	1210	0.293	355	368	0.6	0.4	4.215	A
3	365	91	195	1521	0.240	365	612	0.4	0.3	3.116	A
4	40	10	544	1104	0.037	41	16	0.1	0.0	3.386	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	564	141	121	1560	0.361	565	368	0.8	0.6	3.619	A
2	297	74	378	1256	0.236	297	308	0.4	0.3	3.759	A
3	306	76	163	1542	0.198	306	512	0.3	0.2	2.914	A
4	34	8	455	1158	0.029	34	14	0.0	0.0	3.204	A

2021, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	4.80	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	2021	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 (%)
1		ONE HOUR	✓	500	100.000
2		ONE HOUR	✓	498	100.000
3		ONE HOUR	✓	656	100.000
4		ONE HOUR	✓	10	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	202	296	1
	2	364	5	115	14
	3	511	136	0	9
	4	1	6	3	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.36	3.67	0.6	A	459	688
2	0.43	4.89	0.7	A	457	685
3	0.53	5.58	1.1	A	602	903
4	0.01	4.84	0.0	A	9	14

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	376	94	112	1566	0.240	375	658	0.0	0.3	3.020	A
2	375	94	226	1351	0.278	373	262	0.0	0.4	3.680	A
3	494	123	289	1458	0.339	492	311	0.0	0.5	3.719	A
4	8	2	763	971	0.008	7	18	0.0	0.0	3.734	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	449	112	135	1551	0.290	449	787	0.3	0.4	3.267	A
2	448	112	270	1323	0.338	447	313	0.4	0.5	4.110	A
3	590	147	346	1420	0.415	589	372	0.5	0.7	4.331	A
4	9	2	913	880	0.010	9	22	0.0	0.0	4.133	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	551	138	165	1531	0.360	550	964	0.4	0.6	3.669	A
2	548	137	331	1285	0.427	547	384	0.5	0.7	4.876	A
3	722	181	423	1368	0.528	721	455	0.7	1.1	5.550	A
4	11	3	1117	756	0.015	11	26	0.0	0.0	4.832	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	551	138	165	1530	0.360	551	966	0.6	0.6	3.672	A
2	548	137	331	1285	0.427	548	384	0.7	0.7	4.889	A
3	722	181	424	1367	0.528	722	456	1.1	1.1	5.580	A
4	11	3	1120	755	0.015	11	26	0.0	0.0	4.841	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	449	112	135	1551	0.290	450	790	0.6	0.4	3.274	A
2	448	112	271	1322	0.339	449	314	0.7	0.5	4.124	A
3	590	147	347	1419	0.416	591	373	1.1	0.7	4.359	A
4	9	2	916	878	0.010	9	22	0.0	0.0	4.144	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	376	94	113	1566	0.240	377	661	0.4	0.3	3.031	A
2	375	94	227	1350	0.278	375	263	0.5	0.4	3.698	A
3	494	123	290	1457	0.339	495	312	0.7	0.5	3.747	A
4	8	2	767	969	0.008	8	18	0.0	0.0	3.747	A

2024 no dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	4.87	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	2024 no dev	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 (%)
1		ONE HOUR	✓	779	100.000
2		ONE HOUR	✓	409	100.000
3		ONE HOUR	✓	421	100.000
4		ONE HOUR	✓	47	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	285	493	1
	2	205	8	186	10
	3	295	117	2	7
	4	7	15	25	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.57	5.45	1.3	A	715	1072
2	0.40	5.27	0.7	A	375	563
3	0.31	3.52	0.5	A	386	579
4	0.05	3.74	0.1	A	43	65

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	586	147	125	1557	0.377	584	380	0.0	0.6	3.689	A
2	308	77	391	1248	0.247	307	319	0.0	0.3	3.821	A
3	317	79	168	1539	0.206	316	529	0.0	0.3	2.941	A
4	35	9	470	1149	0.031	35	13	0.0	0.0	3.232	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	700	175	150	1541	0.455	699	455	0.6	0.8	4.275	A
2	368	92	468	1199	0.307	367	382	0.3	0.4	4.325	A
3	378	95	201	1516	0.250	378	634	0.3	0.3	3.163	A
4	42	11	563	1092	0.039	42	16	0.0	0.0	3.427	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	858	214	184	1518	0.565	856	557	0.8	1.3	5.421	A
2	450	113	572	1134	0.397	449	467	0.4	0.7	5.253	A
3	464	116	246	1486	0.312	463	776	0.3	0.5	3.516	A
4	52	13	689	1016	0.051	52	20	0.0	0.1	3.733	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	858	214	184	1518	0.565	858	558	1.3	1.3	5.452	A
2	450	113	574	1133	0.397	450	468	0.7	0.7	5.271	A
3	464	116	247	1486	0.312	464	777	0.5	0.5	3.520	A
4	52	13	690	1015	0.051	52	20	0.1	0.1	3.735	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	700	175	150	1540	0.455	702	457	1.3	0.8	4.303	A
2	368	92	470	1198	0.307	369	383	0.7	0.4	4.344	A
3	378	95	202	1516	0.250	379	636	0.5	0.3	3.169	A
4	42	11	565	1091	0.039	42	16	0.1	0.0	3.430	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	586	147	126	1557	0.377	587	382	0.8	0.6	3.718	A
2	308	77	393	1246	0.247	308	320	0.4	0.3	3.842	A
3	317	79	169	1538	0.206	317	532	0.3	0.3	2.951	A
4	35	9	473	1147	0.031	35	14	0.0	0.0	3.239	A

2024 no dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.03	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	2024 no dev	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 (%)
1		ONE HOUR	✓	520	100.000
2		ONE HOUR	✓	518	100.000
3		ONE HOUR	✓	681	100.000
4		ONE HOUR	✓	10	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	210	308	1
	2	378	5	120	15
	3	531	141	0	9
	4	1	6	3	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.38	3.77	0.6	A	477	716
2	0.45	5.10	0.8	A	475	713
3	0.55	5.94	1.2	A	625	937
4	0.02	5.02	0.0	A	9	14

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	391	98	116	1563	0.250	390	683	0.0	0.3	3.066	A
2	390	97	235	1345	0.290	388	272	0.0	0.4	3.757	A
3	513	128	300	1450	0.354	511	323	0.0	0.5	3.823	A
4	8	2	792	954	0.008	7	19	0.0	0.0	3.804	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	467	117	139	1548	0.302	467	818	0.3	0.4	3.330	A
2	466	116	281	1316	0.354	465	325	0.4	0.5	4.228	A
3	612	153	359	1411	0.434	611	387	0.5	0.8	4.499	A
4	9	2	948	859	0.010	9	22	0.0	0.0	4.236	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	573	143	170	1527	0.375	572	1001	0.4	0.6	3.767	A
2	570	143	344	1277	0.447	569	398	0.5	0.8	5.083	A
3	750	187	440	1357	0.553	748	474	0.8	1.2	5.895	A
4	11	3	1160	730	0.015	11	27	0.0	0.0	5.006	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	573	143	171	1527	0.375	573	1003	0.6	0.6	3.771	A
2	570	143	345	1276	0.447	570	399	0.8	0.8	5.098	A
3	750	187	440	1356	0.553	750	475	1.2	1.2	5.935	A
4	11	3	1163	728	0.015	11	28	0.0	0.0	5.017	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	467	117	140	1548	0.302	468	821	0.6	0.4	3.338	A
2	466	116	282	1316	0.354	467	326	0.8	0.6	4.245	A
3	612	153	360	1410	0.434	614	388	1.2	0.8	4.533	A
4	9	2	952	856	0.011	9	23	0.0	0.0	4.248	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	391	98	117	1563	0.250	392	687	0.4	0.3	3.074	A
2	390	97	236	1344	0.290	391	273	0.6	0.4	3.776	A
3	513	128	302	1449	0.354	514	325	0.8	0.6	3.851	A
4	8	2	796	951	0.008	8	19	0.0	0.0	3.818	A

2024 with dev+ committed, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.11	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	2024 with dev+ committed	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 (%)
1		ONE HOUR	✓	781	100.000
2		ONE HOUR	✓	423	100.000
3		ONE HOUR	✓	430	100.000
4		ONE HOUR	✓	110	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	285	493	3
	2	205	8	186	24
	3	295	117	2	16
	4	16	34	60	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.58	5.83	1.4	A	717	1075
2	0.42	5.61	0.7	A	388	582
3	0.32	3.60	0.5	A	395	592
4	0.12	4.03	0.1	A	101	151

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	588	147	166	1530	0.384	585	387	0.0	0.6	3.802	A
2	318	80	418	1230	0.259	317	333	0.0	0.3	3.937	A
3	324	81	180	1531	0.212	323	556	0.0	0.3	2.977	A
4	83	21	470	1149	0.072	83	32	0.0	0.1	3.376	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	702	176	199	1508	0.466	701	463	0.6	0.9	4.456	A
2	380	95	501	1179	0.323	380	399	0.3	0.5	4.503	A
3	387	97	215	1507	0.257	386	665	0.3	0.3	3.213	A
4	99	25	563	1092	0.091	99	39	0.1	0.1	3.622	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	860	215	243	1478	0.582	858	567	0.9	1.4	5.787	A
2	466	116	613	1109	0.420	465	488	0.5	0.7	5.584	A
3	473	118	264	1474	0.321	473	814	0.3	0.5	3.592	A
4	121	30	689	1016	0.119	121	47	0.1	0.1	4.023	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	860	215	243	1478	0.582	860	568	1.4	1.4	5.825	A
2	466	116	614	1108	0.420	466	489	0.7	0.7	5.606	A
3	473	118	264	1474	0.321	473	816	0.5	0.5	3.596	A
4	121	30	690	1015	0.119	121	47	0.1	0.1	4.026	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	702	176	199	1508	0.466	704	465	1.4	0.9	4.492	A
2	380	95	503	1177	0.323	381	400	0.7	0.5	4.528	A
3	387	97	216	1506	0.257	387	668	0.5	0.3	3.217	A
4	99	25	565	1091	0.091	99	39	0.1	0.1	3.629	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	588	147	167	1530	0.384	589	389	0.9	0.6	3.830	A
2	318	80	421	1229	0.259	319	335	0.5	0.4	3.960	A
3	324	81	181	1530	0.212	324	559	0.3	0.3	2.988	A
4	83	21	473	1147	0.072	83	32	0.1	0.1	3.381	A

2024 with dev+ committed, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.39	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	2024 with dev+ committed	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 (%)
1		ONE HOUR	✓	523	100.000
2		ONE HOUR	✓	553	100.000
3		ONE HOUR	✓	701	100.000
4		ONE HOUR	✓	45	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	210	308	4
	2	378	5	120	50
	3	531	141	0	29
	4	5	27	13	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.38	3.88	0.6	A	480	720
2	0.48	5.47	0.9	A	507	761
3	0.58	6.47	1.4	A	643	965
4	0.07	5.30	0.1	A	41	62

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	394	98	139	1548	0.254	392	686	0.0	0.3	3.113	A
2	416	104	245	1339	0.311	415	287	0.0	0.4	3.888	A
3	528	132	328	1431	0.369	525	331	0.0	0.6	3.965	A
4	34	8	792	954	0.036	34	62	0.0	0.0	3.913	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	470	118	167	1529	0.307	470	821	0.3	0.4	3.398	A
2	497	124	293	1309	0.380	496	344	0.4	0.6	4.428	A
3	630	158	393	1388	0.454	629	396	0.6	0.8	4.740	A
4	40	10	948	859	0.047	40	75	0.0	0.0	4.398	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	576	144	204	1504	0.383	575	1005	0.4	0.6	3.873	A
2	609	152	358	1268	0.480	608	421	0.6	0.9	5.445	A
3	772	193	481	1329	0.581	770	485	0.8	1.4	6.413	A
4	50	12	1160	730	0.068	49	91	0.0	0.1	5.288	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	576	144	205	1504	0.383	576	1007	0.6	0.6	3.879	A
2	609	152	359	1267	0.480	609	422	0.9	0.9	5.466	A
3	772	193	482	1328	0.581	772	486	1.4	1.4	6.468	A
4	50	12	1163	728	0.068	50	91	0.1	0.1	5.301	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	470	118	168	1529	0.308	471	825	0.6	0.4	3.407	A
2	497	124	294	1308	0.380	498	345	0.9	0.6	4.451	A
3	630	158	395	1387	0.454	632	397	1.4	0.8	4.786	A
4	40	10	952	856	0.047	41	75	0.1	0.0	4.413	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	394	98	140	1547	0.254	394	690	0.4	0.3	3.122	A
2	416	104	246	1338	0.311	417	289	0.6	0.5	3.910	A
3	528	132	330	1430	0.369	529	332	0.8	0.6	4.000	A
4	34	8	796	951	0.036	34	63	0.0	0.0	3.926	A

2029 no dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.31	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	2029 no dev	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 (%)
1		ONE HOUR	✓	831	100.000
2		ONE HOUR	✓	436	100.000
3		ONE HOUR	✓	450	100.000
4		ONE HOUR	✓	51	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	304	526	1
	2	218	9	198	11
	3	315	125	2	8
	4	8	16	27	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.61	6.06	1.5	A	763	1144
2	0.43	5.72	0.8	A	400	600
3	0.34	3.67	0.5	A	413	619
4	0.06	3.87	0.1	A	47	70

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	626	156	134	1551	0.403	623	406	0.0	0.7	3.867	A
2	328	82	417	1231	0.267	327	340	0.0	0.4	3.974	A
3	339	85	179	1531	0.221	338	564	0.0	0.3	3.014	A
4	38	10	502	1130	0.034	38	15	0.0	0.0	3.298	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	747	187	161	1533	0.487	746	486	0.7	0.9	4.565	A
2	392	98	499	1180	0.332	391	408	0.4	0.5	4.564	A
3	405	101	215	1507	0.268	404	676	0.3	0.4	3.263	A
4	46	11	601	1069	0.043	46	18	0.0	0.0	3.516	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	915	229	197	1509	0.606	913	595	0.9	1.5	6.013	A
2	480	120	611	1110	0.432	479	499	0.5	0.8	5.695	A
3	495	124	263	1475	0.336	495	827	0.4	0.5	3.670	A
4	56	14	736	988	0.057	56	22	0.0	0.1	3.864	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	915	229	197	1509	0.606	915	596	1.5	1.5	6.060	A
2	480	120	612	1109	0.433	480	500	0.8	0.8	5.722	A
3	495	124	263	1475	0.336	495	829	0.5	0.5	3.674	A
4	56	14	737	987	0.057	56	22	0.1	0.1	3.866	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	747	187	161	1533	0.487	749	487	1.5	1.0	4.607	A
2	392	98	501	1178	0.333	393	409	0.8	0.5	4.591	A
3	405	101	215	1507	0.268	405	679	0.5	0.4	3.271	A
4	46	11	602	1068	0.043	46	18	0.1	0.0	3.522	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	626	156	135	1551	0.403	627	408	1.0	0.7	3.900	A
2	328	82	419	1230	0.267	329	342	0.5	0.4	3.998	A
3	339	85	180	1530	0.221	339	568	0.4	0.3	3.024	A
4	38	10	504	1128	0.034	38	15	0.0	0.0	3.303	A

2029 no dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.53	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	2029 no dev	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 (%)
1		ONE HOUR	✓	554	100.000
2		ONE HOUR	✓	554	100.000
3		ONE HOUR	✓	728	100.000
4		ONE HOUR	✓	11	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	224	328	1
	2	404	6	128	16
	3	567	151	0	10
	4	1	7	3	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.40	3.96	0.7	A	508	763
2	0.48	5.52	0.9	A	508	763
3	0.60	6.74	1.5	A	668	1002
4	0.02	5.39	0.0	A	10	15

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	417	104	125	1557	0.268	416	729	0.0	0.4	3.148	A
2	417	104	250	1336	0.312	415	291	0.0	0.5	3.905	A
3	548	137	321	1436	0.382	546	344	0.0	0.6	4.032	A
4	8	2	846	921	0.009	8	20	0.0	0.0	3.946	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	498	125	150	1541	0.323	498	873	0.4	0.5	3.449	A
2	498	125	299	1305	0.382	497	348	0.5	0.6	4.455	A
3	654	164	384	1394	0.470	653	412	0.6	0.9	4.855	A
4	10	2	1013	819	0.012	10	24	0.0	0.0	4.448	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	610	152	183	1518	0.402	609	1069	0.5	0.7	3.957	A
2	610	152	366	1263	0.483	609	426	0.6	0.9	5.494	A
3	802	200	470	1336	0.600	799	505	0.9	1.5	6.673	A
4	12	3	1240	682	0.018	12	30	0.0	0.0	5.376	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	610	152	184	1518	0.402	610	1071	0.7	0.7	3.965	A
2	610	152	367	1263	0.483	610	427	0.9	0.9	5.516	A
3	802	200	471	1336	0.600	801	505	1.5	1.5	6.737	A
4	12	3	1243	680	0.018	12	30	0.0	0.0	5.392	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	498	125	151	1540	0.323	499	877	0.7	0.5	3.458	A
2	498	125	300	1304	0.382	499	350	0.9	0.6	4.480	A
3	654	164	386	1393	0.470	657	413	1.5	0.9	4.908	A
4	10	2	1018	816	0.012	10	24	0.0	0.0	4.466	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	417	104	126	1557	0.268	418	734	0.5	0.4	3.162	A
2	417	104	251	1335	0.312	418	293	0.6	0.5	3.929	A
3	548	137	323	1435	0.382	549	346	0.9	0.6	4.070	A
4	8	2	852	917	0.009	8	20	0.0	0.0	3.961	A

2029 with dev+ committed, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.60	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
D9	2029 with dev+ committed	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 (%)
1		ONE HOUR	✓	833	100.000
2		ONE HOUR	✓	450	100.000
3		ONE HOUR	✓	459	100.000
4		ONE HOUR	✓	114	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	304	526	3
	2	218	9	198	25
	3	315	125	2	17
	4	17	35	62	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.62	6.52	1.6	A	764	1147
2	0.46	6.12	0.8	A	413	619
3	0.35	3.76	0.5	A	421	632
4	0.13	4.18	0.1	A	105	157

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	627	157	175	1524	0.412	624	412	0.0	0.7	3.990	A
2	339	85	444	1214	0.279	337	355	0.0	0.4	4.100	A
3	346	86	191	1523	0.227	344	591	0.0	0.3	3.051	A
4	86	21	502	1130	0.076	85	34	0.0	0.1	3.448	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	749	187	209	1501	0.499	748	494	0.7	1.0	4.772	A
2	405	101	532	1159	0.349	404	425	0.4	0.5	4.763	A
3	413	103	229	1498	0.276	412	707	0.3	0.4	3.316	A
4	102	26	601	1069	0.096	102	40	0.1	0.1	3.721	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	917	229	256	1469	0.624	915	605	1.0	1.6	6.463	A
2	495	124	651	1085	0.457	494	520	0.5	0.8	6.084	A
3	505	126	280	1463	0.345	505	865	0.4	0.5	3.753	A
4	126	31	735	988	0.127	125	49	0.1	0.1	4.174	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	917	229	257	1469	0.624	917	606	1.6	1.6	6.521	A
2	495	124	653	1084	0.457	495	521	0.8	0.8	6.119	A
3	505	126	281	1463	0.345	505	868	0.5	0.5	3.758	A
4	126	31	737	987	0.127	126	50	0.1	0.1	4.178	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	749	187	210	1500	0.499	751	495	1.6	1.0	4.824	A
2	405	101	535	1157	0.350	406	426	0.8	0.5	4.797	A
3	413	103	230	1497	0.276	413	711	0.5	0.4	3.325	A
4	102	26	603	1068	0.096	103	41	0.1	0.1	3.730	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	627	157	176	1523	0.412	628	415	1.0	0.7	4.027	A
2	339	85	447	1212	0.279	339	357	0.5	0.4	4.129	A
3	346	86	192	1522	0.227	346	594	0.4	0.3	3.063	A
4	86	21	504	1128	0.076	86	34	0.1	0.1	3.456	A

2029 with dev+ committed, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.98	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
D10	2029 with dev+ committed	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 (%)
1		ONE HOUR	✓	557	100.000
2		ONE HOUR	✓	589	100.000
3		ONE HOUR	✓	748	100.000
4		ONE HOUR	✓	46	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	224	328	4
	2	404	6	128	51
	3	567	151	0	30
	4	5	28	13	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.41	4.08	0.7	A	511	767
2	0.52	5.95	1.1	A	540	811
3	0.63	7.43	1.7	A	686	1030
4	0.07	5.72	0.1	A	42	63

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	419	105	148	1542	0.272	418	732	0.0	0.4	3.199	A
2	443	111	260	1329	0.334	441	307	0.0	0.5	4.045	A
3	563	141	349	1417	0.397	561	352	0.0	0.7	4.190	A
4	35	9	846	921	0.038	34	64	0.0	0.0	4.062	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	501	125	178	1522	0.329	500	877	0.4	0.5	3.521	A
2	529	132	311	1297	0.408	529	367	0.5	0.7	4.678	A
3	672	168	418	1371	0.490	671	421	0.7	1.0	5.136	A
4	41	10	1013	819	0.050	41	76	0.0	0.1	4.628	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	613	153	217	1495	0.410	612	1073	0.5	0.7	4.074	A
2	649	162	380	1254	0.517	647	449	0.7	1.1	5.917	A
3	824	206	512	1308	0.629	821	516	1.0	1.7	7.339	A
4	51	13	1239	682	0.074	51	93	0.1	0.1	5.701	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	613	153	218	1495	0.410	613	1076	0.7	0.7	4.083	A
2	649	162	381	1254	0.517	648	450	1.1	1.1	5.948	A
3	824	206	513	1308	0.630	823	516	1.7	1.7	7.432	A
4	51	13	1243	680	0.075	51	94	0.1	0.1	5.722	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	501	125	179	1521	0.329	502	881	0.7	0.5	3.532	A
2	529	132	312	1297	0.408	531	369	1.1	0.7	4.710	A
3	672	168	420	1370	0.491	675	422	1.7	1.0	5.203	A
4	41	10	1019	816	0.051	41	77	0.1	0.1	4.650	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	419	105	149	1541	0.272	420	737	0.5	0.4	3.211	A
2	443	111	261	1329	0.334	444	308	0.7	0.5	4.073	A
3	563	141	351	1416	0.398	564	354	1.0	0.7	4.234	A
4	35	9	852	917	0.038	35	64	0.1	0.0	4.080	A

2039 no dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.66	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
D11	2039 no dev	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 (%)
1		ONE HOUR	✓	867	100.000
2		ONE HOUR	✓	456	100.000
3		ONE HOUR	✓	470	100.000
4		ONE HOUR	✓	52	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	317	549	1
	2	228	9	207	12
	3	329	131	2	8
	4	8	16	28	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.63	6.55	1.7	A	796	1193
2	0.46	6.09	0.8	A	418	628
3	0.35	3.79	0.5	A	431	647
4	0.06	3.96	0.1	A	48	72

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	653	163	140	1548	0.422	650	424	0.0	0.7	3.996	A
2	343	86	435	1220	0.281	342	355	0.0	0.4	4.091	A
3	354	88	187	1526	0.232	353	589	0.0	0.3	3.067	A
4	39	10	524	1116	0.035	39	16	0.0	0.0	3.342	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	779	195	167	1529	0.510	778	507	0.7	1.0	4.786	A
2	410	102	521	1166	0.351	409	425	0.4	0.5	4.751	A
3	423	106	224	1501	0.282	422	706	0.3	0.4	3.338	A
4	47	12	628	1053	0.044	47	19	0.0	0.0	3.576	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	955	239	205	1504	0.635	952	621	1.0	1.7	6.488	A
2	502	126	637	1094	0.459	501	520	0.5	0.8	6.060	A
3	517	129	275	1467	0.353	517	863	0.4	0.5	3.786	A
4	57	14	768	968	0.059	57	23	0.0	0.1	3.953	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	955	239	205	1504	0.635	955	622	1.7	1.7	6.552	A
2	502	126	639	1093	0.460	502	521	0.8	0.8	6.095	A
3	517	129	275	1467	0.353	517	865	0.5	0.5	3.791	A
4	57	14	770	967	0.059	57	23	0.1	0.1	3.956	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	779	195	167	1529	0.510	782	509	1.7	1.1	4.839	A
2	410	102	523	1165	0.352	411	426	0.8	0.5	4.784	A
3	423	106	225	1500	0.282	423	709	0.5	0.4	3.346	A
4	47	12	630	1052	0.044	47	19	0.1	0.0	3.583	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	653	163	140	1547	0.422	654	426	1.1	0.7	4.037	A
2	343	86	437	1218	0.282	344	357	0.5	0.4	4.119	A
3	354	88	189	1525	0.232	354	593	0.4	0.3	3.078	A
4	39	10	527	1114	0.035	39	16	0.0	0.0	3.350	A

2039 no dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.92	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
D12	2039 no dev	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 (%)
1		ONE HOUR	✓	579	100.000
2		ONE HOUR	✓	576	100.000
3		ONE HOUR	✓	759	100.000
4		ONE HOUR	✓	11	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	234	343	1
	2	421	6	133	16
	3	592	157	0	10
	4	1	7	3	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.42	4.11	0.7	A	531	797
2	0.51	5.82	1.0	A	529	793
3	0.63	7.38	1.7	A	696	1045
4	0.02	5.66	0.0	A	10	15

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	436	109	130	1554	0.280	434	761	0.0	0.4	3.210	A
2	434	108	261	1329	0.326	432	303	0.0	0.5	4.006	A
3	571	143	334	1428	0.400	569	359	0.0	0.7	4.179	A
4	8	2	882	899	0.009	8	20	0.0	0.0	4.042	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	521	130	155	1537	0.339	520	911	0.4	0.5	3.537	A
2	518	129	313	1296	0.399	517	363	0.5	0.7	4.616	A
3	682	171	399	1384	0.493	681	430	0.7	1.0	5.116	A
4	10	2	1056	793	0.012	10	24	0.0	0.0	4.596	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	637	159	190	1514	0.421	637	1114	0.5	0.7	4.099	A
2	634	159	383	1253	0.506	633	444	0.7	1.0	5.796	A
3	836	209	489	1324	0.631	833	527	1.0	1.7	7.290	A
4	12	3	1292	650	0.019	12	30	0.0	0.0	5.643	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	637	159	190	1513	0.421	637	1117	0.7	0.7	4.109	A
2	634	159	383	1252	0.506	634	445	1.0	1.0	5.824	A
3	836	209	490	1323	0.632	836	527	1.7	1.7	7.381	A
4	12	3	1296	648	0.019	12	30	0.0	0.0	5.664	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	521	130	156	1537	0.339	521	916	0.7	0.5	3.548	A
2	518	129	313	1296	0.400	519	364	1.0	0.7	4.643	A
3	682	171	401	1383	0.494	685	431	1.7	1.0	5.182	A
4	10	2	1062	790	0.013	10	24	0.0	0.0	4.617	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	436	109	131	1554	0.281	436	766	0.5	0.4	3.222	A
2	434	108	262	1328	0.327	434	305	0.7	0.5	4.032	A
3	571	143	336	1426	0.401	573	361	1.0	0.7	4.224	A
4	8	2	888	895	0.009	8	20	0.0	0.0	4.058	A

2039 with dev+ committed, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	6.00	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
D13	2039 with dev+ committed	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 (%)
1		ONE HOUR	✓	869	100.000
2		ONE HOUR	✓	470	100.000
3		ONE HOUR	✓	479	100.000
4		ONE HOUR	✓	115	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	317	549	3
	2	228	9	207	26
	3	329	131	2	17
	4	17	35	63	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.65	7.10	1.9	A	797	1196
2	0.48	6.55	0.9	A	431	647
3	0.36	3.88	0.6	A	440	659
4	0.13	4.28	0.2	A	106	158

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	654	164	180	1520	0.430	651	430	0.0	0.7	4.128	A
2	354	88	462	1203	0.294	352	369	0.0	0.4	4.225	A
3	361	90	199	1518	0.238	359	615	0.0	0.3	3.106	A
4	87	22	524	1116	0.078	86	34	0.0	0.1	3.496	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	781	195	216	1496	0.522	780	515	0.7	1.1	5.014	A
2	423	106	554	1146	0.369	422	442	0.4	0.6	4.970	A
3	431	108	239	1491	0.289	430	737	0.3	0.4	3.393	A
4	103	26	628	1053	0.098	103	41	0.1	0.1	3.789	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	957	239	264	1464	0.654	954	631	1.1	1.8	7.015	A
2	517	129	677	1068	0.484	516	540	0.6	0.9	6.503	A
3	527	132	292	1455	0.362	527	901	0.4	0.6	3.874	A
4	127	32	768	968	0.131	126	51	0.1	0.1	4.277	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	957	239	264	1464	0.654	957	632	1.8	1.9	7.098	A
2	517	129	679	1067	0.485	517	542	0.9	0.9	6.548	A
3	527	132	293	1455	0.362	527	904	0.6	0.6	3.880	A
4	127	32	770	967	0.131	127	51	0.1	0.2	4.283	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	781	195	216	1496	0.522	784	517	1.9	1.1	5.080	A
2	423	106	557	1144	0.369	424	444	0.9	0.6	5.011	A
3	431	108	240	1490	0.289	431	741	0.6	0.4	3.402	A
4	103	26	630	1052	0.098	104	41	0.2	0.1	3.798	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	654	164	181	1520	0.430	656	433	1.1	0.8	4.171	A
2	354	88	465	1201	0.295	355	371	0.6	0.4	4.258	A
3	361	90	201	1517	0.238	361	619	0.4	0.3	3.115	A
4	87	22	527	1114	0.078	87	35	0.1	0.1	3.502	A

2039 with dev+ committed, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	6.44	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
D14	2039 with dev+ committed	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 (%)
1		ONE HOUR	✓	582	100.000
2		ONE HOUR	✓	611	100.000
3		ONE HOUR	✓	779	100.000
4		ONE HOUR	✓	46	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	234	343	4
	2	421	6	133	51
	3	592	157	0	30
	4	5	28	13	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.43	4.24	0.8	A	534	801
2	0.54	6.31	1.2	A	561	841
3	0.66	8.22	1.9	A	715	1072
4	0.08	6.03	0.1	A	42	63

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	438	110	153	1539	0.285	437	764	0.0	0.4	3.262	A
2	460	115	271	1322	0.348	458	319	0.0	0.5	4.154	A
3	586	147	362	1409	0.416	584	367	0.0	0.7	4.348	A
4	35	9	882	899	0.039	34	64	0.0	0.0	4.165	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	523	131	183	1518	0.345	523	914	0.4	0.5	3.613	A
2	549	137	324	1289	0.426	548	382	0.5	0.7	4.856	A
3	700	175	434	1361	0.515	699	439	0.7	1.0	5.428	A
4	41	10	1056	793	0.052	41	76	0.0	0.1	4.788	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	641	160	224	1491	0.430	640	1118	0.5	0.7	4.226	A
2	673	168	397	1244	0.541	671	467	0.7	1.2	6.268	A
3	858	214	530	1296	0.662	854	537	1.0	1.9	8.086	A
4	51	13	1291	650	0.078	51	93	0.1	0.1	6.000	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	641	160	225	1490	0.430	641	1122	0.7	0.8	4.236	A
2	673	168	397	1243	0.541	673	468	1.2	1.2	6.309	A
3	858	214	532	1295	0.662	858	538	1.9	1.9	8.223	A
4	51	13	1296	648	0.078	51	94	0.1	0.1	6.029	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	523	131	184	1518	0.345	524	920	0.8	0.5	3.628	A
2	549	137	325	1288	0.426	551	383	1.2	0.7	4.891	A
3	700	175	436	1360	0.515	704	441	1.9	1.1	5.519	A
4	41	10	1063	789	0.052	41	77	0.1	0.1	4.814	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	438	110	154	1538	0.285	439	769	0.5	0.4	3.275	A
2	460	115	272	1322	0.348	461	321	0.7	0.5	4.186	A
3	586	147	364	1407	0.417	588	369	1.1	0.7	4.401	A
4	35	9	888	895	0.039	35	64	0.1	0.0	4.183	A

2039 with dev+ Commit+Future Flows, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	7.24	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D15	2039 with dev+ Commit+Future Flows	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 (%)
1		ONE HOUR	✓	874	100.000
2		ONE HOUR	✓	521	100.000
3		ONE HOUR	✓	515	100.000
4		ONE HOUR	✓	271	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	317	549	8
	2	228	9	207	77
	3	329	131	2	53
	4	40	82	149	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.70	8.93	2.4	A	802	1203
2	0.57	8.35	1.3	A	478	717
3	0.40	4.25	0.7	A	473	709
4	0.31	5.38	0.4	A	249	373

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	658	164	280	1453	0.453	655	448	0.0	0.8	4.490	A
2	392	98	530	1160	0.338	390	404	0.0	0.5	4.663	A
3	388	97	241	1490	0.260	386	679	0.0	0.4	3.258	A
4	204	51	524	1116	0.183	203	103	0.0	0.2	3.940	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	786	196	335	1416	0.555	784	536	0.8	1.2	5.681	A
2	468	117	635	1095	0.428	467	484	0.5	0.7	5.731	A
3	463	116	289	1458	0.318	463	814	0.4	0.5	3.615	A
4	244	61	628	1053	0.231	243	124	0.2	0.3	4.444	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	962	241	410	1365	0.705	958	656	1.2	2.3	8.744	A
2	574	143	776	1006	0.570	571	591	0.7	1.3	8.233	A
3	567	142	353	1415	0.401	566	995	0.5	0.7	4.240	A
4	298	75	768	968	0.308	298	151	0.3	0.4	5.366	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	962	241	411	1365	0.705	962	657	2.3	2.4	8.927	A
2	574	143	779	1005	0.571	574	593	1.3	1.3	8.350	A
3	567	142	354	1414	0.401	567	998	0.7	0.7	4.251	A
4	298	75	770	967	0.309	298	152	0.4	0.4	5.383	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	786	196	336	1415	0.555	790	538	2.4	1.3	5.796	A
2	468	117	640	1092	0.429	471	487	1.3	0.8	5.813	A
3	463	116	291	1456	0.318	464	819	0.7	0.5	3.629	A
4	244	61	630	1052	0.232	244	125	0.4	0.3	4.462	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	658	164	281	1452	0.453	660	450	1.3	0.8	4.553	A
2	392	98	534	1158	0.339	393	407	0.8	0.5	4.716	A
3	388	97	243	1488	0.261	388	684	0.5	0.4	3.273	A
4	204	51	527	1114	0.183	204	104	0.3	0.2	3.959	A

2039 with dev+ Commit+Future Flows, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	8.42	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
D16	2039 with dev+ Commit+Future Flows	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 (%)
1		ONE HOUR	✓	589	100.000
2		ONE HOUR	✓	699	100.000
3		ONE HOUR	✓	831	100.000
4		ONE HOUR	✓	153	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	234	343	11
	2	421	6	133	139
	3	592	157	0	82
	4	16	92	45	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.46	4.67	0.8	A	540	811
2	0.63	8.05	1.7	A	641	962
3	0.75	11.56	2.9	B	763	1144
4	0.26	7.51	0.3	A	140	211

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	443	111	225	1490	0.298	442	771	0.0	0.4	3.427	A
2	526	132	300	1304	0.404	524	366	0.0	0.7	4.596	A
3	626	156	433	1361	0.460	622	391	0.0	0.8	4.849	A
4	115	29	881	899	0.128	115	174	0.0	0.1	4.586	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	529	132	269	1460	0.363	529	924	0.4	0.6	3.862	A
2	628	157	359	1267	0.496	627	439	0.7	1.0	5.615	A
3	747	187	519	1304	0.573	745	468	0.8	1.3	6.421	A
4	138	34	1056	793	0.173	137	208	0.1	0.2	5.487	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	649	162	329	1420	0.457	647	1128	0.6	0.8	4.651	A
2	770	192	440	1217	0.632	767	537	1.0	1.7	7.947	A
3	915	229	634	1227	0.746	909	572	1.3	2.8	11.127	B
4	168	42	1289	652	0.258	168	254	0.2	0.3	7.431	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	649	162	330	1419	0.457	648	1134	0.8	0.8	4.670	A
2	770	192	440	1216	0.633	770	538	1.7	1.7	8.051	A
3	915	229	636	1225	0.747	915	574	2.8	2.9	11.564	B
4	168	42	1296	648	0.260	168	255	0.3	0.3	7.509	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	529	132	271	1459	0.363	531	932	0.8	0.6	3.882	A
2	628	157	360	1266	0.496	631	442	1.7	1.0	5.693	A
3	747	187	522	1302	0.574	753	470	2.9	1.4	6.630	A
4	138	34	1065	788	0.175	138	210	0.3	0.2	5.549	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	443	111	226	1489	0.298	444	778	0.6	0.4	3.448	A
2	526	132	302	1303	0.404	527	369	1.0	0.7	4.648	A
3	626	156	436	1359	0.460	628	393	1.4	0.9	4.935	A
4	115	29	889	895	0.129	115	175	0.2	0.1	4.620	A

APPENDIX 9.2 – FLOOD RISK ASSESSMENT

PAUL Mc GRAIL
CONSULTING ENGINEERS LIMITED

Proposed Residential Development at

Cornamaddy, Athlone, Co. Westmeath

Phase 3

Flood Risk Assessment

Westmeath County Council

REGISTERED IN IRELAND AS PAUL MC GRAIL LTD
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PROJECT NUMBER: 2022-113				DOCUMENT REF: 2022-113			
1	First Issue	RD	13/12/2022	PMG	13/12/2022	PMG	13/12/2022
Revision	**Description & Rationale**	**Originated**	**Date**	**Checked**	**Date**	**Authorised**	**Date**
Paul Mc Grail Consulting Engineers							

TABLE OF CONTENTS

1 FLOOD RISK

1.1 INTRODUCTION

Paul Mc Grail Consulting Engineers were engaged by Marina Quarter Limited to prepare this Flood Risk Assessment for the subject site.

The proposed development is located at Cornamaddy and the access to this phase will be from the road permitted under ref. no 22/253 in conjunction with section of permitted road under ref. no. 14/7103, which connects to the existing roundabout at N55 x Drumaconn Road. This application comprises the construction of 70 no. of residential units, landscaping and all associated infrastructure and works. Refer to Figure 1 for site location.

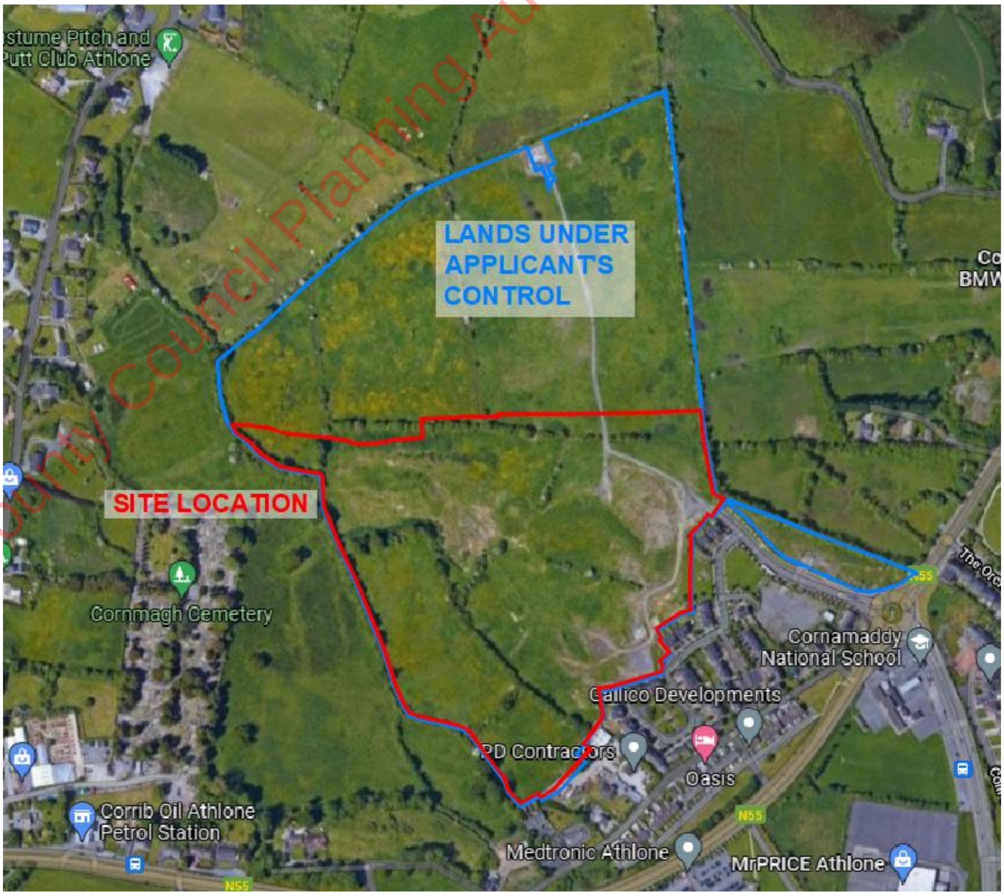


Figure 1 - Site Location

In 2009, the OPW and the then Department of the Environment and Local Government (DEHLG) published Guidelines on flood risk management for planning authorities entitled The Planning System and Flood Risk Management - Guidelines for Planning Authorities. The Guidelines introduce mechanisms for the incorporation of flood risk identification, assessment and management into the planning process. Implementation of the Guidelines is intended to be achieved through actions at the national, regional, local authority and site-specific levels. Planning authorities and An Bord Pleanála are required to have regard to the Guidelines in carrying out their functions under the Planning Acts. The core objectives of the Guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure that the requirements of EU and national law in relation to the natural environment and nature conservation are complied with at all stages of flood risk management.

There are three types or levels of flood zones defined for the purposes of the Flood Guidelines:

- Flood Zone A – where the probability of Developments within these areas are required to comply with the recommendations of the Planning System and Flood Risk Guidelines for Planning Authorities (DoEHLG / OPW 2009) flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding)

- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 and 0.5% or 1 in 200 for coastal flooding)
- Flood Zone C - where the probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas on the plan which are not in zones A or B.

Having reviewed the flood maps and the Westmeath Development Plan Flood Risk Assessment and Management Plan he appropriate zoning for the proposed site is **Zone C – Low Probability of Flooding**. Development in this zone is appropriate from a flood risk perspective (subject to assessment of flood hazard from sources other than rivers and the coast) but would need to meet the normal range of other proper planning and sustainability.

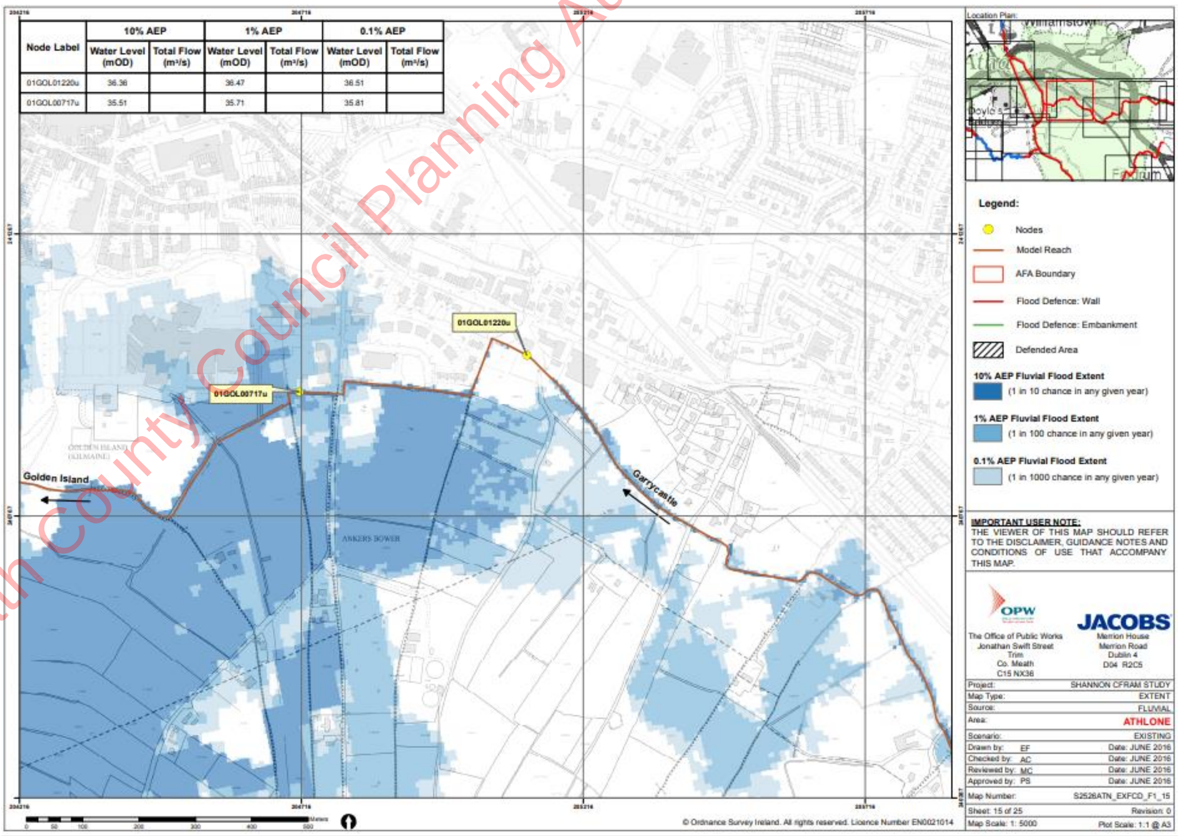


Figure 2 - Predicted Extreme 10% AEP (1 in 10 year), 1% AEP(1 in 100 year) and 0.1% AEP (1 in 1000 year) flood events (extracted from CFRAM fluvial flood maps)

Figure 2, above, extracted from CFRAM fluvial flood maps, illustrates the predicted extreme 10% AEP (1 in 10 year), 1% AEP(1 in 100 year) and 0.1% AEP (1 in 1000 year) flood events at one node point along the River. This is referenced as Node Label 01GOLO220u . Details of the predicted fluvial flood volumes levels for this node point are listened in the table below.

Table 1 - Table of CFRAMS Fluvial Maps – Predicted Flood Levels from Nearest Node (2km away)

Node Label	Water Level (mOD) 10% AEP	Water Level (mOD) 1% AEP	Water Level (mOD) 0.1% AEP
01GOLO220u	36.36	36.47	36.51

1.2 CLIMATE CHANGE

`The Planning System and Flood Risk Management – Guidelines for Planning Authorities' DOEHLG 2009 Technical Appendix A, Section 1.6 recommends that where mathematical models are not available climate change flood extents can be assessed by using the flood Zone B outline as a surrogate for Flood Zone A with allowance for the Possible impacts of climate change. Therefore, and in accordance with the recommendation above, the predicted 0.1% AEP flood level of 36.51m OD listed in the table above is considered to be representative of the 1% AEP plus the 20% climate change flood level.

1.3 ASSESSING FLOOD RISK IN THE CONTEXT OF CLIMATE CHANGE

The Flood Extents associated with the Node 01GOLO220u, as illustrated on the Figure 2, indicate that the proposed development site would not be impacted by a surrogate 1% AEP (1 in 100 year) future scenario climate change fluvial flood event in the River. The lowest finished floor level at the proposed development is 42.10m OD, which is 5.63m above the surrogate 1% AEP future change flood Level.

That proposed development site is therefore considered to be adequately protected in consideration of future scenario extreme fluvial flood event in the area.

1.4 COSTAL FLOODING

The site location is such that it is not affected by costal flooding and as such this is negligible.

1.5 TIDAL FLOODING

The site location is such that it is not affected by tidal water bodies and as such tidal flooding is negligible.

1.6 PLUVIAL FLOODING

The Surface Water network has been designed to mitigate the risk of pluvial flooding. Surface water runoff exceeding the allowable outflow rate for the catchment will be stored in a detention basin for rainfall events ups to a 1 in 100-year return period with an allowance for climate change of 20%. Previous flood events in the area can be reviewed on the Office of Public Works web site, www.floodmaps.ie.

Refer to submitted engineering report for further surface water design details.

1.7 POTENTIAL FOR SITE TO CONTRIBUTE TO OFF-SITE FLOODING

By restricting the flow to greenfield runoff rates and the addition of SUDS features within the proposed drainage system the likelihood of the proposed development adversely affecting the existing ditch or contributing to downstream flooding is mitigated.

PAUL Mc GRAIL
CONSULTING ENGINEERS LIMITED

2 CONCLUSION

The Flood Risk Assessment has concluded that the proposed development is considered to be adequately protected in consideration of future scenario of flood event in the area.

The site of the proposed development is within Zone C, as defined in paragraphs 5.1 and and is appropriate for the Proposed residential development from a flood risk perspective.

The Minimum Finished Floor Level is 42.10m O.D. which is 5.63mm above the 1% AEP Event.

Having reviewed the Athlone Flood Relief Scheme the majority of the flooding close to the site was caused by the river. This river is south of the site approximately 2km away.

We also reviewed past flood events close to the site and note that there was none recorded within 2.5km of the site.

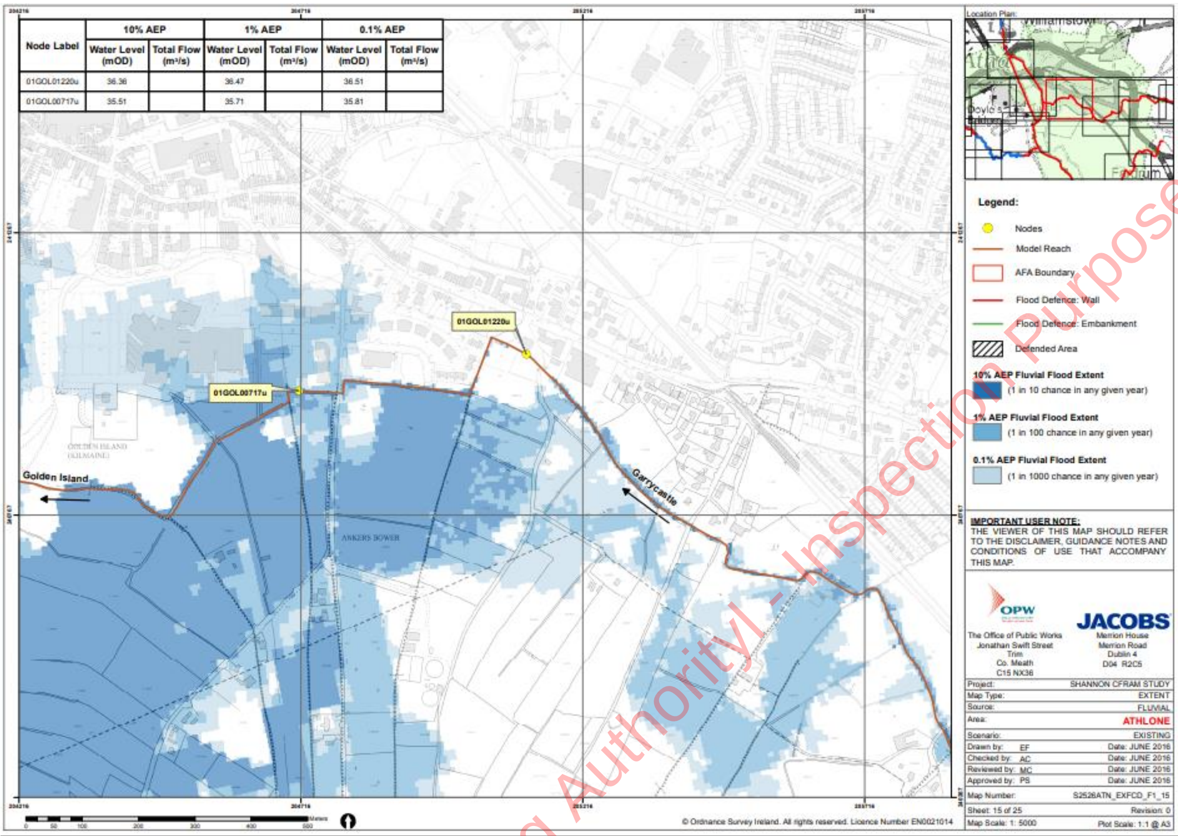
The Athlone Development Plan Flood Map (refer to Appendix A - Figure 5) shows that the site falls outside the extents of the 100 year Fluvial Flood event. This was also evident from the CFRAM maps.

Tidal flooding is not relevant as the site is approximately 40m above sea level.

Report By
Paul Mc Grail
Chartered Engineer
BSc.Eng, Dip.Eng, C.Eng, MIEI, Dip Proj Mang., Dip Conservation

APPENDIX A

EXTRACTS FROM FLOOD MAPS AND ATHLONE DEVELOPMENT PLAN FLOOD RISK ASSESSMENT AND MANAGEMENT PLAN



Node Label	10% AEP		1% AEP		0.1% AEP	
	Water Level (mOD)	Total Flow (m³/s)	Water Level (mOD)	Total Flow (m³/s)	Water Level (mOD)	Total Flow (m³/s)
01GOL01220u	36.36		36.47		36.51	
01GOL00717u	35.51		35.71		35.81	

Figure 1 - Fluvial All Probability

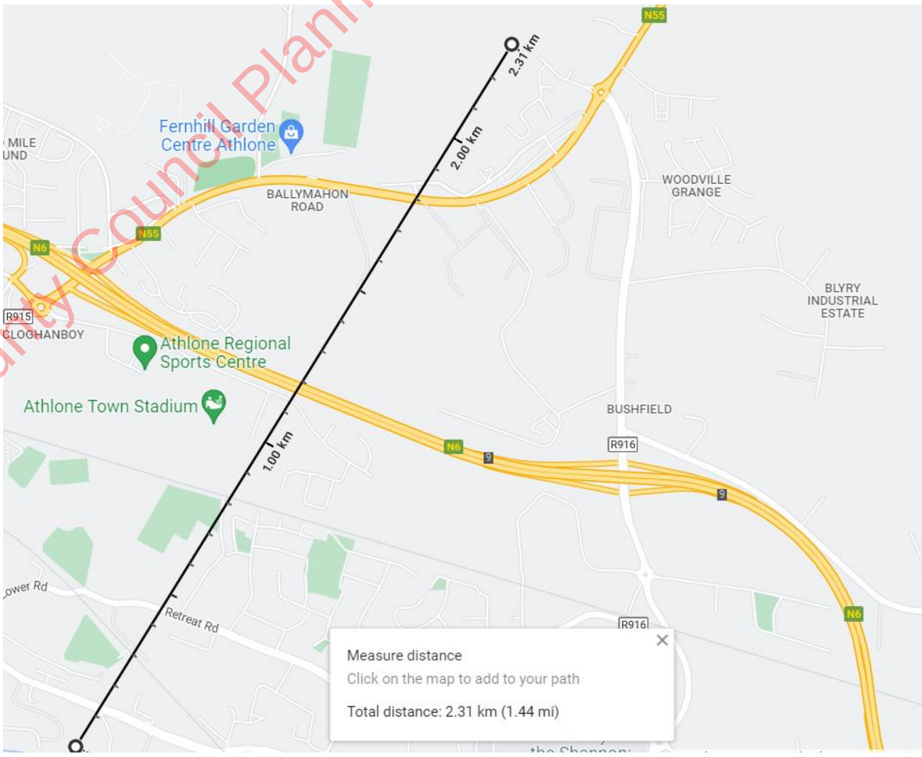


Figure 2 - Distance from Node

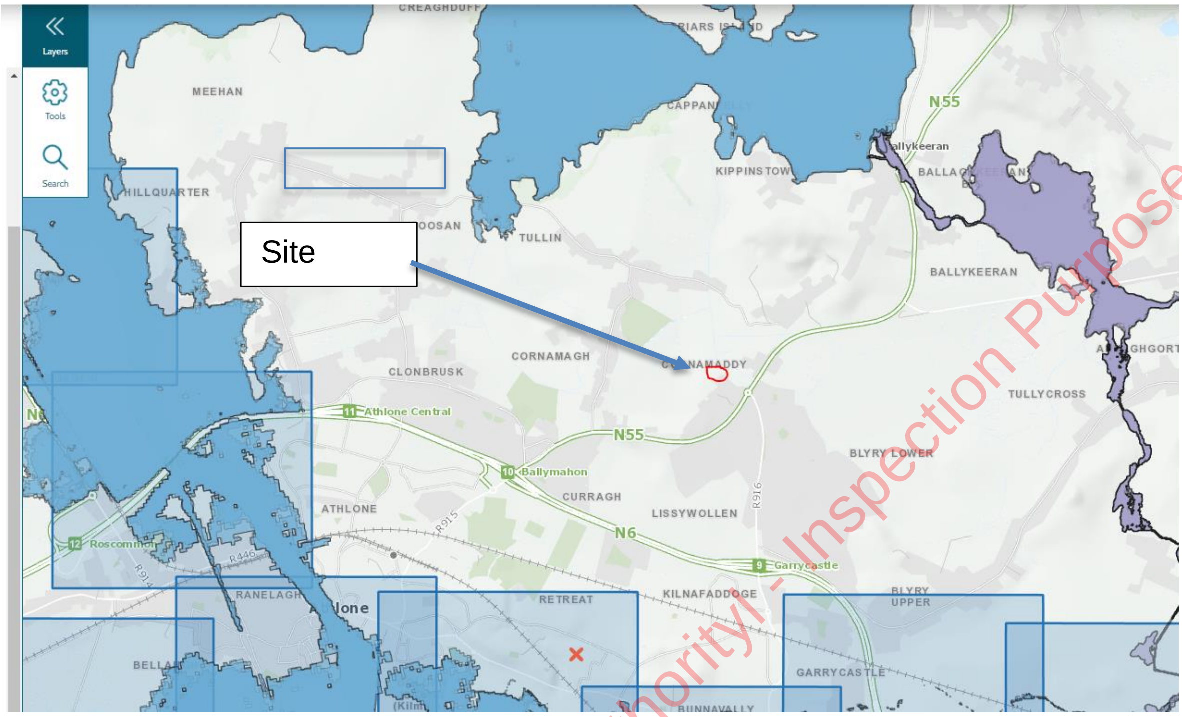


Figure 3 - Flood Extents all Probabilities

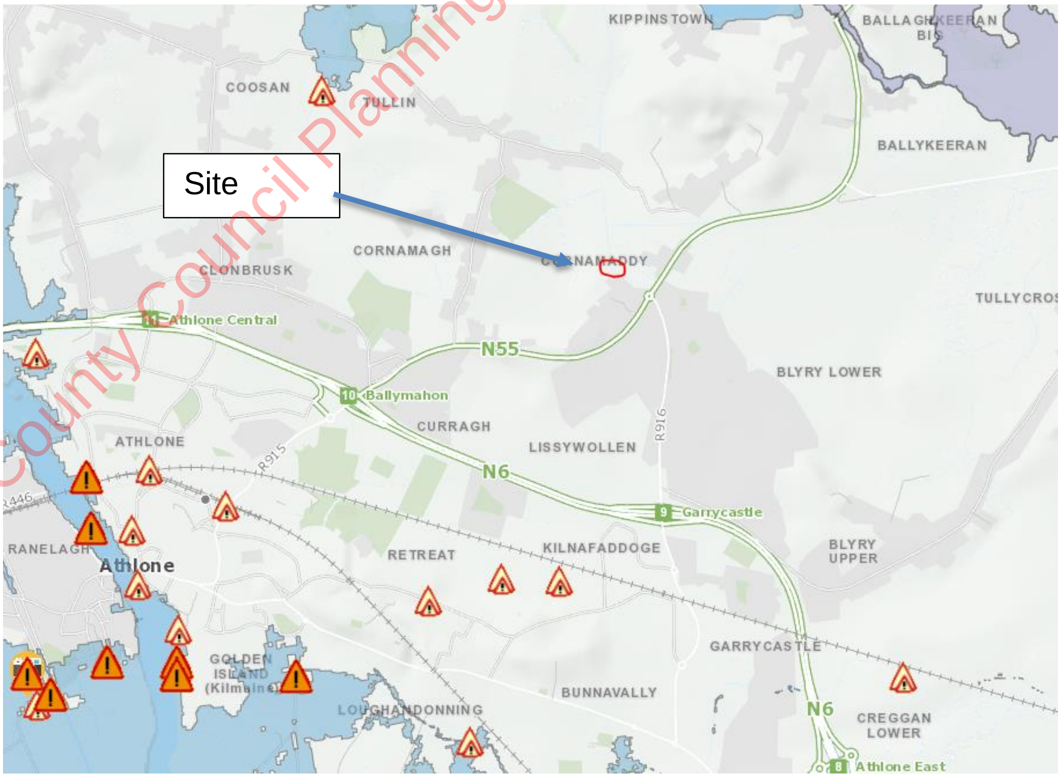


Figure 4 - Past Flood Events

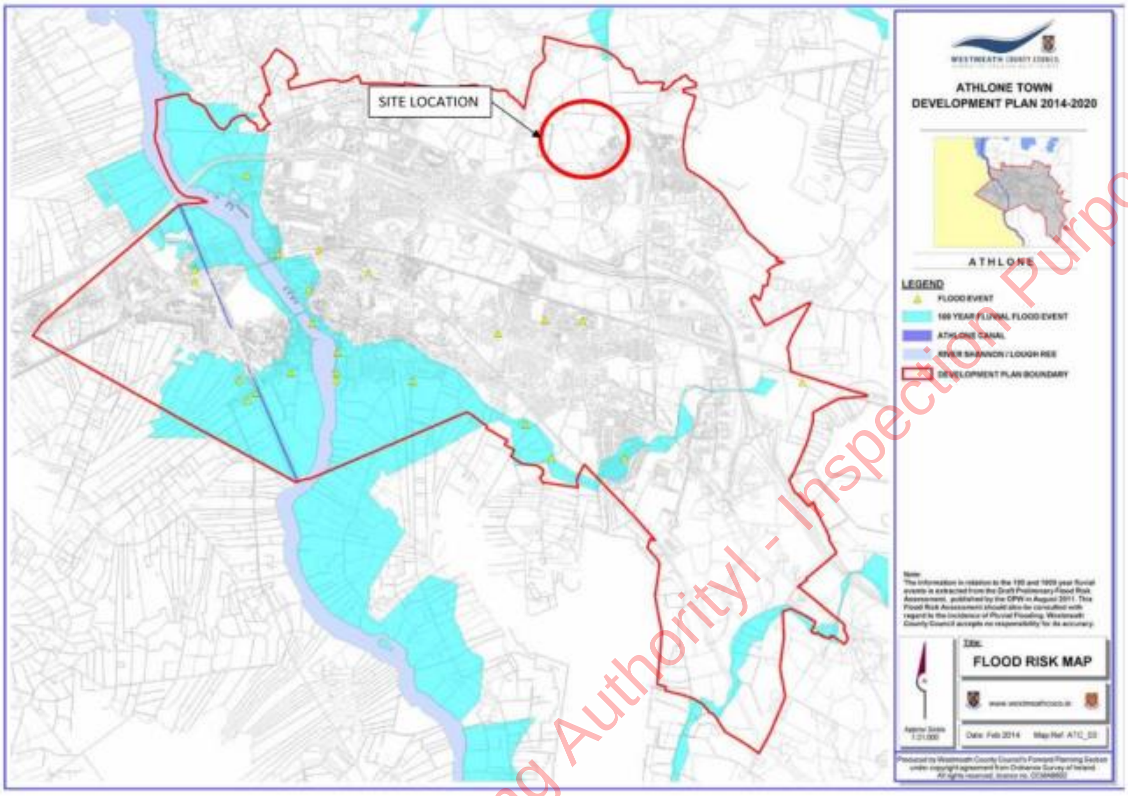


Figure 5 - Athlone Town Development Plan Flood Map

APPENDIX 12.1 – CULTURAL HERITAGE PHOTOGRAPHS

APPENDIX 12.1: CULTURAL HERITAGE PHOTOGRAPHIC RECORD

Plate 12.1 – View from north of existing road leading to south end of site

Plate 12.2– View from northwest of previously disturbed area in Field 1

Plate 12.3– View from southeast of access track and grass regrowth within previously disturbed area in Field 2

Plate 12.4– View from south of access track and pasture grassland within Field 3

Plate 12.5– View from southwest of overgrowth within level ground in north end of Field 4

Plate 12.6– View from south of area of overgrowth within Field 5

Plate 12.7– View from southeast of tree-lined field boundary forming townland division along west side of Field 5

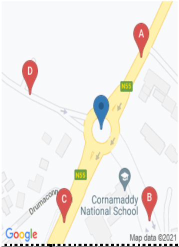
Plate 12.8– View from northwest of esker within Field 6

Plate 12.9– View of Field 7 from south

Plate 12.10– View of Field 8 from north

Plate 12.11– View of Field 9 from southeast

APPENDIX 13.1 – TRAFFIC COUNTS



IDASO

Survey Name: 160 21362 Athlone

Site: Site 1

Location: N55 / R916 Drumaconn

Date: Thu 30-Sep-2021

	A => A										A => B									
TIME	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
07:00	0	0	0	0	0	0	0	0	0	0	0	0	27	0	8	2	3	0	40	44.9
07:15	0	0	0	0	1	0	0	0	1	1	1	0	25	0	4	0	3	0	33	36.1
07:30	0	0	0	0	0	0	0	0	0	0	0	0	34	0	10	2	2	0	48	51.6
07:45	0	0	0	0	0	0	0	0	0	0	0	0	65	0	10	3	4	0	82	88.7
H/TOT	0	0	0	0	1	0	0	0	1	1	1	0	151	0	32	7	12	0	203	221.3
08:00	0	0	0	0	0	0	0	0	0	0	1	0	85	0	12	3	1	2	104	108
08:15	0	0	0	0	0	0	0	0	0	0	0	0	80	0	15	0	3	1	99	103.9
08:30	0	0	0	0	0	0	0	0	0	0	2	0	39	0	10	2	3	0	56	59.3
08:45	0	0	0	0	0	0	0	0	0	0	0	0	49	0	13	2	4	0	68	74.2
H/TOT	0	0	0	0	0	0	0	0	0	0	3	0	253	0	50	7	11	3	327	345.4
09:00	0	0	0	0	0	0	0	0	0	0	0	0	41	0	4	4	2	0	51	55.6
09:15	0	0	0	0	0	0	0	0	0	0	0	0	50	0	6	6	1	0	63	67.3
09:30	0	0	0	0	0	0	0	0	0	0	0	0	44	0	4	3	1	0	52	54.8
09:45	0	0	0	0	0	0	0	0	0	0	0	0	37	0	6	3	2	0	48	52.1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	172	0	20	16	6	0	214	229.8
10:00	0	0	0	0	0	0	0	0	0	0	0	0	43	0	4	6	1	0	54	58.3
10:15	0	0	0	0	0	0	0	0	0	0	0	0	29	0	3	1	3	0	36	40.4
10:30	0	0	0	0	0	0	0	0	0	0	0	0	34	0	3	0	2	0	39	41.6
10:45	0	0	0	0	0	0	0	0	0	0	0	0	38	0	9	3	2	0	52	56.1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	144	0	19	10	8	0	181	196.4
11:00	0	0	0	0	0	0	0	0	0	0	0	0	36	0	5	2	3	0	46	50.9
11:15	0	0	0	0	0	0	0	0	0	0	0	0	29	0	7	3	1	0	40	42.8
11:30	0	0	0	0	0	0	0	0	0	0	0	0	23	0	5	2	2	0	32	35.6
11:45	0	0	0	0	0	0	0	0	0	0	0	0	34	1	10	7	2	0	54	60.1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	122	1	27	14	8	0	172	189.4
12:00	0	0	1	0	0	0	0	0	1	1	0	0	31	0	3	3	4	0	41	47.7
12:15	0	0	0	0	0	0	0	0	0	0	0	0	44	0	7	2	3	0	56	60.9
12:30	0	0	0	0	0	0	0	0	0	0	0	0	27	0	4	2	3	0	36	40.9
12:45	0	0	0	0	0	0	0	0	0	0	0	0	33	0	9	3	2	0	47	51.1
H/TOT	0	0	1	0	0	0	0	0	1	1	0	0	135	0	23	10	12	0	180	200.6
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13:15	0	0	0	0	0	0	0	0	0	0	0	0	34	1	5	5	3	0	48	54.4
13:30	0	0	0	0	0	0	0	0	0	0	0	0	34	0	5	1	5	1	46	54
13:45	0	0	0	0	0	0	0	0	0	0	1	0	35	0	5	4	0	0	45	46.2
H/TOT	0	0	0	0	0	0	0	0	0	0	1	0	136	1	22	12	9	1	182	199.9
14:00	0	0	0	0	0	0	0	0	0	0	0	0	31	0	4	2	0	0	37	38
14:15	0	0	0	0	0	0	0	0	0	0	0	0	43	0	12	2	2	0	59	62.6
14:30	0	0	0	0	0	0	0	0	0	0	0	0	48	0	7	1	1	0	57	58.8
14:45	0	0	0	0	0	0	0	0	0	0	0	0	43	0	5	4	2	0	54	58.6
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	165	0	28	9	5	0	207	218
15:00	0	0	0	0	0	0	0	0	0	0	0	0	46	0	5	3	2	2	58	64.1
15:15	0	0	0	0	0	0	0	0	0	0	0	1	48	0	3	4	0	2	58	61.4
15:30	0	0	0	0	0	0	0	0	0	0	0	0	47	1	6	3	7	1	65	76.6
15:45	0	0	0	0	0	0	0	0	0	0	0	0	33	0	5	3	2	0	43	47.1
H/TOT	0	0	0	0	0	0	0	0	0	0	0	1	174	1	19	13	11	5	224	249.2
16:00	0	0	1	0	0	0	0	0	1	1	0	0	44	1	5	1	2	0	53	56.1
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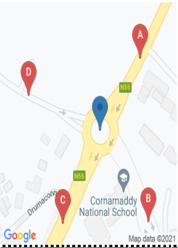
16:30	0	0	0	0	0	0	0	0	0	0	0	0	47	0	8	1	4	0	60	65.7
16:45	0	0	0	0	0	0	0	0	0	0	1	0	43	0	10	0	0	1	55	55.2
H/TOT	0	0	2	0	0	0	0	0	2	2	1	0	176	1	34	3	7	1	223	233.8
17:00	0	0	0	0	0	0	0	0	0	0	0	0	30	0	7	2	3	0	42	46.9
17:15	0	0	0	0	0	0	0	0	0	0	0	1	42	0	5	1	2	0	51	53.5
17:30	0	0	0	0	0	0	0	0	0	0	1	0	58	0	4	1	1	0	65	66
17:45	0	0	0	0	1	0	0	0	1	1	0	0	40	0	5	1	0	0	46	46.5
H/TOT	0	0	0	0	1	0	0	0	1	1	1	1	170	0	21	5	6	0	204	212.9
18:00	0	0	0	0	0	0	0	0	0	0	0	0	52	0	7	1	4	0	64	69.7
18:15	0	0	0	0	0	0	0	0	0	0	0	0	50	0	10	2	0	0	62	63
18:30	0	0	0	0	0	0	0	0	0	0	0	0	37	0	2	0	2	0	41	43.6
18:45	0	0	0	0	0	0	0	0	0	0	0	0	22	0	3	1	1	0	27	28.8
H/TOT	0	0	0	0	0	0	0	0	0	0	0	0	161	0	22	4	7	0	194	205.1
12 TOT	0	0	3	0	2	0	0	0	5	5	7	2	1959	4	317	110	102	10	2511	2701.8

	A => C										A => D									
TIME	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
07:00	0	0	22	0	6	0	0	0	28	28	0	0	0	0	0	0	0	0	0	0
07:15	0	0	41	0	6	1	1	2	51	54.8	0	0	0	0	0	0	0	0	0	0
07:30	0	0	49	0	8	0	5	1	63	70.5	0	0	2	0	0	0	0	0	2	2
07:45	0	0	51	2	14	4	3	1	75	81.9	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	163	2	34	5	9	4	217	235.2	0	0	2	0	0	0	0	0	2	2
08:00	1	0	63	0	8	1	2	2	77	81.3	0	0	0	0	0	0	0	0	0	0
08:15	0	0	123	1	10	2	2	3	141	147.6	0	0	0	0	1	0	0	0	1	1
08:30	0	0	102	0	10	1	1	1	115	117.8	0	0	0	0	0	0	0	0	0	0
08:45	0	0	98	1	13	1	3	0	116	120.4	0	0	0	0	0	0	0	0	0	0
H/TOT	1	0	386	2	41	5	8	6	449	467.1	0	0	0	0	1	0	0	0	1	1
09:00	0	0	82	0	15	3	2	0	102	106.1	0	0	0	0	0	0	0	0	0	0
09:15	0	0	84	0	6	2	0	0	92	93	0	0	0	0	0	0	0	0	0	0
09:30	0	0	45	0	9	2	1	0	57	59.3	0	0	1	0	0	0	0	0	1	1
09:45	0	0	59	1	6	3	1	0	70	72.8	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	270	1	36	10	4	0	321	331.2	0	0	1	0	0	0	0	0	1	1
10:00	0	0	40	0	2	3	1	0	46	48.8	0	0	0	0	0	0	0	0	0	0
10:15	0	0	48	0	6	5	0	0	59	61.5	0	0	0	0	0	0	0	0	0	0
10:30	0	0	48	0	3	1	0	0	52	52.5	0	0	0	0	0	0	0	0	0	0
10:45	0	0	48	0	5	2	1	0	56	58.3	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	184	0	16	11	2	0	213	221.1	0	0	0	0	0	0	0	0	0	0
11:00	0	0	54	0	4	4	1	1	64	68.3	0	0	0	0	0	0	0	0	0	0
11:15	0	0	50	0	5	0	0	0	55	55	0	0	0	0	0	0	0	0	0	0
11:30	0	0	39	0	4	2	1	0	46	48.3	0	0	0	0	0	0	0	0	0	0
11:45	0	0	44	1	3	2	1	0	51	53.3	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	187	1	16	8	3	1	216	224.9	0	0	0	0	0	0	0	0	0	0
12:00	0	0	51	0	3	3	4	0	61	67.7	0	0	0	0	0	0	0	0	0	0
12:15	0	0	65	1	4	0	2	0	72	74.6	0	0	0	0	0	0	0	0	0	0
12:30	0	1	46	0	5	3	2	0	57	60.5	0	0	0	0	0	0	0	0	0	0
12:45	0	0	44	2	4	3	3	0	56	61.4	0	0	0	0	0	0	0	0	0	0
H/TOT	0	1	206	3	16	9	11	0	246	264.2	0	0	0	0	0	0	0	0	0	0
13:00	1	0	44	0	6	1	1	0	53	54	0	0	0	0	0	0	0	0	0	0
13:15	0	0	45	1	6	4	2	0	58	62.6	0	0	0	0	0	0	0	0	0	0
13:30	0	0	49	2	10	0	0	0	61	61	0	0	0	0	0	0	0	0	0	0
13:45	0	0	34	1	3	2	2	2	44	49.6	0	0	1	0	1	0	0	0	2	2
H/TOT	1	0	172	4	25	7	5	2	216	227.2	0	0	1	0	1	0	0	0	2	2
14:00	0	0	46	0	3	3	1	0	53	55.8	0	0	0	0	0	0	0	0	0	0
14:15	0	0	53	1	5	3	0	0	62	63.5	0	0	1	0	0	0	0	0	1	1
14:30	0	0	48	0	7	0	0	0	55	55	0	0	2	0	0	0	0	0	2	2
14:45	1	0	77	0	11	3	4	2	98	105.9	0	0	0	0	0	0	0	0	0	0
H/TOT	1	0	224	1	26	9	5	2	268	280.2	0	0	3	0	0	0	0	0	3	3
15:00	0	0	69	0	10	3	1	0	83	85.8	0	0	5	0	0	0	0	0	5	5
15:15	0	0	63	0	5	1	0	0	69	69.5	0	0	0	0	0	0	0	0	0	0
15:30	0	0	52	0	10	1	1	1	65	67.8	0	0	0	0	0	0	0	0	0	0
15:45	0	0	52	0	5	0	0	1	58	59	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	236	0	30	5	2	2	275	282.1	0	0	5	0	0	0	0	0	5	5
16:00	0	0	56	1	5	2	0	0	64	65	0	0	1	0	0	0	0	0	1	1
16:15	0	0	55	1	8	2	0	0	66	67	0	0	0	0	0	0	0	0	0	0
16:30	0	0	62	0	4	1	0	0	67	67.5	0	0	0	0	0	0	0	0	0	0
16:45	0	0	51	0	11	0	0	0	62	62	0	0	0	0	1	0	0	0	1	1
H/TOT	0	0	224	2	28	5	0	0	259	261.5	0	0	1	0	1	0	0	0	2	2
17:00	0	0	68	2	10	0	2	0	82	84.6	0	0	0	0	0	0	0	0	0	0
17:15	0	0	60	0	9	1	1	0	71	72.8	0	0	0	0	0	0	0	0	0	0
17:30	0	0	63	1	11	3	1	0	79	81.8	0	0	0	0	0	0	0	0	0	0
17:45	0	0	62	0	2	0	0	0	64	64	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	253	3	32	4	4	0	296	303.2	0	0	0	0	0	0	0	0	0	0
18:00	0	0	74	1	5	0	0	0	80	80	0	0	0	0	0	0	0	0	0	0
18:15	0	0	50	1	6	2	0	0	59	60	0	0	0	0	0	0	0	0	0	0
18:30	0	0	63	1	4	0	0	0	68	68	0	0	0	0	0	0	0	0	0	0
18:45	0	0	58	0	4	1	1	0	64	65.8	0	0	0	0	0	0	0	0	0	0
H/TOT	0	0	245	3	19	3	1	0	271	273.8	0	0	0	0	0	0	0	0	0	0
12 TOT	3	1	2750	22	319	81	54	17	3247	3371.7	0	0	13	0	3	0	0	0	16	16



B => A										B => B										B => C										B => D									
P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
0	0	9	0	3	4	0	0	16	18	0	0	0	0	1	0	0	0	1	1	0	0	8	0	0	0	0	0	8	8	0	0	0	0	0	0	0	0	0	0
0	0	9	0	3	0	1	0	13	14.3	0	0	0	0	0	0	0	0	0	0	0	0	17	1	3	0	2	0	23	25.6	0	0	1	0	0	0	0	0	1	1
0	0	14	0	4	0	0	0	18	18	0	0	0	0	0	0	0	0	0	0	1	0	19	0	1	1	1	0	23	24	0	0	0	0	0	0	0	0	0	0
0	0	11	0	8	3	2	0	24	28.1	0	0	0	0	0	0	0	0	0	0	1	0	29	0	4	0	0	0	34	33.2	0	0	0	0	0	0	0	0	0	0
0	0	43	0	18	7	3	0	71	78.4	0	0	0	0	1	0	0	0	1	1	2	0	73	1	8	1	3	0	88	90.8	0	0	1	0	0	0	0	0	1	1
0	0	17	1	9	1	2	1	31	35.1	0	0	0	0	0	0	0	0	0	0	1	0	10	0	3	0	0	3	17	19.2	0	0	0	0	0	0	0	0	0	0
0	0	22	1	6	1	1	3	34	38.8	0	0	0	0	0	0	0	0	0	0	0	0	33	1	7	2	0	1	44	46	0	0	1	0	0	0	0	0	1	1
0	0	40	1	4	1	4	2	52	59.7	0	0	0	0	0	0	0	0	0	0	0	0	33	0	5	2	0	2	42	45	0	0	3	0	0	0	0	0	3	3
0	0	42	0	4	4	3	2	55	62.9	0	0	1	0	0	0	0	0	1	1	0	0	35	2	4	1	0	2	44	46.5	0	0	3	0	0	0	0	0	3	3
0	0	121	3	23	7	10	8	172	196.5	0	0	1	0	0	0	0	0	1	1	1	0	111	3	19	5	0	8	147	156.7	0	0	7	0	0	0	0	0	7	7
0	0	39	0	13	2	2	0	56	59.6	0	0	7	0	0	0	0	0	7	7	0	0	47	0	1	0	1	0	49	50.3	0	0	2	0	1	0	0	0	3	3
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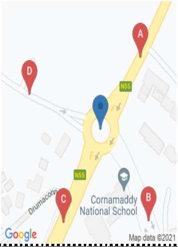

C => A										C => B										C => C										C => D									
P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
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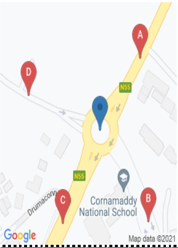
3	2	2838	19	323	94	74	11	3364	3514.6	10	1	1152	7	140	35	7	33	1385	1436	0	0	8	0	2	2	0	1	13	15	1	0	87	2	8	2	0	0	100	100.2



D => A										D => B										D => C										D => D									
P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU	P/C	M/C	CAR	TAXI	LGV	OGV1	OGV2	PSV	TOT	PCU
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APPENDIX 13.2 – TRAFFIC FLOW SHEETS

N55 / R916 / L8048 Roundabout - AM Peak Hour Flows

2021 AM Peak - Base Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	274	474	1	**749**
R916	197	8	179	10	**394**
N55 (south)	284	113	2	7	**406**
L8048	7	14	24	0	**45**
Totals	**488**	**409**	**679**	**18**	**1594**

2024 AM Peak - No Development (Base Flows + 3.95%)

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	285	493	1	**779**
R916	205	8	186	10	**410**
N55 (south)	295	117	2	7	**422**
L8048	7	15	25	0	**47**
Totals	**507**	**425**	**706**	**19**	**1657**

AM Peak - Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	0	0	1	**1**
R916	0	0	0	7	**7**
N55 (south)	0	0	0	4	**4**
L8048	4	9	17	0	**30**
Totals	**4**	**9**	**17**	**12**	**42**

AM Peak - Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	0	0	1	**1**
R916	0	0	0	7	**7**
N55 (south)	0	0	0	5	**5**
L8048	5	10	18	0	**33**
Totals	**5**	**10**	**18**	**13**	**46**

2024 AM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	285	493	3	**781**
R916	205	8	186	24	**424**
N55 (south)	295	117	2	16	**431**
L8048	16	34	60	0	**110**
Totals	**516**	**444**	**741**	**44**	**1745**

2029 AM Peak - No Development (Base Flows + 10.89%)

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	304	526	1	**831**
R916	218	9	198	11	**437**
N55 (south)	315	125	2	8	**450**
L8048	8	16	27	0	**50**
Totals	**541**	**454**	**753**	**20**	**1768**

2029 AM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	304	526	3	**833**
R916	218	9	198	25	**451**
N55 (south)	315	125	2	17	**459**
L8048	17	35	62	0	**113**
Totals	**550**	**473**	**788**	**45**	**1856**

2039 AM Peak - No Development (Base Flows + 15.79%)

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	317	549	1	**867**
R916	228	9	207	12	**456**
N55 (south)	329	131	2	8	**470**
L8048	8	16	28	0	**52**
Totals	**565**	**474**	**786**	**21**	**1846**

2039 AM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	317	549	3	**869**
R916	228	9	207	26	**470**
N55 (south)	329	131	2	17	**479**
L8048	17	35	63	0	**115**
Totals	**574**	**493**	**821**	**46**	**1934**

AM Peak - Future Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	0	0	5	**5**
R916	0	0	0	51	**51**
N55 (south)	0	0	0	36	**36**
L8048	23	47	86	0	**156**
Totals	**23**	**47**	**86**	**92**	**248**

2039 AM Peak - Development Flows + Committed Development Flows + Future Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	317	549	8	**874**
R916	228	9	207	77	**521**
N55 (south)	329	131	2	53	**515**
L8048	40	82	149	0	**271**
Totals	**597**	**540**	**907**	**138**	**2182**

N55 / R916 / L8048 Roundabout - PM Peak Hour Flows

2021 PM Peak - Base Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	1	202	296	1	**500**
R916	364	5	115	14	**498**
N55 (south)	511	136	0	9	**656**
L8048	1	6	3	0	**10**
Totals	**877**	**349**	**414**	**24**	**1664**

2024 PM Peak - No Development (Base Flows + 3.95%)

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	1	210	308	1	**520**
R916	378	5	120	15	**518**
N55 (south)	531	141	0	9	**682**
L8048	1	6	3	0	**10**
Totals	**912**	**363**	**430**	**25**	**1730**

PM Peak - Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	0	0	1	**1**
R916	0	0	0	17	**17**
N55 (south)	0	0	0	10	**10**
L8048	2	10	5	0	**17**
Totals	**2**	**10**	**5**	**28**	**45**

PM Peak - Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	0	0	2	**2**
R916	0	0	0	18	**18**
N55 (south)	0	0	0	10	**10**
L8048	2	11	5	0	**18**
Totals	**2**	**11**	**5**	**30**	**48**

2024 PM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	1	210	308	4	**523**
R916	378	5	120	50	**553**
N55 (south)	531	141	0	29	**702**
L8048	5	27	13	0	**45**
Totals	**916**	**384**	**440**	**83**	**1823**

2029 PM Peak - No Development (Base Flows + 10.89%)

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	1	224	328	1	**554**
R916	404	6	128	16	**552**
N55 (south)	567	151	0	10	**727**
L8048	1	7	3	0	**11**
Totals	**973**	**387**	**459**	**27**	**1845**

2029 PM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	1	224	328	4	**557**
R916	404	6	128	51	**587**
N55 (south)	567	151	0	30	**747**
L8048	5	28	13	0	**46**
Totals	**977**	**408**	**469**	**85**	**1938**

2039 PM Peak - No Development (Base Flows + 15.79%)

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	1	234	343	1	**579**
R916	421	6	133	16	**577**
N55 (south)	592	157	0	10	**760**
L8048	1	7	3	0	**12**
Totals	**1015**	**404**	**479**	**28**	**1927**

2039 PM Peak - With Development Flows + Committed Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	1	234	343	4	**582**
R916	421	6	133	51	**612**
N55 (south)	592	157	0	30	**780**
L8048	5	28	13	0	**47**
Totals	**1019**	**425**	**489**	**86**	**2020**

PM Peak - Future Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	0	0	0	7	**7**
R916	0	0	0	88	**88**
N55 (south)	0	0	0	52	**52**
L8048	11	64	32	0	**107**
Totals	**11**	**64**	**32**	**147**	**254**

2039 PM Peak - Development Flows + Committed Development Flows + Future Development Flows

	N55 (north)	R916	N55 (south)	L8048	**Totals**
N55 (north)	1	234	343	11	**589**
R916	421	6	133	139	**700**
N55 (south)	592	157	0	82	**832**
L8048	16	92	45	0	**154**
Totals	**1030**	**489**	**521**	**233**	**2274**

APPENDIX 13.3 – TRICS DATA

Calculation Reference: AUDIT-464201-190123-0159

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : A - HOUSES PRIVATELY OWNED
VEHICLES

Selected regions and areas:

13	MUNSTER		
	WA	WATERFORD	1 days
15	GREATER DUBLIN		
	DL	DUBLIN	2 days
16	ULSTER (REPUBLIC OF IRELAND)		
	DN	DONEGAL	1 days

Secondary Filtering selection:

Parameter: Number of dwellings
Actual Range: 146 to 280 (units:)
Range Selected by User: 100 to 500 (units:)

Parking Spaces Range: Selected: 16 to 982 Actual: 16 to 982

Percentage of dwellings privately owned: All Surveys Included

Public Transport Provision:
Selection by: Include all surveys

Date Range: 01/01/10 to 03/09/14

Selected survey days:
Tuesday 2 days
Wednesday 1 days
Friday 1 days

Selected survey types:
Manual count 4 days
Directional ATC Count 0 days

Selected Locations:
Suburban Area (PPS6 Out of Centre) 1
Edge of Town 2
Neighbourhood Centre (PPS6 Local Centre) 1

Selected Location Sub Categories:
Residential Zone 4

Secondary Filtering selection:

Use Class:
C3 4 days

Population within 1 mile:
10,001 to 15,000 2 days
25,001 to 50,000 2 days

Population within 5 miles:
5,001 to 25,000 1 days
50,001 to 75,000 1 days
500,001 or More 2 days

Car ownership within 5 miles:
1.1 to 1.5 4 days

Travel Plan:
No 4 days

PTAL Rating:
No PTAL Present 4 days

LIST OF SITES relevant to selection parameters

1 DL-03-A-03 TERRACED/SEMI-DET. DUBLIN
RAHENY ROAD
DUBLIN
RAHENY
Neighbourhood Centre (PPS6 Local Centre)
Residential Zone
Total Number of dwellings: 206
Survey date: TUESDAY 20/04/10 Survey Type: MANUAL

2 DL-03-A-06 DETACHED DUBLIN
UPPER KILMACUD ROAD
DUBLIN
DUNDRUM
Edge of Town
Residential Zone
Total Number of dwellings: 147
Survey date: FRIDAY 30/04/10 Survey Type: MANUAL

3 DN-03-A-05 DETACHED/SEMI-DETACHED DONEGAL
GORTLEE ROAD
LETTERKENNY
GORTLEE
Suburban Area (PPS6 Out of Centre)
Residential Zone
Total Number of dwellings: 146
Survey date: WEDNESDAY 03/09/14 Survey Type: MANUAL

4 WA-03-A-04 DETACHED WATERFORD
MAYPARK LANE
WATERFORD

Edge of Town
Residential Zone
Total Number of dwellings: 280
Survey date: TUESDAY 24/06/14 Survey Type: MANUAL

TRIP RATE for Land Use 03 - RESIDENTIAL/A - HOUSES PRIVATELY OWNED
VEHICLES
Calculation factor: 1 DWELLS
BOLD print indicates peak (busiest) period

	ARRIVALS			DEPARTURES			TOTALS		
Time Range	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate	No. Days	Ave. DWELLS	Trip Rate
00:00 - 01:00									
01:00 - 02:00									
02:00 - 03:00									
03:00 - 04:00									
04:00 - 05:00									
05:00 - 06:00									
06:00 - 07:00									
07:00 - 08:00	4	195	0.047	4	195	0.187	4	195	0.234
08:00 - 09:00	4	195	0.168	4	195	**0.433**	4	195	0.601
09:00 - 10:00	4	195	0.168	4	195	0.243	4	195	0.411
10:00 - 11:00	4	195	0.168	4	195	0.189	4	195	0.357
11:00 - 12:00	4	195	0.184	4	195	0.227	4	195	0.411
12:00 - 13:00	4	195	0.272	4	195	0.258	4	195	0.530
13:00 - 14:00	4	195	0.241	4	195	0.218	4	195	0.459
14:00 - 15:00	4	195	0.280	4	195	0.263	4	195	0.543
15:00 - 16:00	4	195	0.297	4	195	0.228	4	195	0.525
16:00 - 17:00	4	195	0.308	4	195	0.211	4	195	0.519
17:00 - 18:00	4	195	**0.399**	4	195	0.241	4	195	**0.640**
18:00 - 19:00	4	195	0.298	4	195	0.263	4	195	0.561
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.830			2.961			5.791

Parameter summary

Trip rate parameter range selected:	146 - 280 (units:)
Survey date date range:	01/01/10 - 03/09/14
Number of weekdays (Monday-Friday):	4
Number of Saturdays:	0
Number of Sundays:	0
Surveys automatically removed from selection:	0
Surveys manually removed from selection:	0

APPENDIX 13.4 – ARCADY RESULTS

Junctions 9

ARCADY 9 - Roundabout 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: Roundabout Junction.j9
Path: S:\Jobs\2021\21129 LSHD x 2 Athlone TIA+RSA\21129-04 Application 3\Reports\Working\ARCADY
Report generation date: 11/11/2022 12:44:32

Summary of junction performance

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
	2021							
Arm 1	1.2	5.16	0.54	A	0.6	3.67	0.36	A
Arm 2	0.6	5.05	0.38	A	0.7	4.89	0.43	A
Arm 3	0.4	3.44	0.30	A	1.1	5.58	0.53	A
Arm 4	0.1	3.67	0.05	A	0.0	4.84	0.01	A
	2024 no dev							
Arm 1	1.3	5.45	0.57	A	0.6	3.77	0.38	A
Arm 2	0.7	5.27	0.40	A	0.8	5.10	0.45	A
Arm 3	0.5	3.52	0.31	A	1.2	5.94	0.55	A
Arm 4	0.1	3.74	0.05	A	0.0	5.02	0.02	A
	2024 with dev+ committed							
Arm 1	1.4	5.83	0.58	A	0.6	3.88	0.38	A
Arm 2	0.7	5.61	0.42	A	0.9	5.47	0.48	A
Arm 3	0.5	3.60	0.32	A	1.4	6.47	0.58	A
Arm 4	0.1	4.03	0.12	A	0.1	5.30	0.07	A
	2029 no dev							
Arm 1	1.5	6.06	0.61	A	0.7	3.96	0.40	A
Arm 2	0.8	5.72	0.43	A	0.9	5.52	0.48	A
Arm 3	0.5	3.67	0.34	A	1.5	6.74	0.60	A
Arm 4	0.1	3.87	0.06	A	0.0	5.39	0.02	A
	2029 with dev+ committed							
Arm 1	1.6	6.52	0.62	A	0.7	4.08	0.41	A
Arm 2	0.8	6.12	0.46	A	1.1	5.95	0.52	A
Arm 3	0.5	3.76	0.35	A	1.7	7.43	0.63	A
Arm 4	0.1	4.18	0.13	A	0.1	5.72	0.07	A
	2039 no dev							
Arm 1	1.7	6.55	0.63	A	0.7	4.11	0.42	A
Arm 2	0.8	6.09	0.46	A	1.0	5.82	0.51	A
Arm 3	0.5	3.79	0.35	A	1.7	7.38	0.63	A
Arm 4	0.1	3.96	0.06	A	0.0	5.66	0.02	A
	2039 with dev+ committed							
Arm 1	1.9	7.10	0.65	A	0.8	4.24	0.43	A
Arm 2	0.9	6.55	0.48	A	1.2	6.31	0.54	A
Arm 3	0.6	3.88	0.36	A	1.9	8.22	0.66	A
Arm 4	0.2	4.28	0.13	A	0.1	6.03	0.08	A
	2039 with dev+ Commit+Future Flows							
Arm 1	2.4	8.93	0.70	A	0.8	4.67	0.46	A
Arm 2	1.3	8.35	0.57	A	1.7	8.05	0.63	A
Arm 3	0.7	4.25	0.40	A	2.9	11.56	0.75	B
Arm 4	0.4	5.38	0.31	A	0.3	7.51	0.26	A

There are warnings associated with one or more model runs - see the 'Data Errors and Warnings' tables for each Analysis or Demand Set.

Values shown are the highest values encountered over all time segments. Delay is the maximum value of average delay per arriving vehicle.

File summary

File Description

Title	
Location	
Site number	
Date	07/03/2022
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	2021	AM	ONE HOUR	07:45	09:15	15	✓
D2	2021	PM	ONE HOUR	16:45	18:15	15	✓
D3	2024 no dev	AM	ONE HOUR	07:45	09:15	15	✓
D4	2024 no dev	PM	ONE HOUR	16:45	18:15	15	✓
D5	2024 with dev+ committed	AM	ONE HOUR	07:45	09:15	15	✓
D6	2024 with dev+ committed	PM	ONE HOUR	16:45	18:15	15	✓
D7	2029 no dev	AM	ONE HOUR	07:45	09:15	15	✓
D8	2029 no dev	PM	ONE HOUR	16:45	18:15	15	✓
D9	2029 with dev+ committed	AM	ONE HOUR	07:45	09:15	15	✓
D10	2029 with dev+ committed	PM	ONE HOUR	16:45	18:15	15	✓
D11	2039 no dev	AM	ONE HOUR	07:45	09:15	15	✓
D12	2039 no dev	PM	ONE HOUR	16:45	18:15	15	✓
D13	2039 with dev+ committed	AM	ONE HOUR	07:45	09:15	15	✓
D14	2039 with dev+ committed	PM	ONE HOUR	16:45	18:15	15	✓
D15	2039 with dev+ Commit+Future Flows	AM	ONE HOUR	07:45	09:15	15	✓
D16	2039 with dev+ Commit+Future Flows	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

2021, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	4.65	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description
1	N55 (north)	
2	R916	
3	N55 (south)	
4	L8048	

Roundabout Geometry

Arm	V - Approach road half-width (m)	E - Entry width (m)	l' - Effective flare length (m)	R - Entry radius (m)	D - Inscribed circle diameter (m)	PHI - Conflict (entry) angle (deg)	Exit only
1	3.20	6.00	40.0	25.0	45.0	8.0	
2	3.20	6.00	25.0	18.0	45.0	20.0	
3	3.20	6.50	30.0	20.0	45.0	12.0	
4	3.40	6.20	15.0	20.0	45.0	27.0	

Slope / Intercept / Capacity

Roundabout Slope and Intercept used in model

Arm	Final slope	Final intercept (PCU/hr)
1	0.674	1806
2	0.625	1641
3	0.669	1816
4	0.607	1578

The slope and intercept shown above include any corrections and adjustments.

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	2021	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 (%)
1		ONE HOUR	✓	749	100.000
2		ONE HOUR	✓	394	100.000
3		ONE HOUR	✓	406	100.000
4		ONE HOUR	✓	45	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	274	474	1
	2	197	8	179	10
	3	284	113	2	7
	4	7	14	24	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.54	5.16	1.2	A	687	1031
2	0.38	5.05	0.6	A	362	542
3	0.30	3.44	0.4	A	373	559
4	0.05	3.67	0.1	A	41	62

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	564	141	121	1560	0.361	562	366	0.0	0.6	3.597	A
2	297	74	376	1257	0.236	295	307	0.0	0.3	3.739	A
3	306	76	162	1543	0.198	305	509	0.0	0.2	2.905	A
4	34	8	453	1159	0.029	34	14	0.0	0.0	3.198	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	673	168	145	1544	0.436	673	438	0.6	0.8	4.126	A
2	354	89	450	1211	0.293	354	367	0.3	0.4	4.200	A
3	365	91	194	1521	0.240	365	610	0.2	0.3	3.113	A
4	40	10	542	1105	0.037	40	16	0.0	0.0	3.381	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	825	206	177	1522	0.542	823	537	0.8	1.2	5.136	A
2	434	108	551	1148	0.378	433	450	0.4	0.6	5.033	A
3	447	112	237	1492	0.300	447	746	0.3	0.4	3.441	A
4	50	12	664	1031	0.048	49	20	0.0	0.1	3.667	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	825	206	177	1522	0.542	825	537	1.2	1.2	5.159	A
2	434	108	552	1147	0.378	434	450	0.6	0.6	5.047	A
3	447	112	238	1492	0.300	447	748	0.4	0.4	3.444	A
4	50	12	665	1031	0.048	50	20	0.1	0.1	3.668	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	673	168	145	1544	0.436	675	439	1.2	0.8	4.149	A
2	354	89	451	1210	0.293	355	368	0.6	0.4	4.215	A
3	365	91	195	1521	0.240	365	612	0.4	0.3	3.116	A
4	40	10	544	1104	0.037	41	16	0.1	0.0	3.386	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	564	141	121	1560	0.361	565	368	0.8	0.6	3.619	A
2	297	74	378	1256	0.236	297	308	0.4	0.3	3.759	A
3	306	76	163	1542	0.198	306	512	0.3	0.2	2.914	A
4	34	8	455	1158	0.029	34	14	0.0	0.0	3.204	A

2021, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	4.80	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	2021	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 (%)
1		ONE HOUR	✓	500	100.000
2		ONE HOUR	✓	498	100.000
3		ONE HOUR	✓	656	100.000
4		ONE HOUR	✓	10	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	202	296	1
	2	364	5	115	14
	3	511	136	0	9
	4	1	6	3	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.36	3.67	0.6	A	459	688
2	0.43	4.89	0.7	A	457	685
3	0.53	5.58	1.1	A	602	903
4	0.01	4.84	0.0	A	9	14

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	376	94	112	1566	0.240	375	658	0.0	0.3	3.020	A
2	375	94	226	1351	0.278	373	262	0.0	0.4	3.680	A
3	494	123	289	1458	0.339	492	311	0.0	0.5	3.719	A
4	8	2	763	971	0.008	7	18	0.0	0.0	3.734	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	449	112	135	1551	0.290	449	787	0.3	0.4	3.267	A
2	448	112	270	1323	0.338	447	313	0.4	0.5	4.110	A
3	590	147	346	1420	0.415	589	372	0.5	0.7	4.331	A
4	9	2	913	880	0.010	9	22	0.0	0.0	4.133	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	551	138	165	1531	0.360	550	964	0.4	0.6	3.669	A
2	548	137	331	1285	0.427	547	384	0.5	0.7	4.876	A
3	722	181	423	1368	0.528	721	455	0.7	1.1	5.550	A
4	11	3	1117	756	0.015	11	26	0.0	0.0	4.832	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	551	138	165	1530	0.360	551	966	0.6	0.6	3.672	A
2	548	137	331	1285	0.427	548	384	0.7	0.7	4.889	A
3	722	181	424	1367	0.528	722	456	1.1	1.1	5.580	A
4	11	3	1120	755	0.015	11	26	0.0	0.0	4.841	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	449	112	135	1551	0.290	450	790	0.6	0.4	3.274	A
2	448	112	271	1322	0.339	449	314	0.7	0.5	4.124	A
3	590	147	347	1419	0.416	591	373	1.1	0.7	4.359	A
4	9	2	916	878	0.010	9	22	0.0	0.0	4.144	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	376	94	113	1566	0.240	377	661	0.4	0.3	3.031	A
2	375	94	227	1350	0.278	375	263	0.5	0.4	3.698	A
3	494	123	290	1457	0.339	495	312	0.7	0.5	3.747	A
4	8	2	767	969	0.008	8	18	0.0	0.0	3.747	A

2024 no dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	4.87	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	2024 no dev	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 (%)
1		ONE HOUR	✓	779	100.000
2		ONE HOUR	✓	409	100.000
3		ONE HOUR	✓	421	100.000
4		ONE HOUR	✓	47	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	285	493	1
	2	205	8	186	10
	3	295	117	2	7
	4	7	15	25	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.57	5.45	1.3	A	715	1072
2	0.40	5.27	0.7	A	375	563
3	0.31	3.52	0.5	A	386	579
4	0.05	3.74	0.1	A	43	65

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	586	147	125	1557	0.377	584	380	0.0	0.6	3.689	A
2	308	77	391	1248	0.247	307	319	0.0	0.3	3.821	A
3	317	79	168	1539	0.206	316	529	0.0	0.3	2.941	A
4	35	9	470	1149	0.031	35	13	0.0	0.0	3.232	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	700	175	150	1541	0.455	699	455	0.6	0.8	4.275	A
2	368	92	468	1199	0.307	367	382	0.3	0.4	4.325	A
3	378	95	201	1516	0.250	378	634	0.3	0.3	3.163	A
4	42	11	563	1092	0.039	42	16	0.0	0.0	3.427	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	858	214	184	1518	0.565	856	557	0.8	1.3	5.421	A
2	450	113	572	1134	0.397	449	467	0.4	0.7	5.253	A
3	464	116	246	1486	0.312	463	776	0.3	0.5	3.516	A
4	52	13	689	1016	0.051	52	20	0.0	0.1	3.733	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	858	214	184	1518	0.565	858	558	1.3	1.3	5.452	A
2	450	113	574	1133	0.397	450	468	0.7	0.7	5.271	A
3	464	116	247	1486	0.312	464	777	0.5	0.5	3.520	A
4	52	13	690	1015	0.051	52	20	0.1	0.1	3.735	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	700	175	150	1540	0.455	702	457	1.3	0.8	4.303	A
2	368	92	470	1198	0.307	369	383	0.7	0.4	4.344	A
3	378	95	202	1516	0.250	379	636	0.5	0.3	3.169	A
4	42	11	565	1091	0.039	42	16	0.1	0.0	3.430	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	586	147	126	1557	0.377	587	382	0.8	0.6	3.718	A
2	308	77	393	1246	0.247	308	320	0.4	0.3	3.842	A
3	317	79	169	1538	0.206	317	532	0.3	0.3	2.951	A
4	35	9	473	1147	0.031	35	14	0.0	0.0	3.239	A

2024 no dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.03	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	2024 no dev	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 (%)
1		ONE HOUR	✓	520	100.000
2		ONE HOUR	✓	518	100.000
3		ONE HOUR	✓	681	100.000
4		ONE HOUR	✓	10	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	210	308	1
	2	378	5	120	15
	3	531	141	0	9
	4	1	6	3	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.38	3.77	0.6	A	477	716
2	0.45	5.10	0.8	A	475	713
3	0.55	5.94	1.2	A	625	937
4	0.02	5.02	0.0	A	9	14

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	391	98	116	1563	0.250	390	683	0.0	0.3	3.066	A
2	390	97	235	1345	0.290	388	272	0.0	0.4	3.757	A
3	513	128	300	1450	0.354	511	323	0.0	0.5	3.823	A
4	8	2	792	954	0.008	7	19	0.0	0.0	3.804	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	467	117	139	1548	0.302	467	818	0.3	0.4	3.330	A
2	466	116	281	1316	0.354	465	325	0.4	0.5	4.228	A
3	612	153	359	1411	0.434	611	387	0.5	0.8	4.499	A
4	9	2	948	859	0.010	9	22	0.0	0.0	4.236	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	573	143	170	1527	0.375	572	1001	0.4	0.6	3.767	A
2	570	143	344	1277	0.447	569	398	0.5	0.8	5.083	A
3	750	187	440	1357	0.553	748	474	0.8	1.2	5.895	A
4	11	3	1160	730	0.015	11	27	0.0	0.0	5.006	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	573	143	171	1527	0.375	573	1003	0.6	0.6	3.771	A
2	570	143	345	1276	0.447	570	399	0.8	0.8	5.098	A
3	750	187	440	1356	0.553	750	475	1.2	1.2	5.935	A
4	11	3	1163	728	0.015	11	28	0.0	0.0	5.017	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	467	117	140	1548	0.302	468	821	0.6	0.4	3.338	A
2	466	116	282	1316	0.354	467	326	0.8	0.6	4.245	A
3	612	153	360	1410	0.434	614	388	1.2	0.8	4.533	A
4	9	2	952	856	0.011	9	23	0.0	0.0	4.248	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	391	98	117	1563	0.250	392	687	0.4	0.3	3.074	A
2	390	97	236	1344	0.290	391	273	0.6	0.4	3.776	A
3	513	128	302	1449	0.354	514	325	0.8	0.6	3.851	A
4	8	2	796	951	0.008	8	19	0.0	0.0	3.818	A

2024 with dev+ committed, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.11	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	2024 with dev+ committed	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 (%)
1		ONE HOUR	✓	781	100.000
2		ONE HOUR	✓	423	100.000
3		ONE HOUR	✓	430	100.000
4		ONE HOUR	✓	110	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	285	493	3
	2	205	8	186	24
	3	295	117	2	16
	4	16	34	60	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.58	5.83	1.4	A	717	1075
2	0.42	5.61	0.7	A	388	582
3	0.32	3.60	0.5	A	395	592
4	0.12	4.03	0.1	A	101	151

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	588	147	166	1530	0.384	585	387	0.0	0.6	3.802	A
2	318	80	418	1230	0.259	317	333	0.0	0.3	3.937	A
3	324	81	180	1531	0.212	323	556	0.0	0.3	2.977	A
4	83	21	470	1149	0.072	83	32	0.0	0.1	3.376	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	702	176	199	1508	0.466	701	463	0.6	0.9	4.456	A
2	380	95	501	1179	0.323	380	399	0.3	0.5	4.503	A
3	387	97	215	1507	0.257	386	665	0.3	0.3	3.213	A
4	99	25	563	1092	0.091	99	39	0.1	0.1	3.622	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	860	215	243	1478	0.582	858	567	0.9	1.4	5.787	A
2	466	116	613	1109	0.420	465	488	0.5	0.7	5.584	A
3	473	118	264	1474	0.321	473	814	0.3	0.5	3.592	A
4	121	30	689	1016	0.119	121	47	0.1	0.1	4.023	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	860	215	243	1478	0.582	860	568	1.4	1.4	5.825	A
2	466	116	614	1108	0.420	466	489	0.7	0.7	5.606	A
3	473	118	264	1474	0.321	473	816	0.5	0.5	3.596	A
4	121	30	690	1015	0.119	121	47	0.1	0.1	4.026	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	702	176	199	1508	0.466	704	465	1.4	0.9	4.492	A
2	380	95	503	1177	0.323	381	400	0.7	0.5	4.528	A
3	387	97	216	1506	0.257	387	668	0.5	0.3	3.217	A
4	99	25	565	1091	0.091	99	39	0.1	0.1	3.629	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	588	147	167	1530	0.384	589	389	0.9	0.6	3.830	A
2	318	80	421	1229	0.259	319	335	0.5	0.4	3.960	A
3	324	81	181	1530	0.212	324	559	0.3	0.3	2.988	A
4	83	21	473	1147	0.072	83	32	0.1	0.1	3.381	A

2024 with dev+ committed, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.39	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D6	2024 with dev+ committed	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 (%)
1		ONE HOUR	✓	523	100.000
2		ONE HOUR	✓	553	100.000
3		ONE HOUR	✓	701	100.000
4		ONE HOUR	✓	45	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	210	308	4
	2	378	5	120	50
	3	531	141	0	29
	4	5	27	13	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.38	3.88	0.6	A	480	720
2	0.48	5.47	0.9	A	507	761
3	0.58	6.47	1.4	A	643	965
4	0.07	5.30	0.1	A	41	62

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	394	98	139	1548	0.254	392	686	0.0	0.3	3.113	A
2	416	104	245	1339	0.311	415	287	0.0	0.4	3.888	A
3	528	132	328	1431	0.369	525	331	0.0	0.6	3.965	A
4	34	8	792	954	0.036	34	62	0.0	0.0	3.913	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	470	118	167	1529	0.307	470	821	0.3	0.4	3.398	A
2	497	124	293	1309	0.380	496	344	0.4	0.6	4.428	A
3	630	158	393	1388	0.454	629	396	0.6	0.8	4.740	A
4	40	10	948	859	0.047	40	75	0.0	0.0	4.398	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	576	144	204	1504	0.383	575	1005	0.4	0.6	3.873	A
2	609	152	358	1268	0.480	608	421	0.6	0.9	5.445	A
3	772	193	481	1329	0.581	770	485	0.8	1.4	6.413	A
4	50	12	1160	730	0.068	49	91	0.0	0.1	5.288	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	576	144	205	1504	0.383	576	1007	0.6	0.6	3.879	A
2	609	152	359	1267	0.480	609	422	0.9	0.9	5.466	A
3	772	193	482	1328	0.581	772	486	1.4	1.4	6.468	A
4	50	12	1163	728	0.068	50	91	0.1	0.1	5.301	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	470	118	168	1529	0.308	471	825	0.6	0.4	3.407	A
2	497	124	294	1308	0.380	498	345	0.9	0.6	4.451	A
3	630	158	395	1387	0.454	632	397	1.4	0.8	4.786	A
4	40	10	952	856	0.047	41	75	0.1	0.0	4.413	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	394	98	140	1547	0.254	394	690	0.4	0.3	3.122	A
2	416	104	246	1338	0.311	417	289	0.6	0.5	3.910	A
3	528	132	330	1430	0.369	529	332	0.8	0.6	4.000	A
4	34	8	796	951	0.036	34	63	0.0	0.0	3.926	A

2029 no dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.31	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	2029 no dev	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 (%)
1		ONE HOUR	✓	831	100.000
2		ONE HOUR	✓	436	100.000
3		ONE HOUR	✓	450	100.000
4		ONE HOUR	✓	51	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	304	526	1
	2	218	9	198	11
	3	315	125	2	8
	4	8	16	27	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.61	6.06	1.5	A	763	1144
2	0.43	5.72	0.8	A	400	600
3	0.34	3.67	0.5	A	413	619
4	0.06	3.87	0.1	A	47	70

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	626	156	134	1551	0.403	623	406	0.0	0.7	3.867	A
2	328	82	417	1231	0.267	327	340	0.0	0.4	3.974	A
3	339	85	179	1531	0.221	338	564	0.0	0.3	3.014	A
4	38	10	502	1130	0.034	38	15	0.0	0.0	3.298	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	747	187	161	1533	0.487	746	486	0.7	0.9	4.565	A
2	392	98	499	1180	0.332	391	408	0.4	0.5	4.564	A
3	405	101	215	1507	0.268	404	676	0.3	0.4	3.263	A
4	46	11	601	1069	0.043	46	18	0.0	0.0	3.516	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	915	229	197	1509	0.606	913	595	0.9	1.5	6.013	A
2	480	120	611	1110	0.432	479	499	0.5	0.8	5.695	A
3	495	124	263	1475	0.336	495	827	0.4	0.5	3.670	A
4	56	14	736	988	0.057	56	22	0.0	0.1	3.864	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	915	229	197	1509	0.606	915	596	1.5	1.5	6.060	A
2	480	120	612	1109	0.433	480	500	0.8	0.8	5.722	A
3	495	124	263	1475	0.336	495	829	0.5	0.5	3.674	A
4	56	14	737	987	0.057	56	22	0.1	0.1	3.866	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	747	187	161	1533	0.487	749	487	1.5	1.0	4.607	A
2	392	98	501	1178	0.333	393	409	0.8	0.5	4.591	A
3	405	101	215	1507	0.268	405	679	0.5	0.4	3.271	A
4	46	11	602	1068	0.043	46	18	0.1	0.0	3.522	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	626	156	135	1551	0.403	627	408	1.0	0.7	3.900	A
2	328	82	419	1230	0.267	329	342	0.5	0.4	3.998	A
3	339	85	180	1530	0.221	339	568	0.4	0.3	3.024	A
4	38	10	504	1128	0.034	38	15	0.0	0.0	3.303	A

2029 no dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.53	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	2029 no dev	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 (%)
1		ONE HOUR	✓	554	100.000
2		ONE HOUR	✓	554	100.000
3		ONE HOUR	✓	728	100.000
4		ONE HOUR	✓	11	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	224	328	1
	2	404	6	128	16
	3	567	151	0	10
	4	1	7	3	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.40	3.96	0.7	A	508	763
2	0.48	5.52	0.9	A	508	763
3	0.60	6.74	1.5	A	668	1002
4	0.02	5.39	0.0	A	10	15

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	417	104	125	1557	0.268	416	729	0.0	0.4	3.148	A
2	417	104	250	1336	0.312	415	291	0.0	0.5	3.905	A
3	548	137	321	1436	0.382	546	344	0.0	0.6	4.032	A
4	8	2	846	921	0.009	8	20	0.0	0.0	3.946	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	498	125	150	1541	0.323	498	873	0.4	0.5	3.449	A
2	498	125	299	1305	0.382	497	348	0.5	0.6	4.455	A
3	654	164	384	1394	0.470	653	412	0.6	0.9	4.855	A
4	10	2	1013	819	0.012	10	24	0.0	0.0	4.448	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	610	152	183	1518	0.402	609	1069	0.5	0.7	3.957	A
2	610	152	366	1263	0.483	609	426	0.6	0.9	5.494	A
3	802	200	470	1336	0.600	799	505	0.9	1.5	6.673	A
4	12	3	1240	682	0.018	12	30	0.0	0.0	5.376	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	610	152	184	1518	0.402	610	1071	0.7	0.7	3.965	A
2	610	152	367	1263	0.483	610	427	0.9	0.9	5.516	A
3	802	200	471	1336	0.600	801	505	1.5	1.5	6.737	A
4	12	3	1243	680	0.018	12	30	0.0	0.0	5.392	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	498	125	151	1540	0.323	499	877	0.7	0.5	3.458	A
2	498	125	300	1304	0.382	499	350	0.9	0.6	4.480	A
3	654	164	386	1393	0.470	657	413	1.5	0.9	4.908	A
4	10	2	1018	816	0.012	10	24	0.0	0.0	4.466	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	417	104	126	1557	0.268	418	734	0.5	0.4	3.162	A
2	417	104	251	1335	0.312	418	293	0.6	0.5	3.929	A
3	548	137	323	1435	0.382	549	346	0.9	0.6	4.070	A
4	8	2	852	917	0.009	8	20	0.0	0.0	3.961	A

2029 with dev+ committed, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.60	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
D9	2029 with dev+ committed	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 (%)
1		ONE HOUR	✓	833	100.000
2		ONE HOUR	✓	450	100.000
3		ONE HOUR	✓	459	100.000
4		ONE HOUR	✓	114	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	304	526	3
	2	218	9	198	25
	3	315	125	2	17
	4	17	35	62	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.62	6.52	1.6	A	764	1147
2	0.46	6.12	0.8	A	413	619
3	0.35	3.76	0.5	A	421	632
4	0.13	4.18	0.1	A	105	157

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	627	157	175	1524	0.412	624	412	0.0	0.7	3.990	A
2	339	85	444	1214	0.279	337	355	0.0	0.4	4.100	A
3	346	86	191	1523	0.227	344	591	0.0	0.3	3.051	A
4	86	21	502	1130	0.076	85	34	0.0	0.1	3.448	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	749	187	209	1501	0.499	748	494	0.7	1.0	4.772	A
2	405	101	532	1159	0.349	404	425	0.4	0.5	4.763	A
3	413	103	229	1498	0.276	412	707	0.3	0.4	3.316	A
4	102	26	601	1069	0.096	102	40	0.1	0.1	3.721	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	917	229	256	1469	0.624	915	605	1.0	1.6	6.463	A
2	495	124	651	1085	0.457	494	520	0.5	0.8	6.084	A
3	505	126	280	1463	0.345	505	865	0.4	0.5	3.753	A
4	126	31	735	988	0.127	125	49	0.1	0.1	4.174	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	917	229	257	1469	0.624	917	606	1.6	1.6	6.521	A
2	495	124	653	1084	0.457	495	521	0.8	0.8	6.119	A
3	505	126	281	1463	0.345	505	868	0.5	0.5	3.758	A
4	126	31	737	987	0.127	126	50	0.1	0.1	4.178	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	749	187	210	1500	0.499	751	495	1.6	1.0	4.824	A
2	405	101	535	1157	0.350	406	426	0.8	0.5	4.797	A
3	413	103	230	1497	0.276	413	711	0.5	0.4	3.325	A
4	102	26	603	1068	0.096	103	41	0.1	0.1	3.730	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	627	157	176	1523	0.412	628	415	1.0	0.7	4.027	A
2	339	85	447	1212	0.279	339	357	0.5	0.4	4.129	A
3	346	86	192	1522	0.227	346	594	0.4	0.3	3.063	A
4	86	21	504	1128	0.076	86	34	0.1	0.1	3.456	A

2029 with dev+ committed, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.98	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
D10	2029 with dev+ committed	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 (%)
1		ONE HOUR	✓	557	100.000
2		ONE HOUR	✓	589	100.000
3		ONE HOUR	✓	748	100.000
4		ONE HOUR	✓	46	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	224	328	4
	2	404	6	128	51
	3	567	151	0	30
	4	5	28	13	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.41	4.08	0.7	A	511	767
2	0.52	5.95	1.1	A	540	811
3	0.63	7.43	1.7	A	686	1030
4	0.07	5.72	0.1	A	42	63

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	419	105	148	1542	0.272	418	732	0.0	0.4	3.199	A
2	443	111	260	1329	0.334	441	307	0.0	0.5	4.045	A
3	563	141	349	1417	0.397	561	352	0.0	0.7	4.190	A
4	35	9	846	921	0.038	34	64	0.0	0.0	4.062	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	501	125	178	1522	0.329	500	877	0.4	0.5	3.521	A
2	529	132	311	1297	0.408	529	367	0.5	0.7	4.678	A
3	672	168	418	1371	0.490	671	421	0.7	1.0	5.136	A
4	41	10	1013	819	0.050	41	76	0.0	0.1	4.628	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	613	153	217	1495	0.410	612	1073	0.5	0.7	4.074	A
2	649	162	380	1254	0.517	647	449	0.7	1.1	5.917	A
3	824	206	512	1308	0.629	821	516	1.0	1.7	7.339	A
4	51	13	1239	682	0.074	51	93	0.1	0.1	5.701	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	613	153	218	1495	0.410	613	1076	0.7	0.7	4.083	A
2	649	162	381	1254	0.517	648	450	1.1	1.1	5.948	A
3	824	206	513	1308	0.630	823	516	1.7	1.7	7.432	A
4	51	13	1243	680	0.075	51	94	0.1	0.1	5.722	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	501	125	179	1521	0.329	502	881	0.7	0.5	3.532	A
2	529	132	312	1297	0.408	531	369	1.1	0.7	4.710	A
3	672	168	420	1370	0.491	675	422	1.7	1.0	5.203	A
4	41	10	1019	816	0.051	41	77	0.1	0.1	4.650	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	419	105	149	1541	0.272	420	737	0.5	0.4	3.211	A
2	443	111	261	1329	0.334	444	308	0.7	0.5	4.073	A
3	563	141	351	1416	0.398	564	354	1.0	0.7	4.234	A
4	35	9	852	917	0.038	35	64	0.1	0.0	4.080	A

2039 no dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.66	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
D11	2039 no dev	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 (%)
1		ONE HOUR	✓	867	100.000
2		ONE HOUR	✓	456	100.000
3		ONE HOUR	✓	470	100.000
4		ONE HOUR	✓	52	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	317	549	1
	2	228	9	207	12
	3	329	131	2	8
	4	8	16	28	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.63	6.55	1.7	A	796	1193
2	0.46	6.09	0.8	A	418	628
3	0.35	3.79	0.5	A	431	647
4	0.06	3.96	0.1	A	48	72

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	653	163	140	1548	0.422	650	424	0.0	0.7	3.996	A
2	343	86	435	1220	0.281	342	355	0.0	0.4	4.091	A
3	354	88	187	1526	0.232	353	589	0.0	0.3	3.067	A
4	39	10	524	1116	0.035	39	16	0.0	0.0	3.342	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	779	195	167	1529	0.510	778	507	0.7	1.0	4.786	A
2	410	102	521	1166	0.351	409	425	0.4	0.5	4.751	A
3	423	106	224	1501	0.282	422	706	0.3	0.4	3.338	A
4	47	12	628	1053	0.044	47	19	0.0	0.0	3.576	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	955	239	205	1504	0.635	952	621	1.0	1.7	6.488	A
2	502	126	637	1094	0.459	501	520	0.5	0.8	6.060	A
3	517	129	275	1467	0.353	517	863	0.4	0.5	3.786	A
4	57	14	768	968	0.059	57	23	0.0	0.1	3.953	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	955	239	205	1504	0.635	955	622	1.7	1.7	6.552	A
2	502	126	639	1093	0.460	502	521	0.8	0.8	6.095	A
3	517	129	275	1467	0.353	517	865	0.5	0.5	3.791	A
4	57	14	770	967	0.059	57	23	0.1	0.1	3.956	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	779	195	167	1529	0.510	782	509	1.7	1.1	4.839	A
2	410	102	523	1165	0.352	411	426	0.8	0.5	4.784	A
3	423	106	225	1500	0.282	423	709	0.5	0.4	3.346	A
4	47	12	630	1052	0.044	47	19	0.1	0.0	3.583	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	653	163	140	1547	0.422	654	426	1.1	0.7	4.037	A
2	343	86	437	1218	0.282	344	357	0.5	0.4	4.119	A
3	354	88	189	1525	0.232	354	593	0.4	0.3	3.078	A
4	39	10	527	1114	0.035	39	16	0.0	0.0	3.350	A

2039 no dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	5.92	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
D12	2039 no dev	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 (%)
1		ONE HOUR	✓	579	100.000
2		ONE HOUR	✓	576	100.000
3		ONE HOUR	✓	759	100.000
4		ONE HOUR	✓	11	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	234	343	1
	2	421	6	133	16
	3	592	157	0	10
	4	1	7	3	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.42	4.11	0.7	A	531	797
2	0.51	5.82	1.0	A	529	793
3	0.63	7.38	1.7	A	696	1045
4	0.02	5.66	0.0	A	10	15

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	436	109	130	1554	0.280	434	761	0.0	0.4	3.210	A
2	434	108	261	1329	0.326	432	303	0.0	0.5	4.006	A
3	571	143	334	1428	0.400	569	359	0.0	0.7	4.179	A
4	8	2	882	899	0.009	8	20	0.0	0.0	4.042	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	521	130	155	1537	0.339	520	911	0.4	0.5	3.537	A
2	518	129	313	1296	0.399	517	363	0.5	0.7	4.616	A
3	682	171	399	1384	0.493	681	430	0.7	1.0	5.116	A
4	10	2	1056	793	0.012	10	24	0.0	0.0	4.596	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	637	159	190	1514	0.421	637	1114	0.5	0.7	4.099	A
2	634	159	383	1253	0.506	633	444	0.7	1.0	5.796	A
3	836	209	489	1324	0.631	833	527	1.0	1.7	7.290	A
4	12	3	1292	650	0.019	12	30	0.0	0.0	5.643	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	637	159	190	1513	0.421	637	1117	0.7	0.7	4.109	A
2	634	159	383	1252	0.506	634	445	1.0	1.0	5.824	A
3	836	209	490	1323	0.632	836	527	1.7	1.7	7.381	A
4	12	3	1296	648	0.019	12	30	0.0	0.0	5.664	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	521	130	156	1537	0.339	521	916	0.7	0.5	3.548	A
2	518	129	313	1296	0.400	519	364	1.0	0.7	4.643	A
3	682	171	401	1383	0.494	685	431	1.7	1.0	5.182	A
4	10	2	1062	790	0.013	10	24	0.0	0.0	4.617	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	436	109	131	1554	0.281	436	766	0.5	0.4	3.222	A
2	434	108	262	1328	0.327	434	305	0.7	0.5	4.032	A
3	571	143	336	1426	0.401	573	361	1.0	0.7	4.224	A
4	8	2	888	895	0.009	8	20	0.0	0.0	4.058	A

2039 with dev+ committed, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	6.00	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
D13	2039 with dev+ committed	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 (%)
1		ONE HOUR	✓	869	100.000
2		ONE HOUR	✓	470	100.000
3		ONE HOUR	✓	479	100.000
4		ONE HOUR	✓	115	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	317	549	3
	2	228	9	207	26
	3	329	131	2	17
	4	17	35	63	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.65	7.10	1.9	A	797	1196
2	0.48	6.55	0.9	A	431	647
3	0.36	3.88	0.6	A	440	659
4	0.13	4.28	0.2	A	106	158

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	654	164	180	1520	0.430	651	430	0.0	0.7	4.128	A
2	354	88	462	1203	0.294	352	369	0.0	0.4	4.225	A
3	361	90	199	1518	0.238	359	615	0.0	0.3	3.106	A
4	87	22	524	1116	0.078	86	34	0.0	0.1	3.496	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	781	195	216	1496	0.522	780	515	0.7	1.1	5.014	A
2	423	106	554	1146	0.369	422	442	0.4	0.6	4.970	A
3	431	108	239	1491	0.289	430	737	0.3	0.4	3.393	A
4	103	26	628	1053	0.098	103	41	0.1	0.1	3.789	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	957	239	264	1464	0.654	954	631	1.1	1.8	7.015	A
2	517	129	677	1068	0.484	516	540	0.6	0.9	6.503	A
3	527	132	292	1455	0.362	527	901	0.4	0.6	3.874	A
4	127	32	768	968	0.131	126	51	0.1	0.1	4.277	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	957	239	264	1464	0.654	957	632	1.8	1.9	7.098	A
2	517	129	679	1067	0.485	517	542	0.9	0.9	6.548	A
3	527	132	293	1455	0.362	527	904	0.6	0.6	3.880	A
4	127	32	770	967	0.131	127	51	0.1	0.2	4.283	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	781	195	216	1496	0.522	784	517	1.9	1.1	5.080	A
2	423	106	557	1144	0.369	424	444	0.9	0.6	5.011	A
3	431	108	240	1490	0.289	431	741	0.6	0.4	3.402	A
4	103	26	630	1052	0.098	104	41	0.2	0.1	3.798	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	654	164	181	1520	0.430	656	433	1.1	0.8	4.171	A
2	354	88	465	1201	0.295	355	371	0.6	0.4	4.258	A
3	361	90	201	1517	0.238	361	619	0.4	0.3	3.115	A
4	87	22	527	1114	0.078	87	35	0.1	0.1	3.502	A

2039 with dev+ committed, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	6.44	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
D14	2039 with dev+ committed	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 (%)
1		ONE HOUR	✓	582	100.000
2		ONE HOUR	✓	611	100.000
3		ONE HOUR	✓	779	100.000
4		ONE HOUR	✓	46	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	234	343	4
	2	421	6	133	51
	3	592	157	0	30
	4	5	28	13	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.43	4.24	0.8	A	534	801
2	0.54	6.31	1.2	A	561	841
3	0.66	8.22	1.9	A	715	1072
4	0.08	6.03	0.1	A	42	63

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	438	110	153	1539	0.285	437	764	0.0	0.4	3.262	A
2	460	115	271	1322	0.348	458	319	0.0	0.5	4.154	A
3	586	147	362	1409	0.416	584	367	0.0	0.7	4.348	A
4	35	9	882	899	0.039	34	64	0.0	0.0	4.165	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	523	131	183	1518	0.345	523	914	0.4	0.5	3.613	A
2	549	137	324	1289	0.426	548	382	0.5	0.7	4.856	A
3	700	175	434	1361	0.515	699	439	0.7	1.0	5.428	A
4	41	10	1056	793	0.052	41	76	0.0	0.1	4.788	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	641	160	224	1491	0.430	640	1118	0.5	0.7	4.226	A
2	673	168	397	1244	0.541	671	467	0.7	1.2	6.268	A
3	858	214	530	1296	0.662	854	537	1.0	1.9	8.086	A
4	51	13	1291	650	0.078	51	93	0.1	0.1	6.000	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	641	160	225	1490	0.430	641	1122	0.7	0.8	4.236	A
2	673	168	397	1243	0.541	673	468	1.2	1.2	6.309	A
3	858	214	532	1295	0.662	858	538	1.9	1.9	8.223	A
4	51	13	1296	648	0.078	51	94	0.1	0.1	6.029	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	523	131	184	1518	0.345	524	920	0.8	0.5	3.628	A
2	549	137	325	1288	0.426	551	383	1.2	0.7	4.891	A
3	700	175	436	1360	0.515	704	441	1.9	1.1	5.519	A
4	41	10	1063	789	0.052	41	77	0.1	0.1	4.814	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	438	110	154	1538	0.285	439	769	0.5	0.4	3.275	A
2	460	115	272	1322	0.348	461	321	0.7	0.5	4.186	A
3	586	147	364	1407	0.417	588	369	1.1	0.7	4.401	A
4	35	9	888	895	0.039	35	64	0.1	0.0	4.183	A

2039 with dev+ Commit+Future Flows, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	7.24	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D15	2039 with dev+ Commit+Future Flows	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 (%)
1		ONE HOUR	✓	874	100.000
2		ONE HOUR	✓	521	100.000
3		ONE HOUR	✓	515	100.000
4		ONE HOUR	✓	271	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	0	317	549	8
	2	228	9	207	77
	3	329	131	2	53
	4	40	82	149	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.70	8.93	2.4	A	802	1203
2	0.57	8.35	1.3	A	478	717
3	0.40	4.25	0.7	A	473	709
4	0.31	5.38	0.4	A	249	373

Main Results for each time segment

07:45 - 08:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	658	164	280	1453	0.453	655	448	0.0	0.8	4.490	A
2	392	98	530	1160	0.338	390	404	0.0	0.5	4.663	A
3	388	97	241	1490	0.260	386	679	0.0	0.4	3.258	A
4	204	51	524	1116	0.183	203	103	0.0	0.2	3.940	A

08:00 - 08:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	786	196	335	1416	0.555	784	536	0.8	1.2	5.681	A
2	468	117	635	1095	0.428	467	484	0.5	0.7	5.731	A
3	463	116	289	1458	0.318	463	814	0.4	0.5	3.615	A
4	244	61	628	1053	0.231	243	124	0.2	0.3	4.444	A

08:15 - 08:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	962	241	410	1365	0.705	958	656	1.2	2.3	8.744	A
2	574	143	776	1006	0.570	571	591	0.7	1.3	8.233	A
3	567	142	353	1415	0.401	566	995	0.5	0.7	4.240	A
4	298	75	768	968	0.308	298	151	0.3	0.4	5.366	A

08:30 - 08:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	962	241	411	1365	0.705	962	657	2.3	2.4	8.927	A
2	574	143	779	1005	0.571	574	593	1.3	1.3	8.350	A
3	567	142	354	1414	0.401	567	998	0.7	0.7	4.251	A
4	298	75	770	967	0.309	298	152	0.4	0.4	5.383	A

08:45 - 09:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	786	196	336	1415	0.555	790	538	2.4	1.3	5.796	A
2	468	117	640	1092	0.429	471	487	1.3	0.8	5.813	A
3	463	116	291	1456	0.318	464	819	0.7	0.5	3.629	A
4	244	61	630	1052	0.232	244	125	0.4	0.3	4.462	A

09:00 - 09:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	658	164	281	1452	0.453	660	450	1.3	0.8	4.553	A
2	392	98	534	1158	0.339	393	407	0.8	0.5	4.716	A
3	388	97	243	1488	0.261	388	684	0.5	0.4	3.273	A
4	204	51	527	1114	0.183	204	104	0.3	0.2	3.959	A

2039 with dev+ Commit+Future Flows, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Geometry	Arm 1 - Roundabout Geometry	Effective flare length is over 30m, which is outside the normal range. Treat capacities with increasing caution.

Junction Network

Junctions

Junction	Name	Junction type	Use circulating lanes	Arm order	Junction Delay (s)	Junction LOS
1	untitled	Standard Roundabout		1, 2, 3, 4	8.42	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
D16	2039 with dev+ Commit+Future Flows	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 (%)
1		ONE HOUR	✓	589	100.000
2		ONE HOUR	✓	699	100.000
3		ONE HOUR	✓	831	100.000
4		ONE HOUR	✓	153	100.000

Origin-Destination Data

Demand (Veh/hr)

		To			
		1	2	3	4
From	1	1	234	343	11
	2	421	6	133	139
	3	592	157	0	82
	4	16	92	45	0

Vehicle Mix

Heavy Vehicle Percentages

		To			
		1	2	3	4
From	1	10	10	10	10
	2	10	10	10	10
	3	10	10	10	10
	4	10	10	10	10

Results

Results Summary for whole modelled period

Arm	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
1	0.46	4.67	0.8	A	540	811
2	0.63	8.05	1.7	A	641	962
3	0.75	11.56	2.9	B	763	1144
4	0.26	7.51	0.3	A	140	211

Main Results for each time segment

16:45 - 17:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	443	111	225	1490	0.298	442	771	0.0	0.4	3.427	A
2	526	132	300	1304	0.404	524	366	0.0	0.7	4.596	A
3	626	156	433	1361	0.460	622	391	0.0	0.8	4.849	A
4	115	29	881	899	0.128	115	174	0.0	0.1	4.586	A

17:00 - 17:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	529	132	269	1460	0.363	529	924	0.4	0.6	3.862	A
2	628	157	359	1267	0.496	627	439	0.7	1.0	5.615	A
3	747	187	519	1304	0.573	745	468	0.8	1.3	6.421	A
4	138	34	1056	793	0.173	137	208	0.1	0.2	5.487	A

17:15 - 17:30

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	649	162	329	1420	0.457	647	1128	0.6	0.8	4.651	A
2	770	192	440	1217	0.632	767	537	1.0	1.7	7.947	A
3	915	229	634	1227	0.746	909	572	1.3	2.8	11.127	B
4	168	42	1289	652	0.258	168	254	0.2	0.3	7.431	A

17:30 - 17:45

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	649	162	330	1419	0.457	648	1134	0.8	0.8	4.670	A
2	770	192	440	1216	0.633	770	538	1.7	1.7	8.051	A
3	915	229	636	1225	0.747	915	574	2.8	2.9	11.564	B
4	168	42	1296	648	0.260	168	255	0.3	0.3	7.509	A

17:45 - 18:00

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	529	132	271	1459	0.363	531	932	0.8	0.6	3.882	A
2	628	157	360	1266	0.496	631	442	1.7	1.0	5.693	A
3	747	187	522	1302	0.574	753	470	2.9	1.4	6.630	A
4	138	34	1065	788	0.175	138	210	0.3	0.2	5.549	A

18:00 - 18:15

Arm	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Circulating flow (Veh/hr)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Throughput (exit side) (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
1	443	111	226	1489	0.298	444	778	0.6	0.4	3.448	A
2	526	132	302	1303	0.404	527	369	1.0	0.7	4.648	A
3	626	156	436	1359	0.460	628	393	1.4	0.9	4.935	A
4	115	29	889	895	0.129	115	175	0.2	0.1	4.620	A

APPENDIX 14.1 – CEMP

PAUL Mc GRAIL
CONSULTING ENGINEERS LIMITED

Proposed Residential Development at Cornamaddy, Athlone, Co. Westmeath

Phase 3

Construction Environmental Management Plan

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PROJECT NUMBER: 2022-113				DOCUMENT REF: 2022-113			
1	First Issue	RD	13/12/2022	PMG	13/12/2022	PMG	13/12/2022
Revision	**Description & Rationale**	**Originated**	**Date**	**Checked**	**Date**	**Authorised**	**Date**
Paul Mc Grail Consulting Engineers							

TABLE OF CONTENTS

1 INTRODUCTION

This Construction and Environmental Management Plan (CEMP) has been prepared to support the planning application at Cornamaddy, Athlone, Co. Westmeath. The proposed development is located at Cornamaddy and the access to this phase will be from the road permitted under ref. no 22/253 in conjunction with section of permitted road under ref. no. 14/7103, which connects to the existing roundabout at N55 x Drumaconn Road. This application comprises the construction of 70 no. of residential units, landscaping and all associated infrastructure and works.

The purpose of the Construction and Environmental Management Plan (CEMP) is to outline the details in relation to the environmental measures to be implemented on site to prevent any adverse impacts on the surrounding environment. Accordingly, this CEMP identifies the main objectives for the managed procedures which are required to ensure the construction related activities on the Cornamaddy site are executed in a safe and controlled manner and to minimise disruption and impacts on the amenities in the area.

The objective of this CEMP is therefore to identify the potential issues which are relevant to the project, to address these issues and to provide solutions which are satisfactory to all concerned.

This CEMP describes the anticipated construction programme and the nature of the activities to be undertaken. It identifies the environmental considerations associated with these activities and outlines appropriate measures that might be implemented for their mitigation.

This assessment has been made using the experience of the Applicant and their professional advisors based on the typical construction methods and strategies that can be reasonably anticipated at this stage of the process.

The subject site is located approximately located approx. 3km to the northeast of Athlone town centre.

The site is bounded by the Drumaconn housing state to the south and greenfield land in all other directions. Refer to Figure 1 for site location.

Figure 1 - Site Location (Google Earth)

The issues that have been considered in this document are as follows:

- Construction programme and phasing:
- Enabling works.
- Infrastructure works.
- Description of works.
- Site logistics.
- Indicative construction methods.
- Safety, health and environmental provision.

2 CONSTRUCTION PROGRAMMING & PHASING

The assumed programme presented below is indicative of how the project will be constructed, at each stage of the Development some or all of the following activities will be required.

- Archaeological watching brief.
- Geotechnical Investigation.
- Ecology Prep and establishment of tree protection measures and ecological mitigation measures.
- Site clearance and enabling works.
- Service infrastructure works.
- Sub-Structure works.
- Super-Structure works.
- External works and finishes.

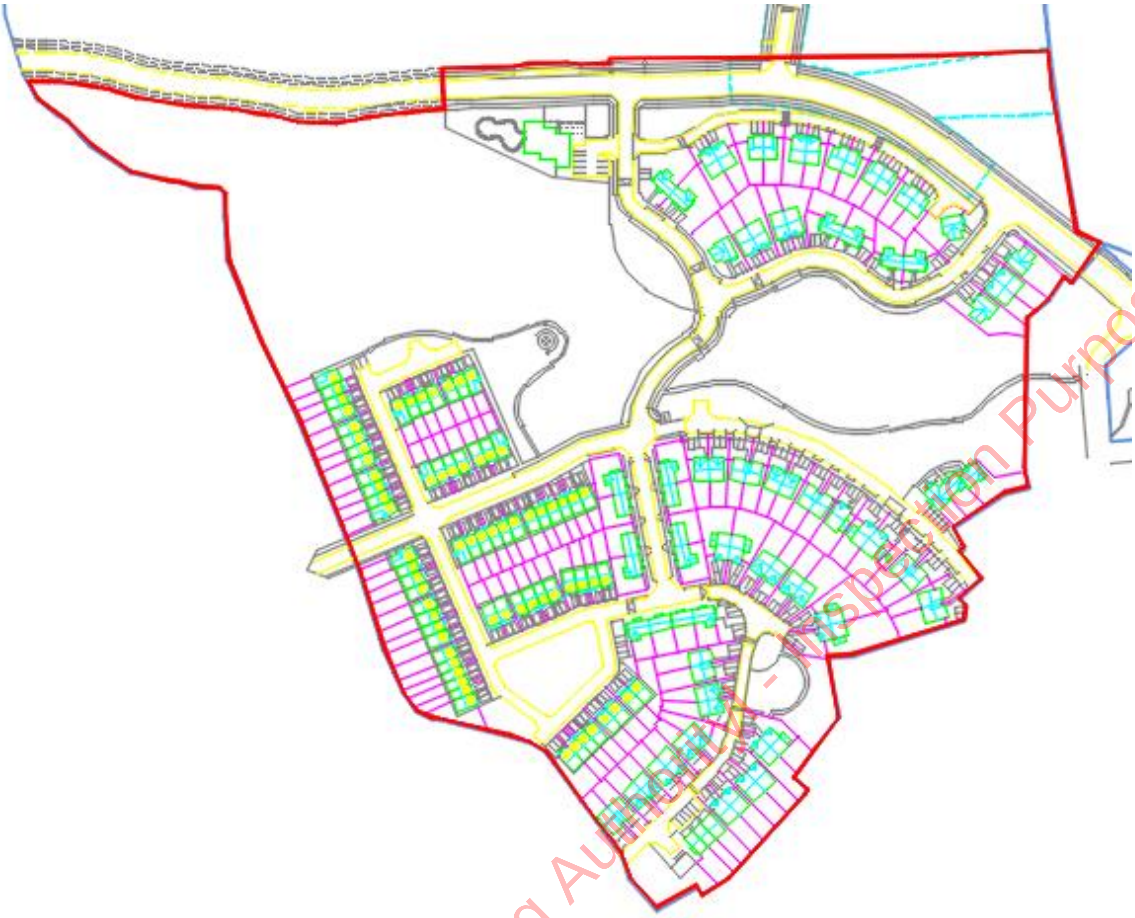

Figure 2 – Site Layout

3 SITE ENABLING WORKS

Site enabling works will include but will not be confined to the following:

- Securing of site boundary and erecting of fencing or hoarding as required.
- Service terminations and positive identification of any services on the site by the utility providers.
- Establishment of tree protection and archaeological protection measure.
- Provision of temporary power, lighting and water services.
- Set up of site accommodation and welfare facilities.
- Identification of the trees that are required to be removed and the removal of these along with scrub and vegetation, in consultation with the appointed Arborist.

3.1 INDICATIVE WORKS METHODOLOGY

The methodology for the completion of the enabling works will be finalised during the tender and appointment stage. The outline of methodology is as follows:

Live services will be terminated and where possible will be removed off site, with the cooperation of the utility providers.

Temporary power and water services will be arranged for the site accommodation and welfare facilities. The site accommodation and welfare facilities will be set up in a location as not to be in the way of the construction, and at a point close to the site entrance.

Any protected trees will be secured, and the subsequent hard fencing will be placed to protect the trees and the root zone below the tree. This will be carried out in consultation with the appointed Arborist and Ecology specialist. Following the fencing of any protected trees, the remaining trees that are required to be removed will have to be identified and removed along with the scrub on site.

Noise levels will be controlled and works undertaken in such a way as to minimise the detrimental impact on adjoining property and local residents.

3.2 INFRASTRUCTURE WORKS

The site infrastructure works include the provision of an entrance access from the road network under construction which links to the Drumaconn Road.

Utility Infrastructure

Provision of the permanent infrastructure to the site will be carried out as early as possible in the programmed works as to possibly incorporate the temporary site requirements with the permanent requirements.

Engagement with the service and utility providers will be entered into early in the design stage to allow for adequate planning of utility infrastructure.

It is the aspiration of the applicant to minimise disruption of existing services and public roads and pathways in the providing of services to the site, this will be done in consultation with the service providers and the Local Authority.

Prior to any works on site or on the boundaries to connect services a desktop study followed by a physical survey will be carried out to identify all existing services. As part of the physical survey, trial holes, slit trenching and CAT scans may be required.

Utilisation of single trenches for multiple services where possible will be encouraged.

Where possible services will be provided to 'future-proof' the development.

3.3 ROAD INFRASTRUCTURE

The Site entrance will be off the road network under construction which links to the Drumaconn Road and will act as the permanent entrance to the development going forward.

4 CONSTRUCTION TRAFFIC AND SITE ACCESS

4.1 CONSTRUCTION ROUTE & ACCESS

Access and egress to the site will be controlled by the developer. All construction traffic will access the site from the road network under construction which links to the Drumaconn Road, as per shown in Figure 3.

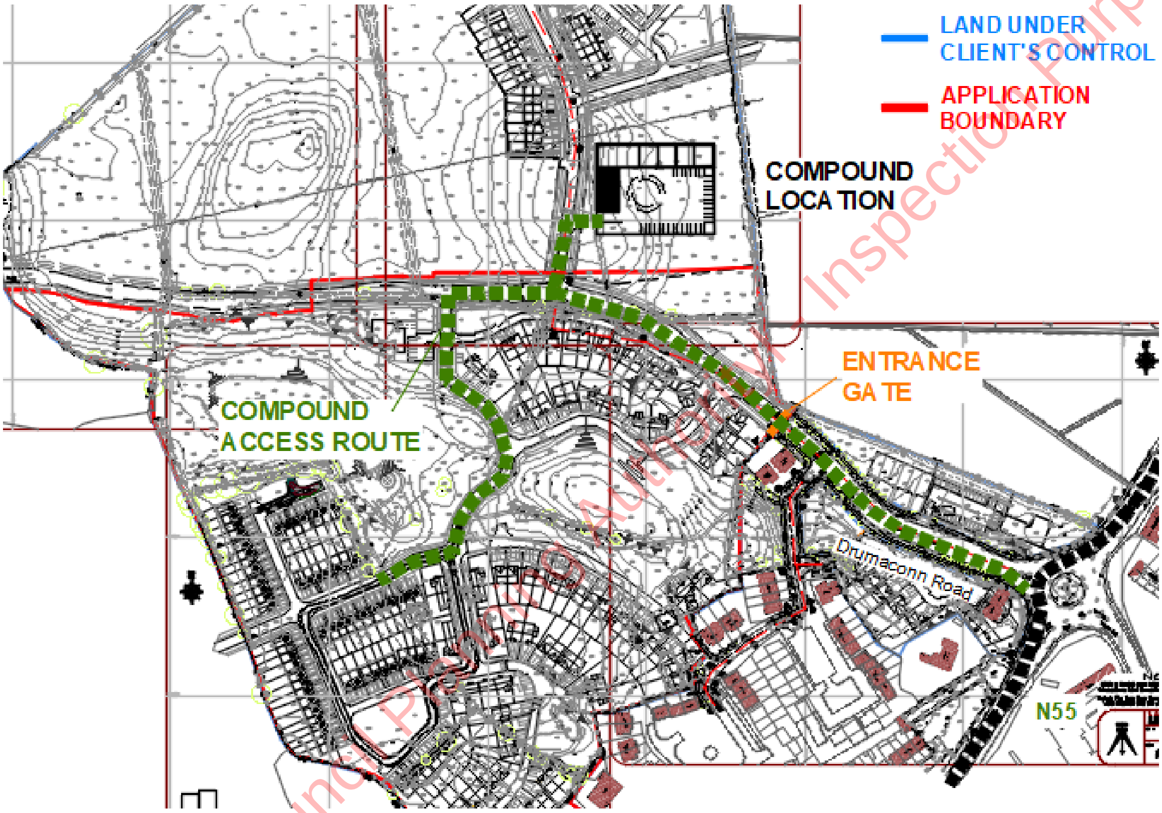

Figure 3 – Site Access

The developer will provide information on the requirements of the site traffic access rules, which will include the following:

- Access routes from the entrance to the compound.
- The site working hours are expected to be 7:00AM to 7:00PM on weekdays and 7:00PM to 2:00PM on Saturday. No works will be undertaken on Sundays or Bank Holidays, without the consent of Westmeath County Council.
- No allowed parking on any access road to the site.
- No construction traffic permitted in or on any developed/occupied phases.
- No vehicle may park on or around any footpaths in the adjoining areas.
- Caution must be exercised entering and leaving the site.
- All vehicles must stop at the security barrier.
- All instructions from the developer or development staff must be obeyed.
- Vehicles leaving the site must do so only at an appropriate break in the traffic and must not force their way into traffic.
- Only vehicles with specific business on the site can enter the site, once permission has been granted by the developer and / or his staff.
- Heavy vehicle drivers must check their tyres for lodged stones and remove them prior to returning to the public roads.

It is proposed that construction vehicle movements would be restricted to the main arterial routes and not pass through predominantly residential areas.

Movements of large or abnormal loads will be addressed in advance with the relevant authorities. Certain trades will require parking on site for vehicles due to transportation of specialist equipment/plant requirements.

Provision of wheel cleaning facilities will be made available on-site where it is deemed necessary or if space constraints do not permit this, the provision of power washing facilities for lorry wheels prior to egress off the site onto the public road in order to maintain the road in a clean condition. A road sweeper will also be utilized as required on the public road at vehicular access / egress points.

4.2 OFF LOADING AND STORAGE AREA

Vehicles will be directed to the delivery points for holding/off-loading/storage, these deliveries will be controlled by a dedicated person allocated to overseeing all deliveries and controlling the entrance.

All deliveries will be notified to the site management team at least 24 hours in advance. No large deliveries will be allowed to the site during peak traffic times for the area.

4.3 PERSONNEL & VEHICLE SEGREGATION

All pedestrian routes will be adequately segregated from vehicular routes across the site. All vehicle crossing points will have appropriate signage to alert pedestrians of vehicle crossing points.

All site operatives will be given a specific site induction, giving information on the pedestrian access routes.

4.4 TEMPORARY ROAD CLOSURE

Road closures are not anticipated, however if they are required for the delivery of large items of plant or materials then such temporary road closures will be planned and approved by the Local Authorities and relevant authorities will be sought.

5 SITE LOGISTICS

5.1 PHASING OF DEVELOPMENT

The Phasing included in the CEMP is indicative to allow for flexibility in terms of the development. In terms of the Delivery and Phasing of Development the following will be the key stages:

- **Phase 1a – Site Set Up**

This task will take up to c.3 months to complete with approximately up to 20 staff employed and will involve consultation with the Project Arborist, Archeologist and Ecologist, site clearance (given the lack of existing scrub/vegetation this will not be significant) set up site offices and contractors compound (at the eastern site – as illustrated in Figure 4 below) and secure the construction site and erection of signage for site security purposes.

- **Phase 1b – Setting out of sites and provision of services**

Given the significant work involved in the provision of drainage services this stage will involve significant work and is estimated to take between 4-5 months and will involve up to 40 construction staff. This will involve the laying of sewers within the site, the construction of detention basins, the provision of footpaths, lighting and roadways. As part of any works (i.e. provision of services) along the public areas/roads in the vicinity of the site, it will be ensured that the surface of the roads/areas will be re-instated to a high standard. Due to the catchment areas the site services associated with the phasing will be constructed as and when required to ensure that all surface water is attenuated prior to discharging to the existing surface water network.

- **Phases 1-5 – Construction of Comercial Units**

The construction of the residential units will, to a certain degree respond to the demand/sale of the units involved, however our client has already had a significant number of enquiries from prospective purchasers and it is anticipated that the construction progress will reflect this strong demand and will involve up to 150 no. construction staff (depending on the number of units being constructed at any one time). The proposed development is expected to take up to four (4) years to complete (subject to planning and market demand).

The units will be developed on a sequential basis starting with the south portion of the site, moving to the north of the site.

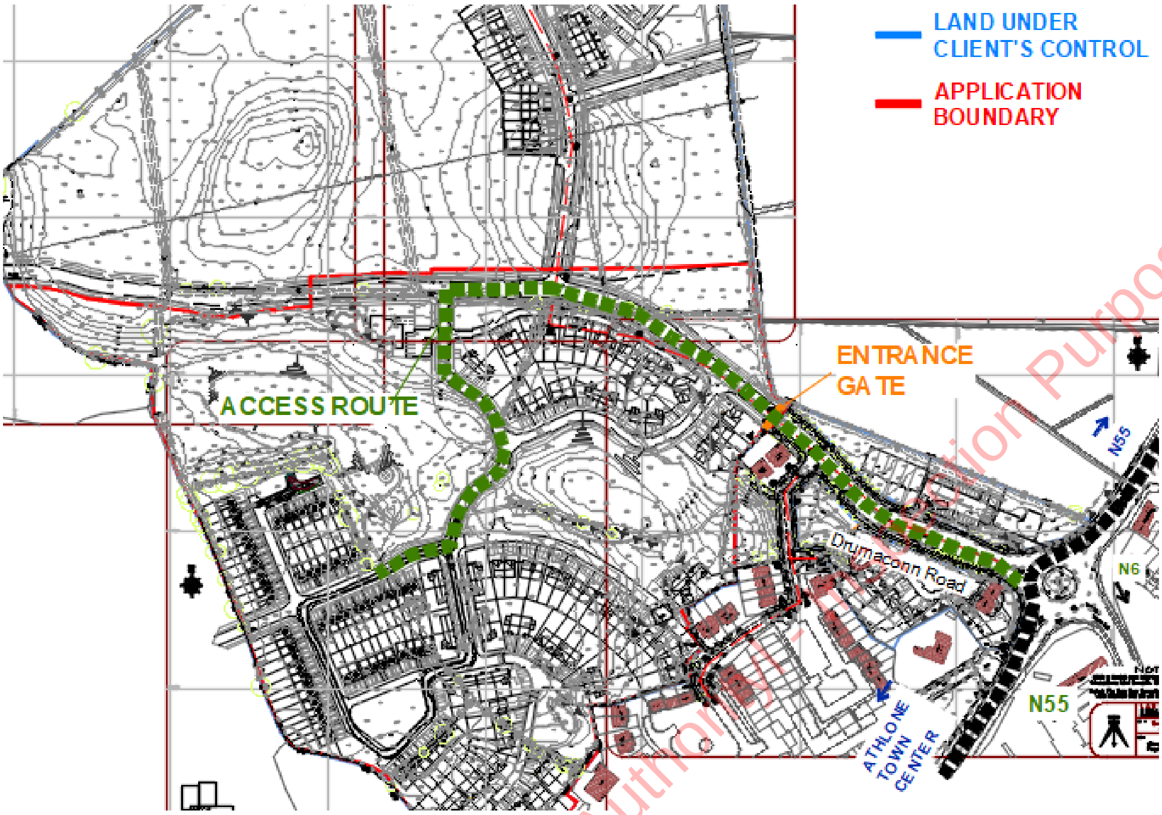

Figure 4 - Site Logistics Map

5.2 SITE ESTABLISHMENT & SECURITY

- At site set up stage the site will be made secure and the general public will be separated from the site by means of fencing and hoarding.
- All site facilities will be contained within the site area.
- The main entrance gate will be controlled by site personnel (gateman) for deliveries.
- Lighting and a camera security system may be used to secure the site in out of hour times.
- Site lighting will be set up with consideration and recommendations of the Ecologist for adjoining properties.

5.3 CONSENT & LICENSES

All statutory consents and licences required to commence an onsite activity will be obtained ahead of work commencing and giving the appropriate notice periods. These will include:

- Construction notices.
- Connections to existing utilities and main sewers.
- Licence to discharge from the site to public systems.

5.4 ACCESS & EGRESS

- The vehicular access road is proposed from the road network under construction which links to the Drumaconn Road.
- Separate pedestrian accesses will be developed at the access points to the site in order to maintain vehicle and pedestrian segregation.
- Access will be strictly controlled via security personnel at the access points to the site.
- A wheel wash will be provided the entrance to the site for lorry wheels prior to egress off the site onto the public road in order to maintain the road in a clean condition.

5.5 MATERIAL STORAGE & HANDLING

- The Client will strive to maintain a tidy site and to operate a “just in time” policy for the delivery and the supply of materials for the works, particularly the final phase of the works when on site storage will be at a minimum.
- Materials will be stored on site as to minimise the risk of damage.

- As per the construction methodology and legislative requirements all fuels stored on site will be bunded and all chemicals will be stored in an appropriate chemical storage tank. Appropriate settlement facilities will be provided on site for refuelling areas.
- A teleporter will be used for general unloading during the structural and envelope works. Unloading over the public roadway and path will be avoided.

5.6 CRANE OPERATIONS

- A mobile crane may be used for elements of the superstructure.
- Loading areas will be used to minimise storage on site, and “just in time” deliveries for each floor level will be used to load materials before the floor for the next level is placed.
- Detailed lifting plans and RAMS (Risk Assessment / Method Statements) will be compiled for all activities involving cranes.

5.7 SITE ACCOMODATION

- It is the intention to provide a main site accommodation and welfare facility on site. The location of these facilities has been determined and marked on site logistics map.
- The principal contractor will be responsible for providing canteen and welfare facilities for the on-site operatives.
- These facilities will be maintained by the main contractor.

5.8 VISITOR MANAGEMENT

- Visitors will only be allowed to enter the site via designated vehicular / pedestrian access gates and must report to the site security office to sign-in and for obtaining any additional PPE required.
- Visitors will be expected to attend a specific site safety briefing and be accompanied by a member of the site team at all times.

6 DESCRIPTION OF WORKS AND INDICATIVE CONSTRUCTION METHODS

6.1 CONSTRUCTION SEQUENCE

The construction sequence is outlined below. Details may change subject to the detailed design development of the proposed construction.

6.2 ENABLING WORKS

- Secure site and set up contractor welfare facilities and site accommodation.
- Locate and terminate existing live services.
- Install tree protection and remove trees that are required to be felled, also implement archaeological protection and mitigation measures.
- Excavate and remove material to the required formation. This will require a bulk excavation and removal from the site.
- Maintain existing entrances and incorporate new roads and hardstanding as required.
- Make good and install any finished boundary treatments that can be installed at this stage.

6.3 SUBSTRUCTURE

- Excavate foundations.
- Excavate, lay, and test underground drainage.
- Coordinate and install all incoming services.

6.4 SUPERSTRUCTURE

- Foundations.
- Floor.
- Timber frame units.
- Blockwork.
- Roofwork.

6.5 FIT OUT & FINISHES

- Fit out of the residential units will use traditional fit out techniques and finishing trades.
- Gardens and public open space areas will be landscaped and planted in accordance with the landscaping proposals for the scheme.

7 SAFETY, HEALTH AND ENVIRONMENT

7.1 GENERAL HEALTH SAFETY AND ENVIRONMENTAL CONSIDERATIONS

Construction works will be carried out in such a way as to limit, as far as practicable, adverse environmental impact.

Works will be carried out in accordance with the following general provisions:

- Planning approvals from the Local Authority
- Requirements of the Local Authority

In accordance with the HAS requirements a Project Supervisor Construction Stage (PSCS) will be appointed for the construction.

As part of the Construction Method Statement, the process will ensure that construction techniques and materials used are a fundamental consideration of the design and intended long-term use, the aim below is achieved:

- Design for durability and low maintenance.
- Design for flexibility and adaptability.
- Use of materials from sustainable sources.
- Use of local materials where possible.

Safety, health and environmental issues on the Development are a primary consideration in the construction methods adopted. The construction team will develop detailed health and safety plans, specific environmental, fire and accident procedures to suit the construction sequence of the Development.

Contractors involved in the Development will ensure that all non-English speaking employees are provided with relevant Health and Safety information in their national language.

All contractors will be required to adopt the relevant skills certification required for that element of the works.

A site-specific Safety Statement and a detailed Construction Stage Safety & Health Plan will be compiled prior to any works on site and will be in accordance with the Health & Safety Authority and Local Authority guidelines.

7.2 CONTROL SUBSTANCES TO HEALTH

The strategy for controlling all substances and all work processes that may generate hazardous substances will have to be addresses and control measures put in place.

Some of the control measures to be employed include the following:

- All fuel and chemicals to be stored in designated areas, with deliveries of hazardous materials supervised.
- Storage tanks and container facilities will be appropriately bunded.
- In the case of spills or discharges, remedial action will be taken as soon as possible in accordance with company procedures.
- Personal protective equipment (PPE) suitable to the pertaining conditions will be used by all site personnel.

7.3 ENVIRONMENTAL, EMERGENCY, FIRE AND ACCIDENT PROCEDURE

Measures will be carried out to avoid environmental incidents, however if these occur then the following types must be reported to the responsible person in the construction team as per the Glenveagh Homes Accident and Emergency Procedure (HSE_P-02-002).
The overall strategy in the event of a spillage will be to “Stop-Contain-Notify” in the event of:

- Spills or discharge to the atmosphere, water supplies, sewage systems, rivers and other watercourses, or to the ground:
    - Any chemical products
    - Oils or fuels
    - Effluent/fumes and gases
    - Waste or contaminated materials

- Damage to existing:
    - Trees and wildlife
    - Flora and existing local habitats

- Any environmental incidents that could lead to:
    - Local Authority or regulatory enforcement
    - Public complaint

Emergency routes and procedures will be continuously adapted to suit the construction sequence and stage of the Development. An Emergency and Evacuation Plan will be prepared following the guidelines detailed below and updated on a regular basis during construction.

- Definition of the management organisation and responsibility for safety
- Definition of appropriate fire prevention measures, including good housekeeping of site, welfare facilities and offices.
- Adequate provision of fire extinguishers across the site.
- Use of non-flammable/fire retardant materials for protection of finished works.
- Safe use and safe storage of flammable materials of all categories, whether solid, liquid or gas.
- Appropriate waste management procedures.
- Monitoring the type and frequency of fire inspections/audits.
- Development of evacuation plans, to include escape routes, muster stations, means of sounding alarms and general emergency procedures.
- Site safety inductions and fire drills.
- The application of permit systems for Hot works, Confined Space Entry and Electrical Access Control.
- The provision of first aiders. Checking of emergency routes are available and unobstructed at all times.
- Liaison with the emergency services and occupants of the adjacent buildings.

First aid facilities will be established and at least one trained first aider will be present on-site at all times. In addition, trained Fire Wardens / Fire Marshalls will be in place on-site to address fire safety.

7.4 PARTICULAR HEALTH, SAFETY & ENVIRONMENTAL CONSIDERATIONS

Work in Proximity to Trees

Contractors appointed for works in close proximity to trees and in consultation with the arboriculture and landscape consultants undertake specific tree protection measures and procedures for the execution of their works to protect the trees. Refer to Arboricultural Impact Assessment.

Where trees are identified for retention construction will be undertaken in accordance with the relevant guidelines.

Retained trees will be adequately protected from damage throughout the demolition and construction works, tree protection measures will include some of the following:

- Assessment of location of the roots;
- The Root Protection Area (RPA) will be designated as a construction exclusion zone (CEZ) within which trees will be protected from activities that have a potential to cause damage. CEZ's will be appropriately protected e.g. fencing;
- Prepare detailed Arboriculture Method Statement for specific operations near trees;
- "No-dig design" around the Oak trees;
- Training (e.g. toolbox talks) in how to avoid tree damage;
- Facilitation pruning;
- Supervision of sensitive operations;
- Appropriate tree protection fencing and barriers;
- Appropriate Ground Protection measures;
- Contingency planning;

7.5 AIR QUALITY

General Provisions

Construction works will be carried out in such a way as to limit the emission to air of pollutants, employing best practices.

- The site will be managed in accordance with the CMP to minimise potential effects on air quality from construction.
- Air monitoring will be undertaken throughout the construction period as may be deemed necessary.
- The storage and handling of construction materials can be significant dust emission source. The appropriate dust control measures will greatly reduce dust emissions from these

sources and ensure that the adverse effect will be reduced or eliminated. These include covering waste sips, scaffold netting, use of water to suppress dust, provision of hard stand access for truck and vehicles.

- Handling and storage areas will be sited as far away as is reasonably and practically possible from public/residential areas. Prolonged storage of materials will be avoided where possible. Transportation of materials that may be dusty will be sheeted down to prevent any escape of materials.
- The burning of materials is prohibited on all Client's project sites.

7.6 CONSTRUCTION PLANT

Construction plant can be a significant source of emission although control measures can be implemented to minimise any adverse impacts. The following measures will be employed:

- Site plant and equipment will be serviced regularly and maintained in good condition and in accordance with the manufacture's specifications. Allowing for economic constraints, the plant will be selected on the basis of which has the least potential for dust and emissions.
- Plant will not be left running when not in use.
- Plant with dust suppression equipment will be used where practicable.

7.7 VEHICLE MOVEMENTS

Vehicle movement may result in dust emissions and exhaust emissions. However, a number of control measures can be adopted to eliminate or minimise such emissions:

- Damping down the site haul roads during prolonged dry periods.
- Regular cleaning of hard surfaces at the site entrance.
- Ensuring that materials are transported appropriately (sheeting used over dusty materials)
- Confinement of plant and machinery to designated haul routes on site. Haul routes will be outside areas of high groundwater vulnerability.
- Speed restrictions on site will be enforced (15 km/h).
- Hoarding to site boundaries where practical which will aid in the reduction of windblown dust-off site.

7.8 DUST

Dust control will be best achieved at sources, and if possible, activities will be carried out in a manner as to preclude dust generation.

If dust is generated, steps will be taken to protect workers in the vicinity who shall, as a minimum, be issued with appropriate dust masks. Dust will, as far as is reasonably practicable, be contained in the area where it was generated. Dust suppression will be carried out to ensure that dust nuisance affecting neighbouring properties is minimised.

Dust emissions from construction will be controlled through careful pre-project planning and effective site management. The following control measure and good practices, will be employed:

- Burning of materials is prohibited on all Client's Project sites.
- Loading and unloading will only be permitted in designated areas.
- Provision of water sprays in dust sensitive locations will be introduced, e.g. concrete cutting.

7.9 ECOLOGY

All construction works will be carefully controlled in terms of potential environmental effects through implementation of this CMP and consultation with the relent bodies. As part of the construction process, protective fencing will be provided to protected trees, which in turn will provide protection to the ecology.

Procedures to minimise risk of pollution potential incidents will be put in place.

7.10 MEASURES TO REDUCE IMPACTS OF HABITAT LOSS

Care will be taken to ensure that trees and hedges being retained are incorporated into the development without being impacted upon. Protective fencing will be provided around trees and hedge vegetation being retained and this will enclose their Root Protection areas (RPAs). The fencing will be at least 2.3m high and constructed in accordance with figure 1 of BS 5837 2012 see fencing detail in Tree Protection Strategy Report' of the Arboriculture Assessment report. The fencing will be made up of Herras fencing panels.

Substantial native tree and hedgerow planting will be planted on the site. Three large areas of open space will be maintained on the site, and existing hedges which are to be retained will be reinforced with native planting. This will reduce the impact of the proposed development upon habitats in the area and there will be no significant operational impact upon habitats due to the provision of substantial native and pollinator friendly habitats proposed for the site.

7.11 MEASURES TO REDUCE IMPACTS ON BATS

Lighting proposals for the construction phase will adhere to the advice provided in *Bats and lighting – Guidance for Planners, Engineers, Architects and Developers* (Bat Conservation Ireland 2010), *Guidance Notes for the Reduction of Obtrusive Light GN01* (Institute of Lighting Professionals, 2011) and *Bats and Lighting in the UK – Bats and the Built Environment Series* (Bat Conservation Trust UK, January 2008). Construction stage lighting shall be reviewed by a qualified bat ecologist. If necessary, the bat ecologist shall recommend adjustments to directional lighting (e.g. through cowls, shields or louvres) to ensure minimum light spill onto vegetated areas, and above lighting columns (reducing light spill to vegetated areas to below 3 lux where possible).

7.12 MEASURES TO REDUCE IMPACTS ON BIRDS

To limit the potential impact of construction on breeding birds, vegetation removal will be restricted to the non-breeding season (September to February, inclusive). Where the construction program does not allow this, an ecologist will undertake a breeding bird check immediately prior to vegetation clearance. Where no breeding birds are present clearance may proceed without requiring a license. However, given that breeding birds and their nests of all bird species are protected under the Wildlife Acts, a license would be required from the NPWS to permit the destruction of nest sites and disturbance to breeding birds during the bird breeding season (1st March to the 31st August). Depending on the species in question licenses may or may not be granted and therefore avoidance of the breeding bird season is by far the best option in order to avoid delays during vegetation clearance.

7.13 NOISE MANAGEMENT

Noise arising from the construction phase will be limited principally to plant operations and traffic movements to and from the site. Worst-case construction noise levels will be within the required threshold limits included in British Standard 5228:2009 and the National Roads Authority Guidelines for the Treatment of Noise and Vibration (2004).

British Standard BS5228:2009 – Noise and vibration control on construction and open sites: Part 1 – Noise outlines a range of measures that can be used to reduce the impact of construction phase noise on the nearest noise sensitive receptors. These measures will be applied by the contractor where appropriate during the construction phase of the proposed development.

- Ensuring that mechanical plant and equipment used for the purpose of the works are fitted with effective exhaust silencers and are maintained in good working order.
- Careful selection of quiet plant and machinery to undertake the required work where available.
- Machines in intermittent use will be shut down in the intervening periods between work.
- Ancillary plant such as generators, compressors and pumps will be placed behind existing physical barriers, and the direction of noise emissions from plant including exhausts or engines will be placed away from sensitive locations, in order to cause minimum noise disturbance.
- Handling of all materials will take place in a manner which minimises noise emissions.
- A complaints procedure will continue to be operated by the contractor throughout the construction phase and all efforts should be made to address any noise issues at the nearest noise sensitive properties.
- Where construction activity takes place in the vicinity of residential properties, it will be restricted to the stipulated hours of operation identified above.

7.14 SOILS & CONTAMINATIONS

Existing Conditions

The subject site is currently used as agricultural land and is surrounded by hedgerows and drainage ditches.

Strategy

The strategy for controlling and mitigating potential adverse environmental or health and safety effects during construction will be to adopt the procedures and methods set out within this CMP.

Operation Control

The strategy for controlling and mitigating potential adverse environmental or health and safety effects during construction will include the following, as appropriate:

- Identification and assessment of the potential for residual ground contamination to be presented prior to the start of any excavation works.
- Minimisation of potential risks to site workers as required by the Safety, Health and Welfare (Construction Regulations) 2013.
- Testing and sampling of excavated soils in order to assess the suitability of materials for re-use on site.
- Dust suppression from any contaminated soils by the regular use of water spray during any dry conditions, sheeting of haulage vehicle loads.
- Stockpiling of contaminated materials will be avoided where possible.
- Stockpiles will be treated to prevent windblown dust.
- Adequate drainage will be designed and installed during construction work to manage surface water runoff.
- The handling and storage of any potentially hazardous liquids on site, e.g. fuels and chemicals, will be controlled and best practice guidelines. Storage tanks/container facilities will have appropriate bunding within the designated area.
- If hazardous liquids escape, remedial action will be taken as soon as possible.
- Where unforeseen contamination is identified during the course of the work, specific investigations will be carried out in the areas in question and appropriate health and safety procedures will be implemented during the removal of the material.

A strategy will be prepared to identify, analyse, segregate and control existing contaminated materials on site.

Procedures will be drawn up to control all potentially contaminated materials brought to site.

7.15 TRANSPORT

General Provisions

The works will be carried out in such a way that inconvenience to the public arising from increase in traffic flows and disruptive effects of construction traffic on local and main roads is limited wherever practical.

The key principle of the traffic management plan is to ensure the safety of all personnel (drivers & pedestrians). This means a separate entrance for vehicles and pedestrians. The onsite traffic flow will change through the course of the Development. All site traffic will be subject to speed restrictions.

Vehicles and pedestrians will be segregated at the site entrance. Site operatives will be required to wear high-vis clothing on site. Plant and truck operators will be required to have valid qualifications for the plant/trucks that they are operating.

Specific material storage will be identified and will be managed for on-site movement by the mobile crane or the forklift.

For large, wide or abnormal loads, guidelines will be followed.

A Construction Traffic Management Plan Report will be prepared by appointed contractor. It will be reviewed and updated in line with the construction programme and will typically include details of the following:

- Temporary Traffic Operations Supervisor (TTOS)
- Temporary traffic control measures.
- Temporary and permanent access to the works – vehicle and pedestrian.
- Off-loading and storage areas.
- Traffic management procedures for waste disposal vehicles.
- Personnel and vehicle segregation.
- Equipment e.g. road cones, temporary fencing and signage etc.
- Ensuring all work is planned and method statements prepared and detailing safe systems of work.
- Ensuring that all sub-contractors make adequate provision for vehicle selection and supervision of drivers.
- Making vehicle safety an integral part of the development safety & health plan.

- Defining standards for driver competence, vehicle safety and maintenance.
- Ensuring the coordination and cooperation between contractors.
- Ensuring that all workers receive site induction training, detailing safe traffic routes and site rules for operating vehicles. Establish safety monitoring procedures for the use of vehicles on site.

7.16 CONSTRUCTION WASTE MANAGEMENT

Refer to Construction Waste Management Plan prepared by PMcG Consulting Engineers for details.

8 WORK FORCE

8.1 EMPLOYMENT AND MANAGEMENT OF WORKFORCE

Working Hours

For the duration of the proposed infrastructure works the expected working hours shall be 7:00AM to 7:00PM on weekdays and 7:00PM to 2:00PM on Saturday. No works will be undertaken on Sundays or Bank Holidays, without the consent of Westmeath County Council.

Subject to the agreement of the local authority, out of hours working may be required for water main connections, foul drainage connections, etc.

8.2 TEMPORARY SITE ACCOMODATION

Site accommodation will be contained within the site boundary. The principal welfare accommodation will comprise of site offices, toilets, canteen and drying rooms. These will be prefabricated where possible.

Preventative pest control measures will be put in place, and regular inspections will take place to ensure good housekeeping.

8.3 SITE SECURITY

Designated vehicular and pedestrian access will be established and all other potential access points to the site secure so far as is reasonably practicable.

It is proposed to use a “Monitored Security Camera” system on site.

9 ENVIRONMENTAL MANAGEMENT

9.1 CONSTRUCTION PHASE MEASURES – POLLUTION PREVENTION

Works will follow best practice guidance as outlined in *Guidelines on the Protection of Fisheries during Construction Works in and Adjacent to Waters* (IFI, 2016), *CIRIA 2010 Environmental Good Practice on Site & CIRIA 2001 Control of Water Pollution from Construction Sites: Guidance for Consultants and Contractors.* Although the risk of any significant impact on water quality in any receiving water bodies is considered to be extremely low given the lack of running water features on the site. Best practice will be implemented at all times in relation to all construction activities to avoid any accidental pollution events occurring to the wet ditches in the area or polluting the ground water table.

This will include the following actions:

- SuDS will be constructed in line with manufacturer's guidelines / best practice methods.
- A combined attenuation system consisted as Stormtech underground to cater for the 100-year return period. The design of the attenuation is in accordance with CIRIA SuDS Manual C753 2015. Please refer to the accompanying drawings for further information.
- During construction, any surfaces which are intended to enable infiltration must be protected from compaction. This includes protecting from heavy traffic or storage materials.
- Water contaminated with silt will not be allowed to enter a watercourse or drain as it can cause pollution. All parts of the drainage system will be protected from construction runoff to prevent silt clogging the system and causing pollution downstream. Measures to prevent this include, early construction of sediment management basins, channelling run-off away from watercourses and surface water drains and erosion prevention measures. Following construction, subsoil that has been compacted during construction should be broken up prior to the re-application of topsoil to reinstate the natural infiltration performance of the ground.
- Pipe systems and orifices will be checked for blockages or partial blockages.
- Silt deposited during construction will be removed.
- Soils will be stabilised and protected from erosion whilst planting becomes established.
- Hydrocarbons or any hazardous chemicals will be stored in specific bunded areas. Refuelling of plant and machinery will also be carried out in bunded areas to minimise risk of any potential pollutants being discharged from the site.
- Pollution control measures will be implemented to control run-off from the site and prevent run-off which is potentially contaminated with sediments or hazardous chemicals entering the drainage network.

- Pouring of cement-based materials for works will only be carried out in dry conditions. Pumped concrete will be monitored to ensure there is no accidental discharge. Mixer washings and excess concrete will not be discharged directly into the drainage network. Concrete washout areas will be created to avoid any accidental discharge from the proposed development site.
- Foul drainage from site offices and compound, where not directed to the existing wastewater network, will be contained and disposed of off-site in an appropriate manner and in accordance with the relevant statutory regulations to prevent the pollution of watercourses.
- A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available on site. Construction staff will be familiar with the emergency procedures and use of the equipment.

9.2 WATER COURSE PROTECTION

This section should be read in conjunction Natura Impact Statement. The main items to be considered are as follows:

- Wet concrete works in proximity to the streams to be avoided were possible.
- Precast elements to be provided for all wing wall connections
- All measures to be maintained throughout the construction phases.
- Restrict movement of construction vehicles along the edge of the watercourse
- In stream works to comply with seasonal restrictions in salmonid rivers.
- Suitable temporary erosion control measures will be employed where required, to prevent sedimentation/ erosion arising from any newly profiled banks until new vegetation establishes eg jute/coir mesh blankets.
- An interceptor trench will be required in front of the silt fencing where space allows. The silt fence must be capable of preventing 425μ (micron) and above sediment from passing through. It should also be resistant to damage during deformation resulting from loading by entrapped sediment.
- Surface water or pumped ground water generated during the construction phase of the project will be treated on site using a sediment management basin to remove any sediment prior to discharge.

9.3 SITE BIOSECURITY MITIGATION MEASURES

This section should be read in conjunction with Natura Impact Statement. The main items to be considered are as follows:

- Validation that all machinery/vehicles are free of Invasive Alien Plant Species (IAPS),prior to their first introduction to Site.
- Certification from the suppliers that all imported soils and other fill/landscaping materials are free of IAPS
- A regular schedule of Site inspections across the IAPS growing seasons, for the duration of the construction works programme.
- Validation that all machinery/vehicles are free of IAPS, prior to leaving the Site.
- Appropriate and effective Site biosecurity hygiene to ensure that no IAPS are transmitted off-site for the duration of the Proposed Works.

Report By

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APPENDIX 14.2 – CWMP

PAUL Mc GRAIL
CONSULTING ENGINEERS LIMITED

Proposed Residential Development at Cornamaddy, Athlone, Co. Westmeath

Phase 3

Construction Waste Management Plan

REGISTERED IN IRELAND AS PAUL MC GRAIL LTD
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PAUL Mc GRAIL
CONSULTING ENGINEERS LIMITED

PROJECT NUMBER: 2022-113				DOCUMENT REF: 2022-113			
1	First Issue	RD	13/12/2022	PMG	13/12/2022	PMG	13/12/2022
Revision	**Description & Rationale**	**Originated**	**Date**	**Checked**	**Date**	**Authorised**	**Date**
Paul Mc Grail Consulting Engineers							

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1 INTRODUCTION

Paul Mc Grail Consulting Engineers have produced this Construction Waste Management Plan on behalf of Marina Quarter Limited for the proposed development.

The development comprises of 70 residential units at Cornamaddy, Athlone Co. Westmeath.

This Construction Waste Management Plan (CWMP) includes estimated quantities of different types of waste associated with works and re-used (on-site and off-site), to be recycled (on-site and off-site) and to be removed from site for appropriate disposal.

This assessment has been made using the experience of the Applicant and their professional advisors based on the typical construction methods and strategies that can be reasonably anticipated at this stage of the process.

This Construction Waste Management Plan (CWMP) is prepared with reference to the following documentation:

- EU and Irish Environmental Legalisation
- Best Practice on the Preparation of Waste Management Plans for Construction and Demolition Projects
- EPA Research Designing out Waste.
- Construction and Demolition Waste Management – A handbook for Contractors & Site Managers (2002). FAS and the Construction Industry Federation.

This Construction Waste Management Plan (CWMP) follows the format outlined in the Best Practice on the Preparation of Waste Management Plans for Construction and Demolition Projects, Department of the Environment, Heritage and Local Government (DoEHLG), July 2006, (The Guidelines).

The proposed works make reference to the following key items regarding excavation and general waste:

- All construction waste will be segregated into different skips
- All surplus clean soil and topsoil will be removed off site and brought to a permitted site or facility
- A register shall be maintained of the movement of waste off site, to include an estimate of quantities of waste removed, name and waste collection point permit number of the contractors engaged to collect the waste, details of the recovery or disposal facility or facilities used. The developer shall retain all recovery or disposal receipts.
- A prohibition on the burning or burying of waste on the site

The aim of this plan is to provide a framework to ensure that optimum levels of the waste reduction, reuse recycling are achieved throughout the duration of the project.

The persons appointed to undertake the works shall be responsible for the development of this plan and the implantation of all necessary protocols and measures to ensure the regulatory compliance, including the provision of data to the Local Authority.

2 DESCRIPTION OF PROJECT

2.1 SITE LOCATION

The subject site is located to the north of Athlone town centre in Cornamaddy, Co. Westmeath. The site is generally bounded to the north and east by agricultural fields in the townland of Cornamaddy, to the south by the existing Drumaconn residential estate, to the east by the housing development under construction (refer to granted planning application ref. no. 14/7103 for details) and the granted permission to the north of the development site ref No. 22/253. Refer to Figure 1 for site location.

Figure 1 – Site Layout

2.2 SCOPE OF WORKS

The works consist of 70 residential units and all ancillary development works.

2.3 ASSIGNMENT OF RESPONSIBILITY

While the initial plan endeavours to provide representative indicative quantities, it should be noted that the estimated volumes should be developed further as the project progresses, similarly the proposed methodologies described in this report will develop further as part of the physical work on site.

The Project Manager of the site will be responsible for the overall implementation of the plan and associated procedures. The Project Manager will ensure that reporting and recording requirements are met and all necessary resources are in place to support the implementation of the plan.

The Project Manager will designate a Site Engineer/Manager/Assistant Manager as the Construction Waste Manager and who will have overall responsibility for the implementation of the Project Construction Waste Management Plan (CWMP). The Construction Waste Manager will have the authority to instruct all site personnel to comply with the specific provision of the Plan. A technically competent person will also be required to assess waste arising and determine its classification in accordance with the Hazardous Waste List.

At an operational level, the scheme Site Agent/Site Manager and appropriate personnel from any sub-contractors on the site shall be assigned the direct responsibility to ensure that the discrete operations stated in the Project Construction Waste Management Plan are performed on an ongoing basis.

The waste manager will be in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The waste manager will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this CWMP.

3 WASTE ARISINGS AND PROPOSAL FOR MANAGING WASTE

3.1 WASTE HIERARCHY

The waste hierarchy below outlines that waste prevention and minimisation are the first priority in managing wastes, followed by waste reuse and recycling with disposal being considered as a last resort.

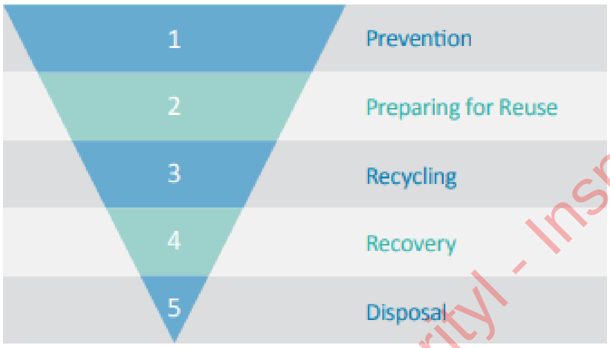

Figure 2 - Outlining the Waste Management Hierarchy

Following guidelines from the UK Waste and Resources Action Programme (WRAP) has identified five key principles that design teams can use the this has been utilised during the design Stage of the project. As outlined

- Design for Waste Efficient Procurement
- Design for Materials Optimisation
- Design for Off Site Construction
- Design for Reuse and Recycling

3.2 DESIGNING FOR OFF SITE CONSTRUCTION

The benefits of off-site factory production in the construction industry are well documented and considerably reduce waste on site. The following off-site construction activities will be utilised on the site:

- Retaining walls were possible to utilise the excavated rock in the form of geogrid (example would be Tobermore Secura Grid)
- Timber frame housing which reduces waste from site cutting.
- Precast Drainage manholes and drainage products

3.3 ANALYSIS OF WASTE ARISING'S

The main waste stream arising, including surplus materials, which are likely to be generated during the project, are presented in the table below:

Waste Type	European Waste Classification Code	Waste Clarification
Concrete, bricks, tiles, ceramic	**17 01**	
Concrete (Foundations, structures, general)	17 01 01	Non-hazardous
Concrete (Blocks)	17 01 01	Non-hazardous
Mixture of concrete, bricks, tiles and ceramics	17 01 07	Non-hazardous
Wood, Glass, Plastic	**17 02**	
Wood	17 02 01	Non-hazardous
Glass	17 02 02	Non-hazardous
Plastic	17 02 03	Non-hazardous
Bituminous mixtures, coal tar and tarred products	**17 03**	
Bituminous materials	17 03 02	Non-hazardous
Metals (including their alloys)	**17 04**	
Lead	17 04 03	Non-hazardous
Iron and Steel	17 04 05	Non-hazardous
Soils	**17 05**	
Topsoil and Subsoil and Rock	17 05 04	Non-hazardous
Gypsum-bases construction materials	**17 08**	
Gypsum-bases construction materials	17 08 02	Non-hazardous
Other construction waste	**17 09**	
Mixed general construction waste	17 09 04	Non-hazardous

- The selected European Waste Classification (EWC) codes provided are provisional only. In a number of instances more than one EWC may be considered appropriate. Care should be taken to ensure that the waste collectors permit includes all EWC codes specified in the appropriate documentation. In addition, there will be a requirement for a technically competent person to assess waste as it arises and to make a determination as to the classification of the material in accordance with the Hazardous Waste List.

- For the purpose of this plan it is assumed that all of the soil and stone waste arising from the site will be categorised as non-hazardous. Analysis may be required prior to acceptance at certain facilities.

3.3.1 Predicted Waste Arisings

At this stage of the development the figures provided should be considered as provisional only, however, they do provide an indication as to the achievable recycling rates.

Preliminary investigations indicate that approximately 8,000m3 of topsoil and 18,000m3 of sub-grade material will need to be excavated.

There are no anticipated demolition works associated with the development as the site is currently a greenfield site.

Waste Type	%
Soil and Stones	84.8
Segragated Wood, Glass and Plastic	0.3
Concrete, Brick, Tile & Gypsum	6.9
Bituminous Mictures	1.3
Mixed C&D Waste	4.5

Waste Type	Tonnes	Re Use		Recyclable		Disposal	
		Tonnage	%	Tonnage	%	Tonnage	%
Segragated Wood, Glass and Plastic	5	0.5	10	2.75	55	1.75	35
Concrete, Brick, Tile & Gypsum	35	7	20	22.75	65	5.25	15
Bituminous Mictures	7	1.4	20	2.8	40	2.8	40
Mixed Waste	22	2.2	10	8.8	40	11	50
Total							

Concrete , Brick, Tiles, Gypsum.

The majority of concrete blocks, bricks, tiles generated as part of the construction and works are expected to be clean, inert material and should be recycled, where possible. If this waste at any time does need to be removed from site it will be stockpiled in a segregated area until it can be collected for recycling by a licensed haulier. Wood, Glass & Plastics Timber waste will be kept to a minimum through the re-use of shutters, etc. throughout the job.

Wood , Glass & Plastic

Material waste noted above will be kept to a minimum as the majority of the housing will be timber frame and fabricated off site thus reducing waste. Any timber that cannot be re-used because of poor quality, etc. will be segregated and stored for recycling in a skip. Where possible pallets will be stored for return to the supplier. In the case of hard plastic, it is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

3.3.1.2 Waste Storage

Waste skips will be located in the construction compound. All waste must be segregated and placed in the relevant skip. Skips will be collected by an appointed waste collector and disposed of at the relevant licensed facility.

A list of the potential waste collectors for the project are shown below and each collector should be verified by contacting the National Waste Collection Permit Office (NWCPO).

Chris Lynch Skip Hire and Waste management Services, Mullingar Business park
Wallace Waste, 114-15 Mullingar Business Park, Co Westmeath.
Corr & Nyland , Ballew Lismacaffrey, Co. Westmeath (Sub soil waste).

Figure 3 - Construction waste segregation compound design

3.4 MINIMISATION AND OPPORTUNITIES FOR RE-USE/RECYCLING

Waste will arise on the project mainly from bulk excavation and general construction activities relating to the roads and services. The site management team will order materials and arrange storage in order to minimise the potential for waste on site.

- Materials will be ordered to suit to prevent waste.
- Concrete blocks, engineering bricks and clay bricks that are surplus will be broken up and used for hardstanding areas.
- Excess wood will be segregated in separate skips and sent for recycling. The site management will police to make sure that the segregation of the wood skip is kept exclusively for wood.
- Plastic arising from general waste or packaging will be segregated and stored in separate skips. Again, the site management team will ensure that there is no contamination of the segregated skips on site.
- Any excess metal generated on site from reinforcement steel and from the demolition element of the project will be kept in the one area and removed off site to a licenced metal recycling facility. The Site Management team will keep certification of this on file on site.
- Topsoil that is required for the soft landscaping will be measured and this quantity will be retained on site. The soil that will have to be removed off site will be removed to a licenced landfill facility. The Site Management team will keep records of the removal and the certification on file on site.

- Any hazardous material discovered during the course of the construction shall be reported to the Site Management team. The relevant authorities will be informed and an agreed method for the removal of the hazardous material.

4 CONSTRUCTION WASTE MANAGEMENT PROCEDURE

4.1 ROLES AND RESPONSABILITIES

4.1.1 Project Manager

The Project Manager will be responsible for the overall implementation of the plan and associated procedure. The Project Manager will ensure that the reporting and recording requirements are met and all necessary resources are in place to support the implementation of the plan.

4.1.2 Nominated Construction Waste Manager

A technically competent and appropriately trained Construction Waste Manager will be appointed by the Project Manager. The nominated person will be responsible for all aspects waste management throughout the different stages of the project including waste assessment and characterisation, implementation of the CWMP (and associated target recycling rates), and effective communication of the objectives with all the operatives associated with the project (including site staff, external contractors and suppliers).

A key objective of the nominated person will be the maintenance of accurate records on the quantities of waste / surplus materials generation and management. The recording of summary information, as described in section 4.30 to 4.5, will further assist the implementation of the plan.

4.1.3 Site Personnel

All personnel on site will be responsible for the effective implementation of the plan and associated procedures. All staff will receive training on waste prevention, segregation and best practice guidelines.

4.2 TRAINING

Copies of the CWMP will be made available to all relevant personnel on site. The Project Manager will arrange for all site personnel and sub-contractors to be instructed about / receive training on the objectives of the Project Construction Waste Management Plan and materials management and be informed of the responsibilities that fall upon them as a consequence of its provision.

The topics to be covered will include:

- Project programme and requirements
- Health and Safety requirements
- CWMP
- Materials to be segregated
- Segregation systems and protocols
- Arrangement for the storage and handling of reusable materials and recyclables
- Document control requirements

Where source segregation and materials re-use techniques apply, each member of staff will be given instructions on how to comply with the Project Construction Waste Management Plan and will be displayed for the benefit of site staff.

4.3 RECORD KEEPING

The Construction Waste Manager shall develop a system whereby details of all arising's, movements and treatments of Construction Waste will be recorded throughout the Construction Stage of the Project. Where practicable, a computerised monitoring tool may be employed. This system will enable the Contractor to measure and record the quantity of waste generated and identify possible savings on wastage. Thus, each consignment of Construction Waste taken from site will be subject to documentation and recording. An indicative template is contained in Appendix A, to ensure that full traceability of materials to its final destination.

Verifiable and validated tracking and authorisation documentation will be maintained for all wastes destined for re-use, recovery, recycling or disposal. Justification will also be provided where a disposal option had been employed.

In addition, a record will be kept of all materials as they arrive on site detailing the assignment of specific uses within the works. This will enable the monitoring of the quantity and type of waste produced at various stages throughout the project.

4.4 WASTE AUTHORISATION

All movement of waste and the use of waste contractors will be undertaken in accordance with the Waste Management Acts 1996 – 2022 (updated feb 2022), Waste Management (Collection Permit) Regulations 2007 and Amendments and Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project manager will maintain a copy of all waste collection permits on-site.

Authorization Type	**Specific Need for Project (Yes / No)**	
Waste License	Yes	-
Waste Permit	Yes	-
Waste Collection Permit	Yes	-
Transfrontier Shipment Notification	-	No
Movement of Hazardous Waste Form	-	No

4.5 WASTE AUDITING

The effectiveness of a Waste Management Plan (WMP) and its implementation, will be subject to regular audits by the Construction Waste Manager throughout the duration of the project in accordance with the Audit Plan (to be developed during the works).

The Audit Plan should be clearly defined in the Project CWMP. The regular audits will focus on materials inputs to the project and the waste outputs for each operation identifying additional opportunities for waste reduction, re-use and recycling. The audits will also investigate the operational factors and management policies that contribute to the generation of waste and identify appropriate corrective actions, where necessary. Performance targets will be developed, e.g. an 85% overall recycling target, successes and failures will be recorded, and Action Plans will be developed to address any issue which arise. Inspections of the waste storage areas will be undertaken on a weekly basis, issues relating to housekeeping, inappropriate storage and / or segregation will be actioned at the earliest practicable opportunity.

The Project Manager will record the findings of the audits, including waste types identified, quantities of waste arising, final treatments and cost, in a report to be available to the Local Authority as required during the course of the works.

Details of the inputs of materials to the construction site and the outputs of wastage arising from the project will be investigated and recorded in the Final Waste Audit, which will identify the amount, nature and composition of the waste generated on the site. The Final Waste Audit will examine the manner in which the waste is produced and will provide a commentary highlighting how management policies and practices may inherently contribute to the production of construction and demolition waste. The measure waste quantities will be used to qualify the costs of management and disposal in a Waste Audit Report, which will also record lessons learned from these experiences, which can be applied to future projects.

4.6 ARTICLE 27 DECLARATIONS

If any of the excavated soil is found to be clean/inert (by product), we could re-use this material either on site or nearby construction sites may require clean fill material. Any material re-used on another site will be done under Article 27 of the European Communities (Waste Directive) Regulations 2011.

Excavated excess soils that are required to be exported off-site shall be tested to determine their classification as hazardous or non-hazardous in accordance with EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Non-Hazardous soils may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with Article 27* of the *European Communities (Waste Directive) Regulations 2011*. Article 27 requires that the material classified not a waste, but a by-product must meet specific criteria and that that a declaration of a material as a by-product is notified to the EPA. The EPA publication *"Guidance on Soil and Stone By-Products in the context of Article 27 of the European Communities (Waste Directive) Regulations – Version 3 June 2019* shall be considered in this regard.

The records of all WAC tests shall be maintained in the site's Waste File including the destination of the facility that contaminated soils are exported to and the details of the permitted haulier's Waste Collection Permit.

5 CONSTRUCTION PLAN

An indicative works plan is provided hereunder. The plan will be developed further by the site team as the project progresses. However, it is not anticipated that the final plan will differ significantly due to the unlimited number of activities to be undertaken. The works shall be undertaken in a manner which maximizes the potential for recycling, including source segregating waste where appropriate.

Construction Activity Sequence	General Description
Identification of existing Utility Services	Set up bunting, mark location of live services, including E.S.B., Gas etc.
Removal of Vegetation	e.g. Trees and vegetation
Transport of material off site	Segregation of materials on site
Substructure	Rebar, Formwork and Pour
Superstructure	Prefabricated Timber frame and external masonry cladding
Roof	Prefabricated Truss
External Envelope	Brick/ Blockwork
Internal Finishes	Mechanical & Electrical etc.
External Landscaping	Hard and soft landscaping

6 WASTE MANAGEMENT LEGALISATION AND OBLIGATIONS

6.1 RELEVANT WASTE MANAGEMENT LEGALISATION

This section provides details of waste related legislation relent to the project. In accordance with cradle to grave responsibilities, the Developer will be responsible for all waste arising from the time the waste is generated until it reaches its final destination point; this includes its method of treatment / disposal. The Waste Management Acts 1996 – 2008, give effect to the "polluter pays" principle effectively stating that the waste producer may be liable for any pollution incidents arising from the management of their waste. There is therefore an onus on the Developer to ensure that all contractors managing waste on their behalf are legally compliant and technically competent and the waste itself is contained, handled, treated and disposed of in accordance with all relevant regulatory requirements.

A brief description of the main waste related regulatory controls relevant to the project is provided hereunder; however, the list is nor exhaustive and should be reviewed and amended at regular intervals in accordance with changing legalisation.

- Local Authority Commercial Bye Laws
- Eastern - Midlands Region Waste Management Plan 2015 – 2021, as amended
- Waste Management (Landfill Levy) regulations 2015
- Waste Management (Facility Permit and Registration) Regulations
- Waste Management (Licensing) Regulations 2004
- Waste Management (Collection Permit) Regulations 2008
- Waste Management (Movement of Hazardous Waste) Regulations 1998
- Waste Management (Shipments of Waste) Regulations 2006
- European Waste Catalogue (EWC) and Hazardous Waste List, 2002
- Carriage of Dangerous Goods Regulations, 2007

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APPENDIX A

WASTE TRACKING TEMPLATE

No.	Waste Description	EWC	Date of Collection	Time of Collection	Destination	Treatment/Disposal Method	Container Type	Container Size	Registration Number	Wight (ton)	Haulage Company	Estimate of Actual Waste (ton)	Documents Received	Documents on File	Documents Reference Number
1	Sample – Sub soil	17 05 04	01/01/2020	10.45am	Landfill at Local Authority Facility	Recycling to Landfill	8 Wheeler Truck	10m3	15D 12345	20	ABC Hauliers	20	Yes	Yes	ABC12345
2															
3															
4															
5															
6															
7															
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