



HAYES HIGGINS PARTNERSHIP
CHARTERED ENGINEERS • PROJECT MANAGERS

Civil Engineering Services Report (S179A)

For

Development at Ravel, Dunleer, Co. Louth

Louth County Council



Comhairle Contae **Lú**
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DOCUMENT CONTROL SHEET

	Client	Louth County Council							
	Project Title	Development at Ravel, Dunleer, County Louth							
	Project Ref.	23D046							
	Document Title	S179A							
	Document No.	23D046-PR 01							
	This Document Comprises	DCS	PD	TOC	Text	-	-	-	Appendices
		1	-	1	5				11
Check									

Revision	Status	Author	Reviewed By	Approved By	Issue Dates
P	S 179 A	REM	LM	DH	APRIL 2024



1. Introduction

Hayes Higgins Partnership has been commissioned to prepare a Civil Engineering Services Report for the proposed development at Ravel, Dunleer, County Louth.

This report was compiled after reviewing the available information on drainage and water supply, reviewing the OPW flood maps and other available information. It contains information on the design of the surface water and wastewater systems to be constructed for the proposed development. (The compilation of information on the existing public mains, wastewater and surface water lines.) A survey has been completed to confirm levels, sizes and other information necessary for a more detailed design.

The design of both the surface water and wastewater systems has been carried out in accordance with the following:

- The Greater Dublin Regional Code of Practice for Drainage Works
- Technical Guidance Document H of the Building Regulations
- The Greater Dublin Strategic Drainage Study (GDSDS)
- DOE Recommendations for Site Development Works for Housing Areas
- BS 8301:1985, Code of practice for Building Drainage
- BS EN 752 External building drainage
- OPW The Planning System and Flood Risk Management
- Irish Water Code of Practice and Standard Details (Water & Wastewater)
- DMURS – Design Manual for Urban Roads and Streets
- Louth County Council codes of practice

The wastewater system for the proposed development is a gravity feed system to a collection point at the pump station, which is then pumped to the existing wastewater network. The proposed surface water drainage system is a gravity feed drainage system to an attenuation tank on site. The surface water system is designed to take the runoff generated by a 1 in 100 year storm event (+20% for climate change). The outfall from the surface water system is detailed below.

2. Site

The site in question is located at Ravel, Dunleer, Louth County. The existing site is a greenfield site & is zoned A1 Existing Residential/A2 New Residential/G1 Community Facilities. The site is bound by hedgerow & open watercourse to the north, existing metal railed fence to the eastern boundary with adjoining housing development, Ravel Grange, existing timber post and rail fence to the southern boundary with existing school timber fence and western boundary with R170 and existing masonry wall to rear of two (2) adjoining traveller group scheme units.

The topography of the site shows a general downward slope from south to north. Proposed on the site are the construction of 70no. houses including 9no. 2-bed bungalows, 24no. two storey 2-bed houses, 18no. two storey 3-bed houses, 5no. two storey 4-bed houses, and 2no. 3-bed bungalows, and 12no. sheltered accommodation 2-bed bungalows on a site of c.3.17 hectares in the townland of Ravel, Dunleer, Co. Louth.

The development will also include the construction of new connections to the existing estate road; provision of new cycleway, footpath, and public lighting along the boundary with the R170; new estate roads and homezones within the site; 123no. car parking spaces including both on-street and in-curtilage parking; cycle parking; hard and soft landscaping including public open spaces, playground, and private gardens; boundary treatments; ESB substation; lighting; laying of underground sewers, mains and pipes; underground pump station and attenuation tank; and all associated works. A copy of the site survey drawing is included in Appendix C.

The development will be accessed via an existing entrance located to the south east of the existing development, and via existing estate roadway, which connects to the R170 roadway on the west to the adjoining housing development on the east, Ravel Grange. The proposed entrances are depicted on the attached drawings and residents will have parking spaces located along the proposed road and within the site.

3. Surface Water Drainage

Local Authorities require that all developments must include a sustainable urban drainage system, SuDS. A site investigation was undertaken to establish the permeability of the site. The site investigation advises the site does not have any available infiltration and as such permeable surfaces and natural infiltration are not viable, refer to appendix F. As the conditions on site are not favourable to infiltration a modular attenuation system connected to the existing stream at the northern boundary, via a hydro-brake limiting discharge to 2 l/s/ha, is to be used to dispose of the surface water from the developed site.



A gravity feed surface water system will serve the hardstanding on site. The main surface network in the proposed development are to consist of 225mm diameter uPVC pipes with a minimum fall 1/175. The attenuation system will be located in the green space to the north of the site. There is no available surface water line adjacent to the site.

The required storage volume to retain the on-site runoff for is 560m³. A modular type attenuation system will be provided. To alleviate any possible risk of flood the storage is designed for a 1 in 100 year storm (+20%). A 20% increase in runoff due to climate change is included as per "Greater Dublin Regional Code of Practice for Drainage Works" and the "GDSDS".

The surface water drains have been designed in accordance with BS EN 752, Code of Practice for Drainage Outside Buildings. Details of the proposed surface water drainage system are shown in Hayes Higgins Partnership drawing within Appendix A and calculations within Appendix D.

4. Wastewater Drainage

The wastewater system has been designed in accordance with Irish Water Code of Practice and Standard Details for Wastewater, BS 8301:1985, Code of Practice for Building Drainage and the current Building Regulations.

The wastewater system for the development is a gravity feed system falling to a proposed pumping station, located in the north eastern open space of the development and then being pumped to the existing 225mm foul line on the south / access road to Ravel Grange of the site. The development will not result in a significant increase in foul discharge from the site on the public sewer and we do not anticipate any capacity problems. Refer to attached, Confirmation of Feasibility from Irish Water, Appendix G. The main foul sewers in the proposed development are to consist of 225mm diameter uPVC pipes with required fall designed throughout to suit. A roughness coefficient (ks) of 0.6mm is applied to the design of all pipes.

A Pre-Connection Enquiry form was submitted to Irish Water and Confirmation of Feasibility has been received. Refer to appendix G. The drawings included with the Section 179A show the proposed wastewater layout. Details of the proposed wastewater system are shown in Hayes Higgins Partnership drawing within Appendix A. Final designs are subject to agreement with Irish Water at Connection Application Stage.



5. Water Supply System

There is an existing 100mm diameter watermain located along R170 road at the site entrance to the west. The water network in the vicinity of the site may require upgrades.

There is an existing 100mm HDPE line to the east of the proposed site, situated along the access road, and the proposed 100mm HDPE looped watermain on site will connect into this main line.

In accordance with requirements air valves and scour valves will be provided around the site as necessary. Hydrants will be provided as required by Technical Guidance Document B of the Building Regulations. Water saving devices including aerated taps and low water usage appliances will be used in the proposed development in accordance with best practice. The water supply system has been designed and will be installed in accordance with Irish Water Code of Practice and Standard Details for Water.

A Pre-Connection Enquiry form was submitted to Irish Water and Confirmation of Feasibility received. Refer to appendix G. The proposed watermain layout and details are shown on Hayes Higgins Partnership drawing within Appendix B. Final designs are subject to agreement with Irish Water at Connection Application Stage.

6. Flood Risk Assessment

A flood risk assessment was undertaken to identify possible sources of flooding and the risk posed to the development, and separately the risk posed to surrounding areas as a result of the development. The site is noted as not being in a flood zone for either coastal or fluvial flooding.

External Sources

Flood maps website, www.floodmaps.ie has been reviewed. This shows that the site has not been subjected to flooding during previously reported flooding events. As such it is reasonable to assume there is no risk to the proposed development resulting from flooding off-site.

Internal sources

It is intended that all surface water run off generated by the 1 in 100 year storm will be dealt with via the attenuation tank. An allowance has been made for a 20% increase in runoff due to climate change, as per the "Greater Dublin Strategic Drainage Study" recommendations.



7. Site Layout

This development has been designed in accordance with Design Manual for Urban Roads and Streets (DMURS), refer to road layout drawing 23D046-01, minimum footpath widths and junction radii have been provided to comply with DMURS. A swept path analysis has been carried out for a fire truck as shown on drawings attached, refer to appendix E. A Road Safety Audit and Traffic Impact Assessment have been completed by Roadplan. Please refer to Appendix H and I.

8. DMURS Statement of Consistency

The proposed site layout is confirmed to abide by the guidelines as set out in the Design Manual for Urban Roads and Streets.

9. Services Design Summary

The proposed surface water drainage system has been designed so as to ensure that adequate self-cleansing velocities are obtained, adequate attenuation & sustainable drainage systems in accordance with the Building Regulations, and comply in full with the Greater Dublin Regional Code of Practice for Drainage Works.

Similarly, the proposed wastewater system has been designed so as to ensure that adequate self-cleansing velocities are obtained for partial flows under design loading, in accordance with the Building Regulations and Irish Water Code of Practice and Standard Details for Water & Wastewater.

Local roads & streets are designed in accordance with DMURS & the objectives of the Louth County Development Plan to be safe, attractive & comfortable for all users. The design encourages the use of sustainable modes of transport with facilities for pedestrians/cyclists including the provision of bicycle parking. There is also provision for electric vehicle charge points both on street & in-curtilage.



Appendix A – Proposed Drainage Layout

(See accompanying drawings listed below)




DRAWING / DOCUMENT REGISTER AND ISSUE SHEET

Sheet No. 1

Project No.	23D046	Day	10
Project Name	DUNLEER HOUSING	Month	04
		Year	24

Drq No.	Drawing / Document Name	Format	R.C. Sched. Sheets	Drawing Revisions
01	Proposed Site Levels Layout	A1		P
02	Proposed Drainage Layout	A1		P
03	Proposed Watermain Layout	A1		P
04A	Irish Water Foul & Surface Drainage Details - Sheet 1	A1		P
04B	Irish Water Foul & Surface Drainage Details - Sheet 2	A1		P
04C	Irish Water Foul & Surface Drainage Details - Sheet 3	A1		P
04D	Irish Water Foul & Surface Drainage Details - Sheet 4	A1		P
05A	Irish Water Watermain Details - Sheet 1	A1		P
05B	Irish Water Watermain Details - Sheet 2	A1		P
05C	Irish Water Watermain Details - Sheet 3	A1		P
05D	Irish Water Watermain Details - Sheet 4	A1		P
06	Proposed Cycling & Pedestrian Crossing Layout	A1		P
07	Proposed Swept Path Analysis Layout	A1		P

Distribution	Initials	Name	No. of copies
Client		L.C.C.	1
Architect		EML Architects	1
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Quantity Surveyor			
Main Contractor			
	Head Office		
	Site		
Mech. / Elec. Engineer			
Structural Engineer		H.H.P	1
Planning Authority		L.C.C.	1
Irish Water			
Fire Authority			
Construction Manager			
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	Preliminary Information	A I	Planning Tender	P T	Measurement Construction	M C	Prints Disks	PR CD	Email Upload Share Drive

Symbols Key

Appendix B – Proposed Watermain Layout

(See accompanying drawings listed below)




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		Site	
Mech. / Elec. Engineer			
Structural Engineer		H.H.P	1
Planning Authority		L.C.C.	1
Irish Water			
Fire Authority			
Construction Manager			
Tank Copy			

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Preliminary Information	A I Planning Tender	P T Measurement Construction
		M C
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Appendix C – Site Survey



Appendix D – Surface Water Calculations



Extreme Rainfall Return Periods

Location: Ravel, Dunleer, Louth Co
 Average Annual Rainfall:

Maximum rainfall (mm) of indicated duration expected in the indicated return period.

Duration		Return Period (years)											
		1/2	1	2	3	4	5	10	20	30	50	75	100
5 min	5	2.7	3.6	4.2	4.9	5.4	5.8	7.1	8.5	9.4	10.7	11.8	12.7
10 min	10	3.7	5.1	5.8	6.8	7.6	8.1	9.9	11.8	13.1	14.9	16.5	17.7
15 min	15	4.4	6.0	6.8	8.1	8.9	9.5	11.6	13.9	15.4	17.5	19.4	20.8
30 min	30	5.8	7.8	8.8	10.4	11.4	12.2	14.7	17.5	19.3	21.9	24.1	25.7
60 min	60	7.6	10.1	11.4	13.4	14.6	15.6	18.7	22.0	24.2	27.2	29.8	31.8
2 hour	120	10.1	13.2	14.8	17.2	18.7	19.9	23.7	27.7	30.3	33.9	37.0	39.3
3 hour	180	11.8	15.4	17.3	19.9	21.7	23.0	27.2	31.7	34.6	38.5	41.9	44.5
4 hour	240	13.3	17.3	19.3	22.1	24.0	25.5	30.0	34.9	38.0	42.2	45.9	48.6
6 hour	360	15.7	20.1	22.4	25.7	27.8	29.4	34.5	39.9	43.3	48.0	52.0	55.1
9 hour	540	18.4	23.5	26.1	29.8	32.1	33.9	39.6	45.6	49.4	54.6	59.0	62.3
12 hour	720	20.7	26.3	29.1	33.1	35.6	37.6	43.7	50.1	54.2	59.8	64.5	68.1
18 hour	1080	24.4	30.7	33.8	38.3	41.2	43.4	50.2	57.3	61.9	68.0	73.2	77.1
24 hour	1440	27.4	34.3	37.7	42.6	45.7	48.0	55.4	63.1	67.9	74.4	80.0	84.2
48 hour	2880	34.9	42.9	46.8	52.2	55.7	58.3	66.3	74.7	79.9	86.8	92.7	97.1

	1in5 mm/hr	1in30 mm/hr	1in100 mm/hr
21.5	23.40	25.10	N/A
29.9	32.70	35.00	N/A
35.2	38.40	41.10	N/A
43.4	47.20	50.40	N/A
53.4	58.00	61.70	N/A
65.8	71.20	75.60	N/A
74.3	80.30	85.20	N/A
81.1	87.40	92.60	N/A
91.6	98.60	104.30	N/A
103.4	111.10	117.50	N/A
112.8	121.00	127.80	N/A
127.4	136.50	143.90	N/A
138.9	148.60	156.60	184.20
153.7	163.50	171.50	199.10

Notes: Larger margins of error for 1, 2, 5 and 10 minute values and for 100 year return periods
 M560: 13.4 M52d: 52 M560/m52d: 0.26

Rainfall Intensities increased by 20% to allow for Global Warming

Duration		Return Period (years)											
		1/2	1	2	3	4	5	10	20	30	50	75	100
5 min	5	3.2	4.3	5.0	5.9	6.5	7.0	8.5	10.2	11.3	12.8	14.2	15.2
10 min	10	4.4	6.1	7.0	8.2	9.1	9.7	11.9	14.2	15.7	17.9	19.8	21.2
15 min	15	5.3	7.2	8.2	9.7	10.7	11.4	13.9	16.7	18.5	21.0	23.3	25.0
30 min	30	7.0	9.4	10.6	12.5	13.7	14.6	17.6	21.0	23.2	26.3	28.9	30.8
60 min	60	9.1	12.1	13.7	16.1	17.5	18.7	22.4	26.4	29.0	32.6	35.8	38.2
2 hour	120	12.1	15.8	17.8	20.6	22.4	23.9	28.4	33.2	36.4	40.7	44.4	47.2
3 hour	180	14.2	18.5	20.8	23.9	26.0	27.6	32.6	38.0	41.5	46.2	50.3	53.4
4 hour	240	16.0	20.8	23.2	26.5	28.8	30.6	36.0	41.9	45.6	50.6	55.1	58.3
6 hour	360	18.8	24.1	26.9	30.8	33.4	35.3	41.4	47.9	52.0	57.6	62.4	66.1
9 hour	540	22.1	28.2	31.3	35.8	38.5	40.7	47.5	54.7	59.3	65.5	70.8	74.8
12 hour	720	24.8	31.6	34.9	39.7	42.7	45.1	52.4	60.1	65.0	71.8	77.4	81.7
18 hour	1080	29.3	36.8	40.6	46.0	49.4	52.1	60.2	68.8	74.3	81.6	87.8	92.5
24 hour	1440	32.9	41.2	45.2	51.1	54.8	57.6	66.5	75.7	81.5	89.3	96.0	101.0
48 hour	2880	41.9	51.5	56.2	62.6	66.8	70.0	79.6	89.6	95.9	104.2	111.2	116.5

1in5 mm/hr	1in30 mm/hr	1in100 mm/hr
83.52	135.36	182.88
58.32	94.32	127.44
45.60	73.92	99.84
29.28	46.32	61.68
18.72	29.04	38.16
11.94	18.18	23.58
9.20	13.84	17.80
7.65	11.40	14.58
5.88	8.66	11.02
4.52	6.59	8.31
3.76	5.42	6.81
2.89	4.13	5.14
2.40	3.40	4.21
1.46	2.00	2.43

23D046 - Surface Water Attenuation Calculation 1-100 + 20%

Time (mins)	1 <i>Storm Frequency & Duration</i>	2 <i>Rainfall</i> <i>(mm)</i>	3 <i>Rainfall Intensity</i> <i>(mm/hr)</i>	4 <i>Potential Run-off From Developed Site</i> <i>(l/s)</i>	5 <i>Allowable Run-off From Developed Site</i> <i>(l/s)</i>	6 <i>Storage Requirement</i> <i>(m3)</i>
5	M100-5 min	15.24	182.88	606.56	2.0	181.4
10	M100-10 min	21.24	127.44	422.68	2.0	252.4
15	M100-15 min	24.96	99.84	331.14	2.0	296.2
30	M100-30 min	30.84	61.68	204.58	2.0	364.6
60	M100-60 min	38.16	38.16	126.57	2.0	448.4
120	M100-2 hr	47.16	23.58	78.21	2.0	548.7
180	M100-3 hr	53.40	17.80	59.04	2.0	616.0
240	M100 - 4hr	58.32	14.58	48.36	2.0	667.6
360	<u>M100-6 hr</u>	<u>66.12</u>	<u>11.02</u>	<u>36.55</u>	<u>2.0</u>	<u>746.3</u>
540	M100-9 hr	74.76	8.31	27.55	2.0	827.9
720	M100-12 hr	81.72	6.81	22.59	2.0	889.4
1080	M100-18 hr	92.52	5.14	17.05	2.0	975.1
1440	M100-24 hr	101.04	4.21	13.96	2.0	1033.6
2880	M100-2day	116.52	2.43	8.05	2.0	1045.7

Allowable Run-off	2	l/s		
	<u>Area</u>	<u>Factor</u>	<u>Total</u>	
Paving	7032	1	7032	m ²
Roof	4908	1	4908	m ²
Total Area			11940	m²

STORMTECH Stormwater Management System Design Tool

ver: Aug15

PROJECT REF:	23D046
LOCATION:	Ravel, Dunleer, Louth Co
DATE:	01.12.23
CREATED BY:	

SYSTEM PARAMETERS

Required Total Storage	750 m ³
Stormtech chamber model	MC4500
Filtration Permeable Geo or Impermeable Geo	Filter geo
Number of Isolator Rows (IR)	1

SITE PARAMETERS

Stone Porosity	40%	
Excavation Batter Angle (degrees)	60°	<i>Minimum Requirement</i>
Stone Above Chambers	0.3 m	0.30
Stone Below Chambers	0.23 m	0.23
In-between Row Spacing	0.30 m	0.23
Additional Storage outside Excavation. E.g manholes, Header Pipe	0 m ³	

HEADER PIPE

Is Header pipe required within excavation	No
Orientation of Header Pipe	Parrallel to IR
Diameter of Header Pipe	0.225 m
Length of Header Pipe	0 m

CHAMBER SYSTEM DIMENSIONS

	Calculated	Adopted
Number of Rows		10 ea
Number of units per Row		10 ea
System Installed Storage Depth (effective storage depth)	2.055	m
Tank overall installed Width at base	28.70	30 m
Tank overall installed Length at Base	14.46	21 m
Total Effective System Storage	585.2	769.6 m ³

STORMTECH SYSTEM DETAIL

StormTech Chamber Model	MC4500
Unit Width	2.54 m
Unit Length	1.23 m
Unit Height	1.525 m
Min Cover Over System	0.3 m
Max Cover Over Chamber	2.1 m
Chamber Internal Storage Vol.	3.01 m ³
Header Pipe Internal Storage Vol in Excavation	0.0 m ³

STONE AND EXCAVATION DETAIL

Volume of Dig for System	1425 m ³
Width at base	30.00 m
Width at top	32.37 m
Length at base	21.00 m
Length at top	23.37 m
Depth Of System	2.06 m
Area of Dig at Base of System	630 m ²
Area of Dig at Top of System	757 m ²
Void Ratio	54%
Stone Requirement - m ³	1101 m ³
Stone Requirement - tonne	1805 tonne

Appendix E – Swept Path Analysis

(See accompanying drawings listed below)




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		Site	
Mech. / Elec. Engineer			
Structural Engineer		H.H.P	1
Planning Authority		L.C.C.	1
Irish Water			
Fire Authority			
Construction Manager			
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Symbols Key

Appendix F – Site Investigation Report



S.I. Ltd Contract No: 6181

Client: Louth County Council
Engineer: Doherty Finegan Kelly
Contractor: Site Investigations Ltd

Ravel,
Ardee Road, Dunleer, Co. Louth
Site Investigation

Prepared by:

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Stephen Letch

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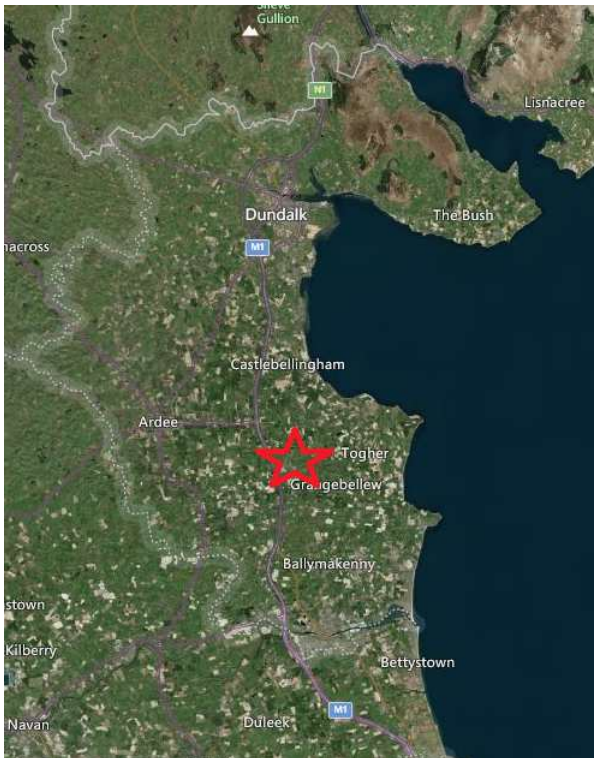
1. Introduction

On the instructions of Doherty Finegan Kelly, Site Investigations Ltd (SIL) were appointed to complete a site investigation at Ardee Road, Dunleer, Co. Louth. The investigation was for a residential development on the site, Ravel, and was completed on behalf of the Client, Louth County Council. The investigation was started in August and completed in September 2023.

This report presents the factual geotechnical data obtained from the field and laboratory testing with interpretation of the ground conditions discussed.

2. Site Location

Ravel is located to the north of Dunleer village on the Ardee Road. The map on the left shows the location of Dunleer in south Co. Louth and the second map shows the site location in Dunleer.



3. Fieldwork

All fieldwork was carried out in accordance with BS 5930:2015, Engineers Ireland GI Specification and Related Document 2nd Edition 2016, Eurocode 7: Geotechnical Design and BRE Special Digest 365. The fieldworks comprised the following:

- 2 No. cable percussive boreholes

- 10 No. trial pits with Dynamic Probes and California Bearing Ratio tests
- 2 No. soakaway tests
- 2 No. slit trenches

3.1. Cable Percussive Boreholes

Cable percussion boring was undertaken at 2 No. locations using a Dando 150 rig and constructed 200mm diameter boreholes. The boreholes terminated at similar depths of 8.50mbgl and 8.90mbgl after an hour and a half chiselling was completed and no further progress was made. It was not possible to collect undisturbed samples due to the granular soils encountered so bulk disturbed samples were recovered at regular intervals.

To test the strength of the stratum, Standard Penetration Tests (SPT's) were performed at 1.00m intervals in accordance with BS 1377 (1990). In soils with high gravel and cobble content it is appropriate to use a solid cone (60°) (CPT) instead of the split spoon and this was used throughout the testing. The test is completed over 450mm and the cone is driven 150mm into the stratum to ensure that the test is conducted over an undisturbed zone. The cone is then driven the remaining 300mm and the blows recorded to report the N-Value. The report shows the N-Value with the 75mm incremental blows listed in brackets (e.g., BH01 at 1.00mbgl where N=8-(1,1/1,2,2,3)). Where refusal of 50 blows across the test zone was encountered was achieved during testing, the penetration depth is also reported (e.g., BH01 at 6.00mbgl where N=50-(5,10/50 for 285mm)).

At BH02, a groundwater standpipe was installed in the borehole to allow for long term monitoring of the water table. This consists of a slotted pipe with a gravel surround response zone to allow for the water the equalise in the standpipe.

The cable percussive borehole logs are presented in Appendix 1.

3.2. Trial Pits with Dynamic Probes and California Bearing Ratio tests

10 No. trial pits were excavated using a tracked excavator. The strata were logged and photographed by SIL geotechnical engineer and groundwater ingresses and pit wall stability was also recorded. Representative disturbed bulk samples were recovered as the pits were excavated, which were returned to the laboratory for geotechnical testing.

Adjacent to the trial pits, dynamic probes were completed using a track mounted Competitor 130 machine. The testing complies with the requirements of BS1377: Part 9 (1990) and Eurocode 7: Part 3. The configuration utilised standard DPH (Heavy) probing method comprising a 50kg weight, 500mm drop height and a 50mm diameter (90°) cone. The number of blows required to drive the cone each 100mm increment into the sub soil is recorded in

accordance with the standards. The dynamic probe provides no information regarding soil type or groundwater conditions.

The dynamic probe results can be used to analyse the strength of the soil strata encountered by the probe. 'Proceedings of the Trinity College Dublin Symposium of Field and Laboratory Testing of Soils for Foundations and Embankments' presents a paper by Foirbart that is most relevant to Irish soil conditions and within this paper the following equations were included:

Granular Soils: $DPH N_{100} \times 2.5 = SPT N \text{ value}$

Cohesive Soils: $C_u = 15 \times DPH N_{100} + 30 \text{ kN/m}^2$

These equations present a relationship between the probe N_{100} value and the SPT N value for granular soils and the undrained shear strength of cohesive soils.

At 0.50mbgl in each pit, undisturbed cylindrical mould samples were taken to complete a California Bearing Ratio test in the laboratory. The result facilitates the designing of the access roads and associated areas. These tests were completed to BS1377: 1990: Part 4, Clause 7 'Determination of California Bearing Ratio'.

The trial pit and dynamic probe logs and photographs are presented in Appendix 2 with the CBR test results in Appendix 3.

3.3. Soakaway Tests

At 2 No. locations, soakaway tests were completed and logged by SIL geotechnical engineer. BRE Special Digest 365 stipulates that the pit should be filled three times and that the final cycle is used to provide the infiltration rate. The time taken for the water level to fall from 75% volume to 25% volume is required to calculate the rate of infiltration. However, if the water level does not fall at a steady rate, then the test is deemed to have failed and the area is unsuitable for storm water drainage.

The soakaway test results and photographs are presented in Appendix 4.

3.4. Slit Trenches

Slit trenching was completed at 2 No. locations to check the location and depth of any services on the site. The trench was completed by hand digging with machine assistance and the depth and orientation of any service on the site was logged by the SIL engineer.

The slit trench logs with photographs are presented in Appendix 5.

3.5. Groundwater Monitoring

Following the completion of the fieldworks, a set of groundwater measurements were completed. The measurements were completed using a dip tape with a sensor at the end, which was lowered into the standpipe and set off a buzzer when the groundwater was encountered.

The groundwater readings are presented in Appendix 6.

3.6. Surveying

Following completion of all the fieldworks, a survey of the exploratory hole locations was completed using a GeoMax GPS Rover. The data is supplied on each individual log and along with a site plan in Appendix 10.

4. Laboratory Testing

Geotechnical laboratory testing was completed on representative soil samples in accordance with BS 1377 (1990). Testing included:

- 5 No. Moisture contents
- 5 No. Atterberg limits
- 5 No. Particle size gradings with 3 No. hydrometers
- 5 No. pH and sulphate content

Environmental testing was completed by ALS Environmental Ltd. and consists of the following:

- 4 No. Suite I analysis

The geotechnical laboratory test results are presented in Appendix 7 with the environmental tests reported in Appendix 8 and a Waste Classification Report in Appendix 9.

5. Ground Conditions

5.1. MADE GROUND

MADE GROUND was recorded in the south west corner of the site to 0.60mbgl in TP08, 0.90mbgl in TP09 and 1.60mbgl in TP10. The fill material consists of cohesive brown slightly sandy slightly gravelly silty clay with TP08 and TP10 recording a brown silty sandy gravel underlying the cohesive soils. Anthropogenic material of concrete fragments was recorded in TP09.

5.2. Overburden

The natural ground conditions are dominated by grey and brown (slightly) sandy (slightly) gravelly silty CLAY with cobbles overlying black slightly sandy slightly gravelly silty CLAY with cobbles and boulders.

The boreholes recorded similar SPT N-values of 8 and 12 at 1.00mbgl, 18 and 26 at 2.00mbgl and 16 and 17 at 3.00mbgl.

5.3. Groundwater

Groundwater was recorded in both boreholes at 4.20mbgl and 2.90mbgl respectively and were sealed off by the borehole casings at 4.50mbgl and 3.50mbgl. Groundwater also ingressed into six of the ten trial pits at depths ranging from 1.20mbgl at TP06 2.40mbgl at TP08 with ingress rates recorded as slow to rapid.

6. Recommendations and Conclusions

Please note the following caveats:

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 the exploratory hole locations or below the final level of excavation, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for adjacent unexpected conditions that have not been revealed by the exploratory holes. It is further recommended that all bearing surfaces when excavated should be inspected by a suitably qualified Engineer to verify the information given in this report.

Excavated surfaces in clay strata should be kept dry to avoid softening prior to foundation placement. Foundations should always be taken to a minimum depth of 0.50mBGL to avoid the effects of frost action and possible seasonal shrinkage/swelling.

If it is intended that on-site materials are to be used as fill, then the necessary laboratory testing should be specified by the Client to confirm the suitability. Also, relevant lab testing should be specified where stability of side slopes to excavations is a concern, or where contamination may be an issue.

6.1. Shallow Foundations

Due to the unknown depth of foundation and no longer-term groundwater information, this analysis assumes the groundwater will not influence the construction or performance of these foundations.

MADE GROUND was encountered across the site to a maximum depth of 1.60mbgl at TP10. SIL do not recommend that narrow shallow foundations are placed on fill material due to the

unknown compaction methods used during laying of man-made material. This unknown could result in softer spots and differential settlement once construction is completed. If shallow foundations are to be used and man-made soils are encountered below foundation level, then the soil should be removed and replaced with engineered fill which is compacted to the required standard.

The boreholes encountered firm brown (slightly) sandy (slightly) gravelly silty CLAY at 1.00mbgl and the SPT N-values at these locations range from 8 to 12. Using a correlation proposed by Stroud and Butler between SPT N-values and plasticity indices, the SPT N-value can be used to calculate the undrained shear strength. With the low plasticity indexes recorded in the laboratory for the soils, this correlation is $C_u=6N$. Therefore, using the lower value of 8, this indicates that the undrained shear strength of the CLAY is 48kN/m^2 . This can be used to calculate the ultimate bearing capacity, and this has been calculated to be 263kN/m^2 . Finally, a factor of safety is applied and with a factor of 3, an allowable bearing capacity of 88kN/m^2 would be anticipated using the lowest SPT value.

The SPTs increase to 18 to 26 at 2.00mbgl and this indicates an undrained shear strength of 108kN/m^2 , ultimate bearing capacity of 587kN/m^2 and an allowable bearing capacity of 195kN/m^2 .

For analysis of bearing capacities from the dynamic probes, the N_{100} values are used as follows in cohesive soils. The undrained shear strength (C_u) is calculated using the N_{100} value as per the equation in Section 3.3. This can then be used in calculations to work out the ultimate bearing capacity (ULS) and when a factor of safety of 3 is applied, the allowable bearing capacity (ABC) can be provided. The table overleaf shows the allowable bearing capacities for N_{100} values 1 to 10 at 1.00mbgl.

N ₁₀₀ Value	Cohesive Soils		
	C _u	ULS	ABC
1	45	248	83
2	60	330	110
3	75	400	135
4	90	480	160
5	105	555	185
6	120	630	210
7	135	705	235
8	150	780	260
9	165	855	285
10	180	930	310

All capacities shown are in kN/m².

The following assumptions were made as part of these analyses. If any of these assumptions are not in accordance with detailed design or observations made during construction these recommendations should be re-evaluated.

- Foundations are to be constructed on a level formation of uniform material type (described above).
- All man-made or filled material is to be removed prior to construction.
- The bulk unit weight of the material in this stratum has a minimum density of 19kN/m³.
- All bearing capacity calculations allow for a settlement of 25mm.
- Based on groundwater observations this analysis assumes the groundwater will not influence the construction or performance of these foundations.

The trial pit walls generally remained stable during excavation; however, TP02 and TP06 recorded pit wall instability, therefore, it would be recommended that all excavations should be checked immediately and battered back accordingly. Regular inspection of temporary excavations should be completed during construction to ensure that all slopes are stable. Temporary support should be used on any excavation that will be left open for an extended period.

6.2. Groundwater

The caveats below relating to interpretation of groundwater levels should be noted:

There is always considerable uncertainty as to the likely rates of water ingress into excavations in clayey soil sites due to the possibility of localised unforeseen sand and gravel lenses acting as permeable conduits for unknown volumes of water.

Furthermore, water levels noted on the borehole and trial pit logs do not generally give an accurate indication of the actual groundwater conditions as the borehole or trial pit is rarely left open for sufficient time for the water level to reach equilibrium.

Also, during boring procedures, a permeable stratum may have been sealed off by the borehole casing, or water may have been added to aid drilling. Therefore, an extended period of groundwater monitoring using any constructed standpipes is required to provide more accurate information regarding groundwater conditions. Finally, groundwater levels vary with time of year, rainfall and possible nearby construction sites.

Pumping tests would be required to determine likely seepage rates and persistence into excavations taken below the groundwater level. Deep trial pits also aid estimation of seepage rates.

As discussed previously, groundwater was recorded in the boreholes at 4.20mbgl and 2.90mbgl and in six of the ten trial pits recorded slow to rapid ingresses during the fieldworks.

There is always considerable uncertainty as to the likely rates of water ingress into excavations in cohesive soil sites due to the possibility of localised unforeseen sand and gravel lenses acting as permeable conduits for unknown volumes of water. Based on this information at the exploratory hole locations to date, it is considered likely that any shallow ingress (less than 2.00mbgl) into excavations of the CLAY will be slow to rapid. If granular soils are encountered in shallow excavations, then the possibility of water ingressing into an excavation increase.

If groundwater is encountered during excavations then mechanical pumps will be required to remove the groundwater from sumps. Sumps should be carefully located and constructed to ensure that groundwater is efficiently removed from excavations and trenches.

6.3. Pavement Design

The CBR test results in Appendix 3 indicate a CBR value of 7.3% to 14.4%.

The CBR samples tests were recovered at 0.50mbgl and inspection of the formation strata should be completed prior to construction of the pavement. Once the exact formation levels are finalised then additional in-situ testing could be completed to assist with the detailed pavement design.

6.4. Soakaway Tests

SA01 failed as the water level did not fall sufficiently enough to complete the test. The BRE Digest stipulates that the pit should half empty within 24hrs, and extrapolation indicates this condition would not be satisfied. The test was terminated at the end of the first (of a possible three) fill/empty cycle since further testing would give even slower fall rates due to increased soil saturation. The unsuitability of the soils for soakaways is further suggested by the soil descriptions of the materials in this area of the site where the soakaway was completed, i.e., well compacted clay soils.

SA02 failed the specification as water ingressed into the pit and therefore indicate that the soils are already saturated and unsuitable for soakaway design.

6.5. Contamination

Environmental testing was carried out on four samples from the investigation and the results are shown in Appendix 8. For material to be removed from site, Suite I testing was carried out to determine if the material is hazardous or non-hazardous and then the leachate results were compared with the published waste acceptance limits of BS EN 12457-2 to determine whether the material on the site could be accepted as 'inert material' by an Irish landfill.

The Waste Classification report created using HazWasteOnline™ software shows that the material tested can be classified as non-hazardous material. The sample from TP07 recorded Total Petroleum Hydrocarbons above the limits of detection and TP09 recorded toluene over the limit of detection but this is not in liquid phase and therefore, HP3 can be discounted.

Following this analysis of the solid test results, the leachate disposal suite results indicate that the soils tested would generally be able to be treated as Inert Waste.

Four samples were tested for analysis but it cannot be discounted that any localised contamination may have been missed. Any MADE GROUND excavated on site should be stockpiled separately to natural soils to avoid any potential cross contamination of the soils. Additional testing of these soils may be requested by the individual landfill before acceptance and a testing regime designed by an environmental engineer would be recommended to satisfy the landfill.

6.6. Aggressive Ground Conditions

The chemical test results in Appendix 7 indicate a general pH value between 8.35 and 8.92, which is close to neutral and below the level of 9, therefore no special precautions are required.

The maximum value obtained for water soluble sulphate was 127mg/l as SO₃. The BRE Special Digest 1:2005 – ‘Concrete in Aggressive Ground’ guidelines require SO₄ values and after conversion (SO₄ = SO₃ x 1.2), the maximum value of 152mg/l shows Class 1 conditions and no special precautions are required.

6.7. Radon Gas

The Environmental Protection Agency (EPA) has updated the Radon gas exposure map and this is available to view on the EPA website. This shows the possible exposure to radon gas with the bedrock geology, subsoil geology, soil permeability and aquifer type analysed to produce the map. The map below shows that the site falls within the low level of 1 in 20 homes have a possibility of high radon exposure. Measures should be taken in the form of radon protection barriers to protect from radon exposure in the new structure.



EPA map identifying possible Radon exposure.


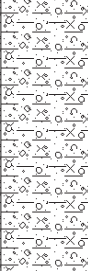
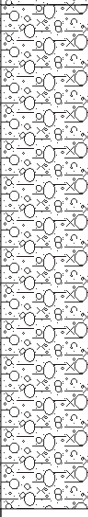

<https://gis.epa.ie/EPAMaps/Radon?&lid=EPA:RadonRiskMapofIreland>

Appendix 1
Cable Percussive Borehole Logs

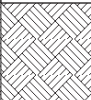
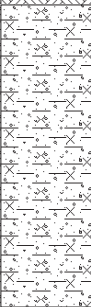
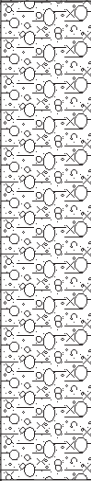

Contract No: 6181		Cable Percussion Borehole Log							Borehole No: BH01								
Contract:		Ravel		Easting:		705154.790		Date Started:		05/09/2023							
Location:		Ardee Road, Dunleer, Co. Louth		Northing:		788192.010		Date Completed:		05/09/2023							
Client:		Louth County Council		Elevation:		26.66		Drilled By:		J. O'Toole							
Engineer:		Doherty Finegan Kelly		Borehole Diameter:		200mm		Status:		FINAL							
Depth (m)		Stratum Description			Legend	Level (mOD)		Samples and Insitu Tests			Water Strike	Backfill					
Scale	Depth					Scale	Depth	Depth	Type	Result							
	0.20	TOPSOIL.				26.5	26.46										
	0.5	Brown slightly sandy slightly gravelly silty CLAY with low cobble content.															
	0.60	Firm grey slightly sandy gravelly silty CLAY.				26.0	26.06										
	1.0							1.00	B	JOT09							
	1.40	Firm brown slightly sandy slightly gravelly silty CLAY with low cobble content.				25.5		1.00	C	N=8 (1,1/1,2,2,3)							
	1.80	Stiff brown sandy slightly gravelly silty CLAY.				25.0	25.26										
	2.0							2.00	B	JOT10							
	2.5							2.00	C	N=18 (1,2/4,4,5,5)							
	2.90	Stiff brown slightly sandy slightly gravelly silty CLAY.				24.5	24.86										
	3.0							2.00	B	JOT11							
	3.5							3.00	C	N=16 (2,2/3,4,4,5)							
	4.0							3.00									
	4.20	Very stiff grey slightly sandy slightly gravelly silty CLAY with high cobble content.				24.0	23.76										
	4.5							4.00	B	JOT12							
	5.0							4.00	C	N=32 (3,5/7,9,8,8)							
	5.5							4.00									
	5.80	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble content.				22.5	22.46										
	6.0							5.00	B	JOT13							
	6.5							5.00	C	N=34 (2,4/7,7,9,11)							
	7.0							5.00									
	7.5							6.00	B	JOT14							
	8.0							6.00	C	N=50 (5,10/50 for 285mm)							
	8.40	Obstruction - possible boulders.				20.0	20.86										
	8.50	End of Borehole at 8.50m				20.5	18.26										
	8.50					20.0	18.16	8.50	C	50 (25 for 5mm/50 for 5mm)							
	9.0							7.00	B	JOT15							
	9.5							7.00	C	N=36 (3,5/7,9,9,11)							
								7.00									
								8.00	B	JOT16							
								8.00	C	50 (4,6/50 for 200mm)							
								8.00									
								8.50	C	50 (25 for 5mm/50 for 5mm)							
								8.50									
								18.0									
								17.5									
								17.0									
		Chiselling:		Water Strikes:			Water Details:			Installation:			Backfill:		Remarks:		Legend:
From:	To:	Time:	Strike:	Rose:	Depth Sealed:	Date:	Hole Depth:	Water Depth:	From:	To:	Pipe:	From:	To:	Type:	Borehole terminated due to obstruction.		B: Bulk
8.40	8.50	01:30	4.20	4.00	NS	05/09	8.50	Dry				0.00	8.50	Arisings		D: Disturbed	
																U: Undisturbed	
																ES: Environmental	
																W: Water	
																C: Cone SPT	
																S: Split spoon SPT	


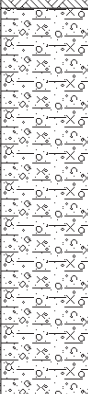
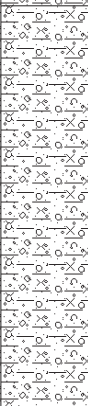

Contract No: 6181		Cable Percussion Borehole Log							Borehole No: BH02									
Contract:		Ravel			Easting:		705244.840		Date Started:		31/08/2023							
Location:		Ardee Road, Dunleer, Co. Louth			Northing:		788157.690		Date Completed:		01/09/2023							
Client:		Louth County Council			Elevation:		25.29		Drilled By:		J. O'Toole							
Engineer:		Doherty Finegan Kelly			Borehole Diameter:		200mm		Status:		FINAL							
Depth (m)		Stratum Description			Legend	Level (mOD)		Samples and Insitu Tests			Water Strike	Backfill						
Scale	Depth					Scale	Depth	Depth	Type	Result								
0.20		TOPSOIL.				25.0	25.09											
0.5		Brown slightly sandy slightly gravelly silty CLAY with low cobble content.				25.0	25.09											
0.70		Firm brown slightly sandy gravelly silty CLAY.				24.5	24.59											
1.0								1.00	B	JOT01								
1.30		Firm brown slightly sandy slightly gravelly silty CLAY with low cobble content.				24.0	23.99	1.00	C	N=12 (1,2/2,3,3,4)								
1.5																		
1.80		Stiff brown sandy slightly gravelly silty CLAY.				23.5	23.49											
2.0								2.00	B	JOT02								
2.5								2.00	C	N=26 (2,5/5,7,7,7)								
2.90		Stiff brown slightly sandy slightly gravelly silty CLAY.				22.5	22.39											
3.0								3.00	B	JOT03								
3.5								3.00	C	N=17 (2,3/3,4,5,5)								
4.0		Stiff brown slightly sandy slightly gravelly silty CLAY with medium cobble content.				21.5	21.29	4.00	B	JOT04								
4.5								4.00	C	N=27 (3,4/7,7,6,7)								
5.0																		
5.0								5.00	B	JOT05								
5.5								5.00	C	N=30 (3,5/7,7,7,9)								
5.50		Very stiff grey slightly sandy slightly gravelly silty CLAY with high cobble content.				19.5	19.79											
6.0								6.00	B	JOT06								
6.5								6.00	C	N=48 (5,7/11,11,12,14)								
7.0																		
7.0								7.00	B	JOT07								
7.5								7.00	C	N=50 (4,6/9,14,14,13)								
8.0																		
8.0								8.00	B	JOT08								
8.5								8.00	C	50 (5,12/50 for 125mm)								
8.70		Obstruction - possible boulders.				16.5	16.59											
8.90		End of Borehole at 8.90m				16.0	16.39	8.90	C	50 (25 for 5mm/50 for 5mm)								
9.0																		
9.5																		
		Chiselling:		Water Strikes:			Water Details:			Installation:			Backfill:		Remarks:		Legend: B: Bulk D: Disturbed U: Undisturbed ES: Environmental W: Water C: Cone SPT S: Split spoon SPT	
		From:	To:	Time:	Strike:	Rose:	Depth Sealed	Date:	Hole Depth:	Water Depth:	From:	To:	Pipe:	From:	To:	Type:		Borehole terminated due to obstruction.
		8.30	8.50	01:00	2.90	2.80	NS	31/08	4.50	Dry	0.00	1.50	Solid	0.00	1.00	Bentonite Gravel		
		8.70	8.90	01:30				01/09	4.50	Dry	1.50	8.00	Slotted	1.00	8.90			

Appendix 2
Trial Pit and Dynamic Probe Logs and Photographs



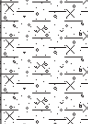
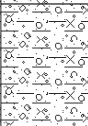

Contract No: 6181		Trial Pit and Dynamic Probe Log				Trial Pit No: TP01			
Contract: Ravel		Easting: 705150.190		Date: 31/08/2023					
Location: Ardee Road, Dunleer, Co. Louth		Northing: 788251.450		Excavator: 13T Tracked Excavator					
Client: Louth County Council		Elevation: 25.30		Logged By: P. McGonagle					
Engineer: Doherty Finegan Kelly		Dimensions (LxWxD) (m): 3.90 x 0.50 x 3.50		Scale: 1:30					
Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples		Probe	Water Strike
Scale:	Depth			Scale:	Depth:	Depth	Type		
	0.40	TOPSOIL.		25.0					
	0.5	Firm becoming stiff brown grey sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.		24.90	0.50	CBR	1		
	1.0			24.5	0.50	ES	2		
	1.50	Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 250mm diameter).		24.0	1.00	B	3		
	2.0			23.80			4		
	2.5			23.5			5		
	3.0			23.0			6		
	3.50	Pit terminated at 3.50m		22.80	2.00	B	7		
	4.0			22.5			8		
	4.5			22.0			9		
	5.0			21.80	3.50	B	10		
	5.5			21.5			11		
				21.0			12		
				20.5			13		
				20.0			14		
				19.5			15		
							16		
							17		
							18		
							19		
							20		
							21		
							22		
							23		
							24		
							25		
							26		
							27		
							28		
							29		
							30		
							31		
							32		
							33		
							34		
							35		
		Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:			
		Scheduled depth.	Pit walls stable.	2.20 Medium		B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental			

Contract No: 6181		Trial Pit and Dynamic Probe Log				Trial Pit No: TP02			
Contract:		Ravel		Easting:	705197.850	Date:	31/08/2023		
Location:		Ardee Road, Dunleer, Co. Louth		Northing:	788263.820	Excavator:	13T Tracked Excavator		
Client:		Louth County Council		Elevation:	24.39	Logged By:	P. McGonagle		
Engineer:		Doherty Finegan Kelly		Dimensions (LxWxD) (m):	3.60 x 0.50 x 2.90	Scale:	1:30		
Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples		Probe	Water Strike
Scale:	Depth			Scale:	Depth:	Depth	Type		
0.40		TOPSOIL.		24.0	23.99	0.50	CBR	1 1 3 3 3 3 3 3 2	
1.10		Firm grey brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone.		23.5	23.29	1.00	B	1 1 2 3	
1.50		Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.		23.0		1.50	B	6 6 8 5 3	
2.50				22.5				5 6 4 5 4	
2.90		Pit terminated due to pit wall collapse. Pit terminated at 2.90m		22.0		2.50	B	8 35	
3.00				21.5	21.49				
3.50				21.0					
4.00				20.5					
4.50				20.0					
5.00				19.5					
5.50				19.0					
				18.5					
		Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:			Key:	
		Pit wall instability.	Major pit wall collapse forcing completion.	Dry				B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental	

Contract No: 6181		Trial Pit and Dynamic Probe Log				Trial Pit No: TP03			
Contract:		Ravel	Easting:	705269.880	Date:	31/08/2023			
Location:		Ardee Road, Dunleer, Co. Louth	Northing:	788263.090	Excavator:	13T Tracked Excavator			
Client:		Louth County Council	Elevation:	23.41	Logged By:	P. McGonagle			
Engineer:		Doherty Finegan Kelly	Dimensions (LxWxD) (m):	3.50 x 0.50 x 3.50	Scale:	1:30			
Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples		Probe	Water Strike
Scale:	Depth			Scale:	Depth:	Depth	Type		
	0.40	TOPSOIL.		23.0	23.01	0.50	CBR	2 3 3 4 4 3 2 3 3	
	1.60	Firm grey brown sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone.		22.5		1.00	B	1 2 3 3 5 10	
	3.50	Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 250mm diameter).		22.0	21.81	2.00	B	8 6 5 6 7 5 8 15 27 21 20 27 35	▼
	3.50	Pit terminated at 3.50m		20.0	19.91	3.50	B		
				19.5					
				19.0					
				18.5					
				18.0					
				17.5					
	Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:			Key:		
	Scheduled depth.	Pit walls stable.	2.20 Medium	-			B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental		

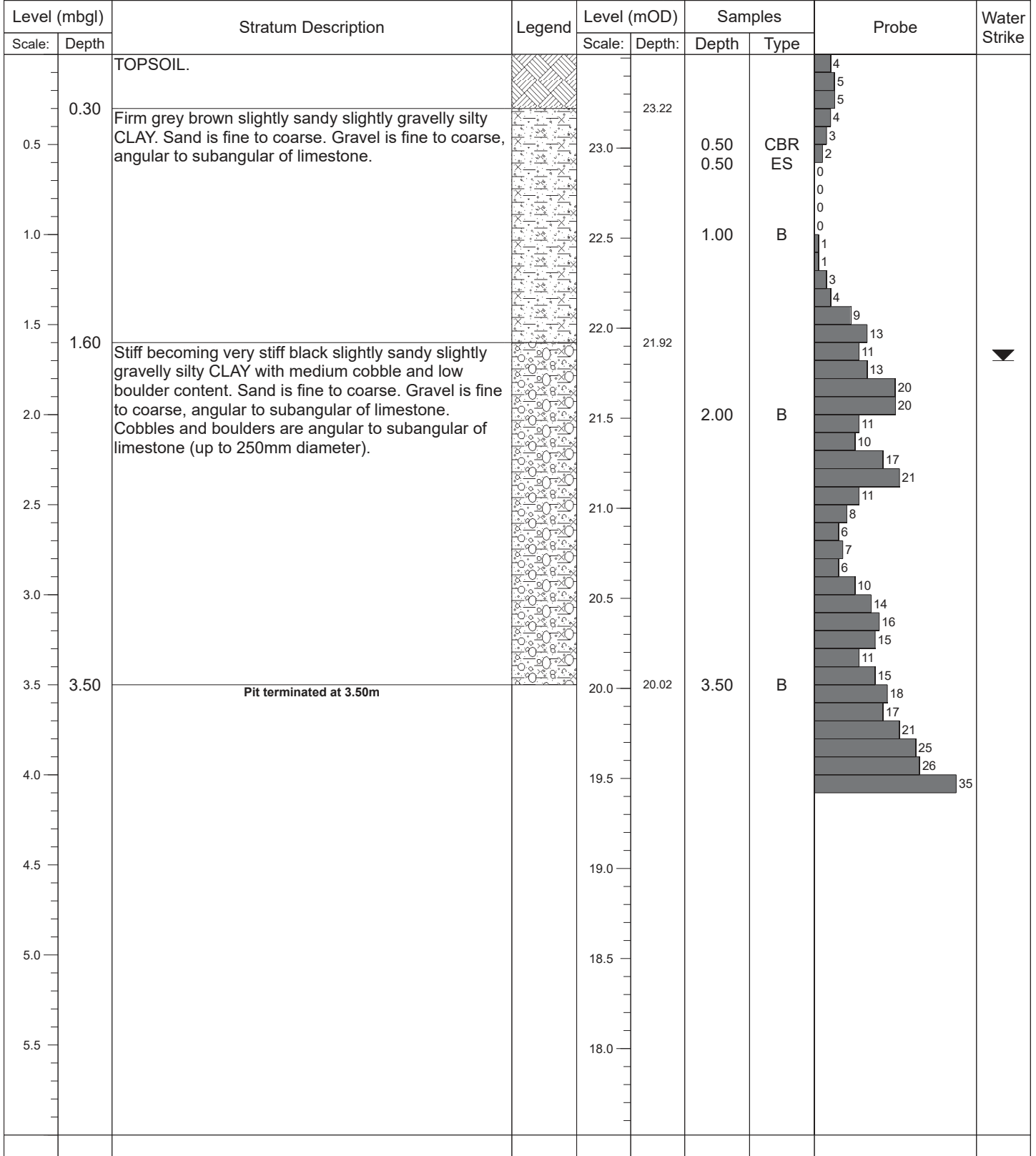
Contract No: 6181		Trial Pit and Dynamic Probe Log				Trial Pit No: TP04			
Contract:		Ravel	Easting:		705145.660	Date:		31/08/2023	
Location:		Ardee Road, Dunleer, Co. Louth	Northing:		788195.690	Excavator:		13T Tracked Excavator	
Client:		Louth County Council	Elevation:		26.76	Logged By:		P. McGonagle	
Engineer:		Doherty Finegan Kelly	Dimensions (LxWxD) (m):		3.80 x 0.50 x 3.50	Scale:		1:30	
Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples		Probe	Water Strike
Scale:	Depth			Scale:	Depth:	Depth	Type		
	0.35	TOPSOIL.		26.5				1	
	0.5	Firm becoming stiff brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.		26.41	0.50	CBR		6	
	1.0			26.0	0.50	ES		6	
	1.5			25.5	1.00	B		7	
	2.0	1.90 Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.		25.0	1.80	B		4	
	2.5			24.86				2	
	3.0			24.5	2.50	B		3	
	3.5	Pit terminated at 3.50m		24.0				3	
	4.0			23.5				4	
	4.5			23.26				2	
	5.0			23.0				3	
	5.5			22.5				9	
				22.0				27	
				21.5				14	
				21.0				12	
								6	
								5	
								7	
								15	
								15	
								10	
								16	
								15	
								10	
								7	
								14	
								13	
								13	
								35	
	Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:			Key:		
	Scheduled depth.	Pit walls stable.	Dry				B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental		

Contract No: 6181		Trial Pit and Dynamic Probe Log				Trial Pit No: TP05			
Contract:		Ravel		Easting:	705184.720	Date:	31/08/2023		
Location:		Ardee Road, Dunleer, Co. Louth		Northing:	788200.430	Excavator:	13T Tracked Excavator		
Client:		Louth County Council		Elevation:	24.80	Logged By:	P. McGonagle		
Engineer:		Doherty Finegan Kelly		Dimensions (LxWxD) (m):	3.80 x 0.50 x 3.10	Scale:	1:30		
Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples		Probe	Water Strike
Scale:	Depth			Scale:	Depth:	Depth	Type		
0.20		TOPSOIL.		24.60	24.60				
0.5		Firm brown slightly sandy gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone.		24.5	24.5	0.50	CBR	1 1 1 3 3 3 4 5	
1.0				24.0	24.0	1.00	B	2 2 1	
1.30		Firm becoming stiff grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.		23.50	23.50	1.50	B	0 0 8 15 18 22	
2.0				23.0	23.0			13 11	
2.00		Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 250mm diameter).		22.80	22.80	2.50	B	9 26 16 19 16 15 18 14	
2.5				22.5	22.5			11 11	
3.0				22.0	22.0			12 11 11	
3.10		Obstruction - possible boulders. Pit terminated at 3.10m		21.70	21.70			10 10 11 13 10 19 21 11 15 22 23 20 21 24 35	
3.5				21.5	21.5			10 10 11 13	
4.0				21.0	21.0			19 21 11 15 22 23	
4.5				20.5	20.5			20 21 24 35	
5.0				20.0	20.0				
5.5				19.5	19.5				
5.5				19.0	19.0				
		Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:			Key:	
		Obstruction - boulders.	Pit walls stable.	Dry				B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental	

Contract No: 6181		Trial Pit and Dynamic Probe Log				Trial Pit No: TP06			
Contract:		Ravel	Easting:	705218.760	Date:	31/08/2023			
Location:		Ardee Road, Dunleer, Co. Louth	Northing:	788197.720	Excavator:	13T Tracked Excavator			
Client:		Louth County Council	Elevation:	24.29	Logged By:	P. McGonagle			
Engineer:		Doherty Finegan Kelly	Dimensions (LxWxD) (m):	4.00 x 0.50 x 3.00	Scale:	1:30			
Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples		Probe	Water Strike
Scale:	Depth			Scale:	Depth:	Depth	Type		
	0.10	TOPSOIL.		24.19					
	0.5	Firm brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone.		24.0	0.50	CBR	3, 3, 4, 3, 6, 3, 3		
	1.00	Firm becoming stiff grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.		23.29	0.90	B	2, 6, 8, 15, 13, 11, 13, 15, 12, 8, 10, 8		▼
	1.5			23.0	1.50	B	13, 15, 12, 8, 10, 8		
	2.0			22.5			5, 6, 7, 6, 8, 5, 7, 8, 9		
	2.20	Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 250mm diameter).		22.09	2.50	B	8, 5, 7, 8, 9, 8, 10, 11, 10, 7, 8, 6, 10, 6, 13, 19, 11, 11, 12, 13, 24, 28, 35		
	2.5			21.5					
	3.00	Pit terminated due to pit wall collapse. Pit terminated at 3.00m		21.29					
	3.5			21.0					
	4.0			20.5					
	4.5			20.0					
	5.0			19.5					
	5.5			18.5					
		Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:		Key:		
		Pit wall instability.	Major pit wall collapse forcing completion.	1.20 Rapid			B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental		

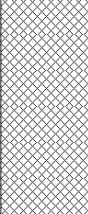
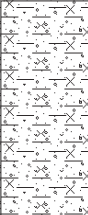
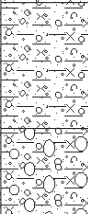
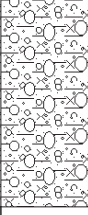
Contract No: 6181	Trial Pit and Dynamic Probe Log				Trial Pit No: TP07
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Contract:	Ravel	Easting:	705279.030	Date:	31/08/2023
Location:	Ardee Road, Dunleer, Co. Louth	Northing:	788213.920	Excavator:	13T Tracked Excavator
Client:	Louth County Council	Elevation:	23.52	Logged By:	P. McGonagle
Engineer:	Doherty Finegan Kelly	Dimensions (LxWxD) (m):	3.80 x 0.50 x 3.50	Scale:	1:30



	Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
	Scheduled depth.	Pit walls stable.	1.70 Rapid		B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 6181		Trial Pit and Dynamic Probe Log				Trial Pit No: TP08			
Contract:		Ravel	Easting:	705175.210	Date:	31/08/2023			
Location:		Ardee Road, Dunleer, Co. Louth	Northing:	788169.270	Excavator:	13T Tracked Excavator			
Client:		Louth County Council	Elevation:	25.72	Logged By:	P. McGonagle			
Engineer:		Doherty Finegan Kelly	Dimensions (LxWxD) (m):	3.80 x 0.50 x 2.80	Scale:	1:30			
Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples		Probe	Water Strike
Scale:	Depth			Scale:	Depth:	Depth	Type		
	0.30	MADE GROUND: brown slightly sandy slightly gravelly silty clay.		25.5					
	0.50	MADE GROUND: brown silty sandy gravel with high cobble content.		25.42		0.50	CBR		
	0.60	Firm brown slightly sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone.		25.12					
	1.00			25.0		1.00	B		
	1.50	Firm becoming stiff grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.		24.5					
	2.00	Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 250mm diameter).		24.22					
	2.80	Obstruction - possible boulders. Pit terminated at 2.80m		24.0		1.90	B		
	3.00			23.72					
	3.50			23.5					
	4.00			23.0		2.50	B		
	4.50			22.92					
	5.00			22.5					
	5.50			22.0					
				21.5					
				21.0					
				20.5					
				20.0					
		Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:		Key:		
		Obstruction - boulders.	Pit walls stable.	2.40 Slow			B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental		

Contract No: 6181		Trial Pit and Dynamic Probe Log				Trial Pit No: TP09			
Contract:		Ravel	Easting:		705219.910	Date:		31/08/2023	
Location:		Ardee Road, Dunleer, Co. Louth	Northing:		788166.570	Excavator:		13T Tracked Excavator	
Client:		Louth County Council	Elevation:		25.20	Logged By:		P. McGonagle	
Engineer:		Doherty Finegan Kelly	Dimensions (LxWxD) (m):		3.90 x 0.50 x 3.50	Scale:		1:30	
Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples		Probe	Water Strike
Scale:	Depth			Scale:	Depth:	Depth	Type		
		MADE GROUND: brown slightly sandy slightly gravelly silty clay with some concrete fragments.		25.0					
0.5						0.50	CBR	1	
	0.90	Firm brown sandy slightly gravelly silty CLAY. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone.		24.30	1.00		B	5	
1.0				24.0				5	
1.5				23.5				6	
1.80		Stiff grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles are angular to subangular of limestone.		23.40	2.00		B	6	
2.0				23.0				7	
2.30		Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, angular to subangular of limestone. Cobbles and boulders are angular to subangular of limestone (up to 250mm diameter).		22.90	3.00		B	4	
2.5				22.5				6	
3.0				22.0				8	
3.5	3.50	Pit terminated at 3.50m		21.70				15	
4.0				21.5				22	
4.5				21.0				19	
5.0				20.5				11	
5.5				20.0				22	
				19.5				16	
								14	
								11	
								10	
								8	
								15	
								13	
								23	
								23	
								22	
								35	



Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Scheduled depth.	Pit walls stable.	Dry		B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

TP01 Sidewall



TP01 Spoil



TP02 Sidewall



TP02 Spoil



TP03 Sidewall



TP03 Spoil



TP04 Sidewall



TP04 Spoil



TP05 Sidewall



TP05 Spoil



TP06 Sidewall



TP06 Spoil



TP07 Sidewall



TP07 Spoil



TP08 Sidewall



TP08 Spoil



TP09 Sidewall



TP09 Spoil



TP10 Sidewall



TP10 Spoil



Appendix 3
California Bearing Ratio Test Results

California Bearing Ratio (CBR) In accordance with BS1377: Part 4: Method 7

Client	Louth County Council
Site	Ardee road, Dunleer
S.I. File No	6181 / 23
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email info@siteinvestigations.ie
Report Date	25th September 2023

CBR No	Depth (mBGL)	Sample No	Lab Ref	Sample Type	Moisture Content (%)	CBR Value (%)	Location / Remarks
TP01	0.50	PM37	23/1395	B	8.9	7.6	
TP02	0.50	PM38	23/1396	B	9.2	7.3	
TP03	0.50	PM39	23/1397	B	11.3	10.2	
TP04	0.50	PM40	23/1398	B	14.0	9.8	
TP05	0.50	PM41	23/1399	B	15.0	7.3	
TP06	0.50	PM42	23/1400	B	11.8	7.8	
TP07	0.50	PM43	23/1401	B	15.2	7.7	
TP08	0.50	PM44	23/1402	B	9.7	10.1	
TP09	0.50	PM45	23/1403	B	11.6	14.4	
TP10	0.50	PM46	23/1404	B	11.3	12.3	

Appendix 4
Soakaway Test Results and Photographs

SOAKAWAY TEST



Project Reference:	6181
Contract name:	Ravel
Location:	Ardee Road, Dunleer, Co. Louth
Test No:	SA01
Date:	31/08/2023

Ground Conditions

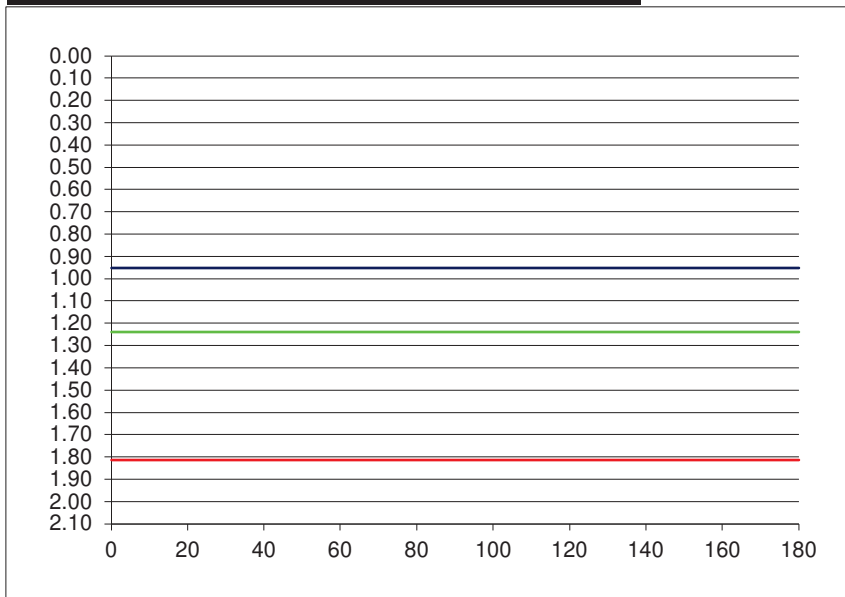
From	To	
0.00	0.40	TOPSOIL.
0.40	1.50	Firm brown grey sandy slightly gravelly silty CLAY with low cobble content.
1.50	2.10	Stiff becoming very stiff black slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content.

Remarks:

-

Elapsed Time (mins)	Fall of Water (m)
0	0.95
0.5	0.95
1	0.95
1.5	0.95
2	0.95
2.5	0.95
3	0.95
3.5	0.95
4	0.95
4.5	0.95
5	0.95
6	0.95
7	0.95
8	0.95
9	0.95
10	0.95
12	0.95
14	0.95
16	0.95
18	0.95
20	0.95
25	0.95
30	0.95
40	0.95
50	0.95
60	0.95
75	0.95
90	0.95
120	0.95
150	0.95
180	0.95

Pit Dimensions (m)	
Length (m)	3.60 m
Width (m)	0.50 m
Depth	2.10 m
Water	
Start Depth of Water	0.95 m
Depth of Water	1.15 m
75% Full	1.24 m
25% Full	1.81 m
75%-25%	0.58 m
Volume of water (75%-25%)	1.04 m ³
Area of Drainage	17.22 m ²
Area of Drainage (75%-25%)	6.52 m ²
Time	
75% Full	N/A min
25% Full	N/A min
Time 75% to 25%	N/A min
Time 75% to 25% (sec)	N/A sec



f = **Fail** or
m/min

Fail
m/s

SOAKAWAY TEST



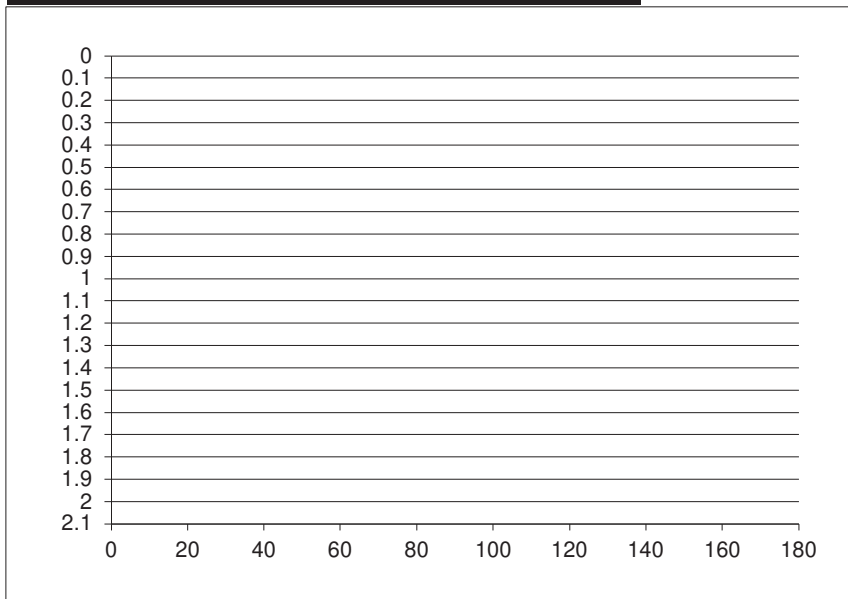
Project Reference:	6181
Contract name:	Ravel
Location:	Ardee Road, Dunleer, Co. Louth
Test No:	SA02
Date:	31/08/2023

Ground Conditions		
From	To	Description
0.00	0.20	TOPSOIL.
0.20	1.50	Firm brown slighty sandy slightly gravelly silty CLAY.
1.00	2.10	Firm becoming stiff grey slightly sandy slightly gravelly silty CLAY with medium cobble content.

Remarks:
Medium water ingress at 1.30mbgl - soils saturated and unsuitable for soakaway design.

Elapsed Time (mins)	Fall of Water (m)
0	-
0.5	-
1	-
1.5	-
2	-
2.5	-
3	-
3.5	-
4	-
4.5	-
5	-
6	-
7	-
8	-
9	-
10	-
12	-
14	-
16	-
18	-
20	-
25	-
30	-
40	-
50	-
60	-
75	-
90	-
120	-
150	-
180	-

Pit Dimensions (m)		
Length (m)	3.30	m
Width (m)	0.50	m
Depth	2.10	m
Water		
Start Depth of Water	-	m
Depth of Water	-	m
75% Full	-	m
25% Full	-	m
75%-25%	-	m
Volume of water (75%-25%)	-	m ³
Area of Drainage	-	m ²
Area of Drainage (75%-25%)	-	m ²
Time		
75% Full	N/A	min
25% Full	N/A	min
Time 75% to 25%	N/A	min
Time 75% to 25% (sec)	N/A	sec



f = Fail or Fail
m/min
m/s

SA01 Sidewall



SA01 Spoil



SA02 Sidewall



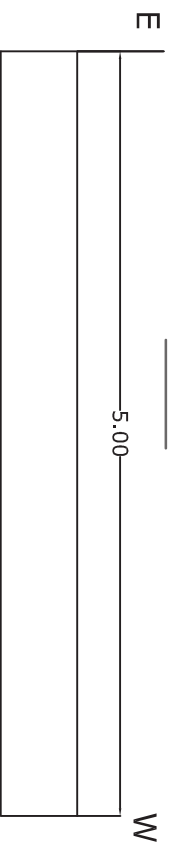
SA02 Spoil



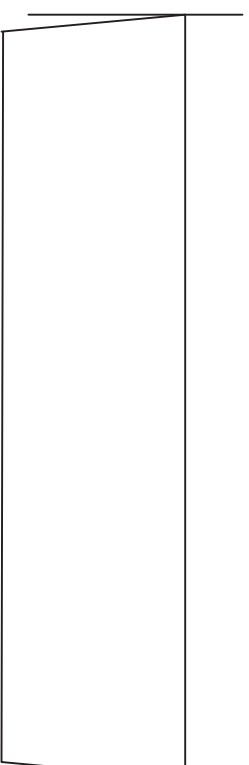
Appendix 5
Slit Trench Logs

STO1

Plan



Cross Section



Services

No:	Diameter:	Colour:	Utility:	Distance:	Depth:	Alignment:
						No Services Encountered.

Ground Conditions

From:	To:	Description:
0.00m	1.00m	MADE GROUND: brown slightly sandy gravelly silty clay with occasional timber, plastic and steel fragments.
1.00m	1.20m	Firm brown sandy slightly gravelly silty CLAY.

Trench Dimensions

Point:	Easting:	Northing:	Level:	Length:	Width:	Depth:
Start	705281.870	788272.160	24.40	5.00m	1.00m	1.20m
End	705273.110	788272.840	23.44			

Photographs



SITE INVESTIGATIONS LTD

Project: Ravel, Ardee Road, Dunleer, Co. Louth

Client: Louth County Council

Consultant: Doherty Finegan Kelly

Logged by: P. McGonagle

Excavation Started: 31/08/2023

Excavation Finished: 31/08/2023

CONTRACT NUMBER

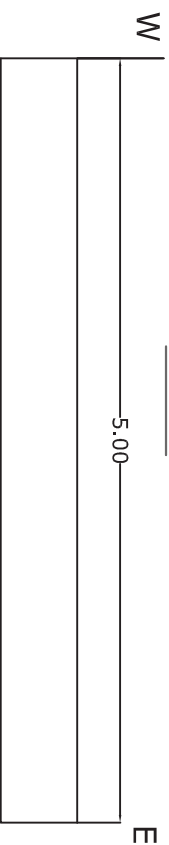
Scale: NOT TO SCALE, ALL DISTANCES IN m

DEPTH ARE TO THE TOP OF SERVICES

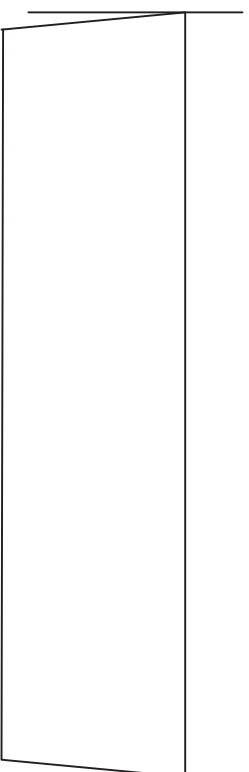
6181

STO2

Plan



Cross Section



Services

No:	Diameter:	Colour:	Utility:	Distance:	Depth:	Alignment:
No Services Encountered.						

Ground Conditions

From:	To:	Description:
0.00m	0.60m	MADE GROUND: brown slightly sandy slightly gravelly silty clay with occasional plastic fragments.
0.60m	1.20m	Firm brown slightly sandy slightly gravelly silty CLAY.

Trench Dimensions

Point:	Easting:	Northing:	Level:	Length:	Width:	Depth:
Start	705205.050	788175.830	25.15	5.00m	1.00m	1.20m
End	705211.670	788174.940	25.05			

Photographs



Project: Ravel, Ardee Road, Dunleer, Co. Louth

Client: Louth County Council

Consultant: Doherty Finegan Kelly

Logged by: P. McGonagle

Excavation Started: 31/08/2023

Excavation Finished: 31/08/2023

CONTRACT NUMBER

SITE INVESTIGATIONS LTD



Scale: NOT TO SCALE, ALL DISTANCES IN m

DEPTH ARE TO THE TOP OF SERVICES

6181

Appendix 6
Groundwater Monitoring

Groundwater Readings

BH No:	Depth of standpipe	Depth to water - mbgl	Depth to water - mOD
13/10/2023			
BH02	7.39	1.92	23.37

Appendix 7
Geotechnical Laboratory Test Results

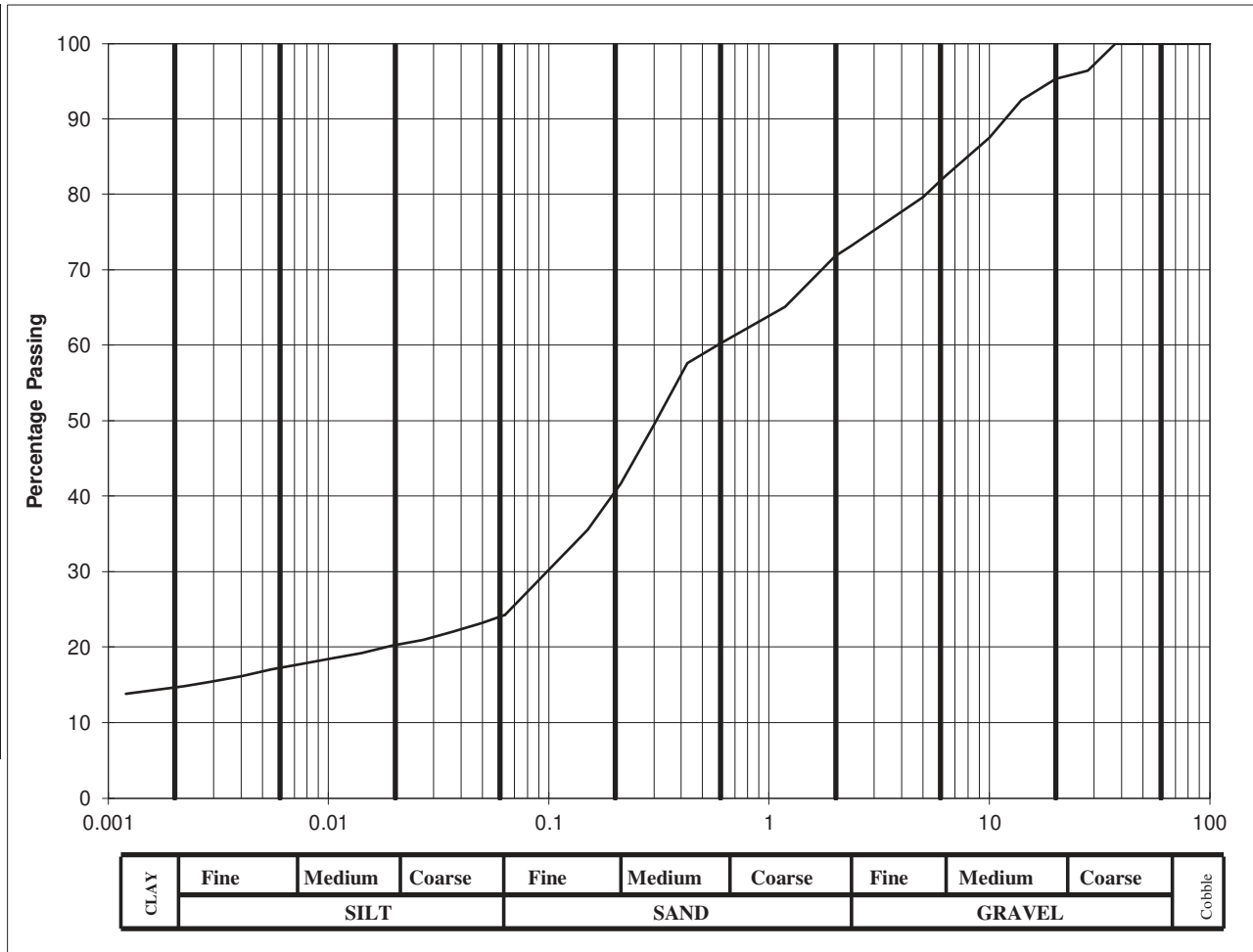
Classification Tests
In accordance with BS 1377: Part 2

Client	Louth County Council
Site	Ardee road, Dunleer
S.I. File No	6181 / 23
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	2nd October 2023

Hole ID	Depth	Sample No	Lab Ref No.	Sample Type	Natural Moisture Content %	Liquid Limit %	Plastic Limit %	Plastic Index %	Bulk Density Mg/m ³	Dry Density Mg/m ³	% passing 425um	Comments	Remarks C=Clay; M=Silt Plasticity: L=Low; I=Intermediate; H=High; V=Very High; E=Extremely High
TP01	1.00	PM03	23/1395	B	39.1	28	19	9			57.6		CL
TP03	1.00	PM07	23/1396	B	33.5	33	20	13			61.3		CL
TP05	1.00	PM16	23/1397	B	11.2	29	20	9			35.8		CL
TP07	1.00	PM09	23/1398	B	13.0	34	19	15			78.0		CL
TP09	1.00	PM12	23/1399	B	15.4	31	19	12			58.9		CL

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	0.0630	24
90	100	0.0200	20
75	100	0.0060	17
63	100	0.0020	15
50	100		
37.5	100		
28	96.4		
20	95.3		
14	92.5		
10	87.5		
6.3	82.3		
5.0	79.6		
2.36	73.1		
2.00	71.8		
1.18	65.1		
0.600	60.2		
0.425	57.6		
0.300	49.5		
0.212	41.7		
0.150	35.5		
0.063	24		

Cobbles, %	0
Gravel, %	28
Sand, %	48
Silt, %	9
Clay, %	15



Client :	Louth County Council
Project :	Ardee road, Dunleer

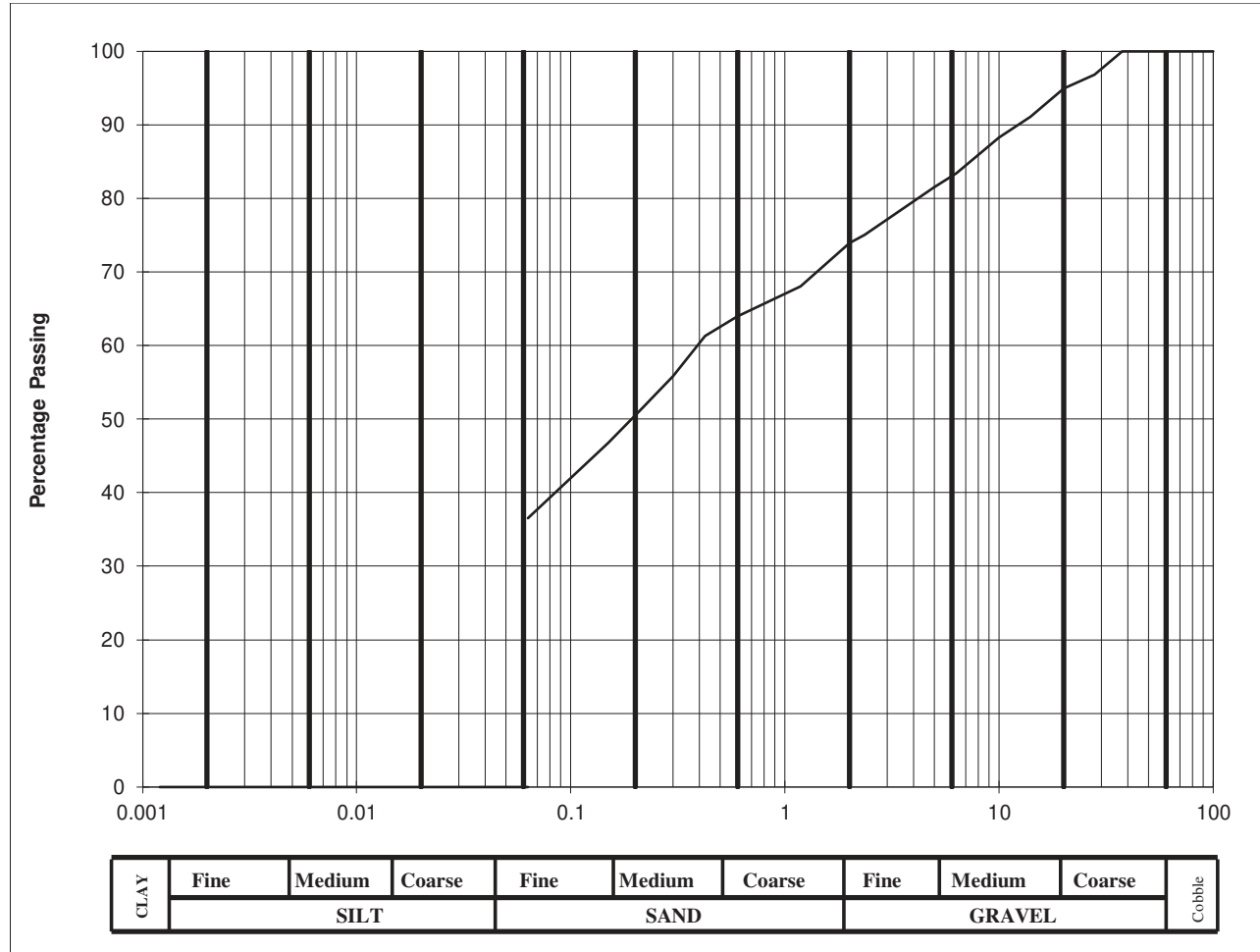
Lab. No :	23/1395
Sample No :	PM03

Hole ID :	TP 01
Depth, m :	1.00

Material description :	sandy slightly gravelly silty CLAY
Remarks :	Soils with clay or silt content between 15% - 35% can be classified as clay or silt depending on the field Engineers assessment of in-situ behaviour. Where material is for re-use and therefore disturbed, only soils with clay or silt >35% are classified as clay or silt

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	0.0630	
90	100	0.0200	
75	100	0.0060	
63	100	0.0020	
50	100		
37.5	100		
28	96.8		
20	94.9		
14	91.1		
10	88.3		
6.3	83.4		
5.0	81.5		
2.36	75		
2.00	73.9		
1.18	68		
0.600	63.9		
0.425	61.3		
0.300	55.8		
0.212	51.2		
0.150	46.8		
0.063	37		

Cobbles, %	0
Gravel, %	26
Sand, %	37
Clay / Silt, %	37



Client :	Louth County Council
Project :	Ardee road, Dunleer

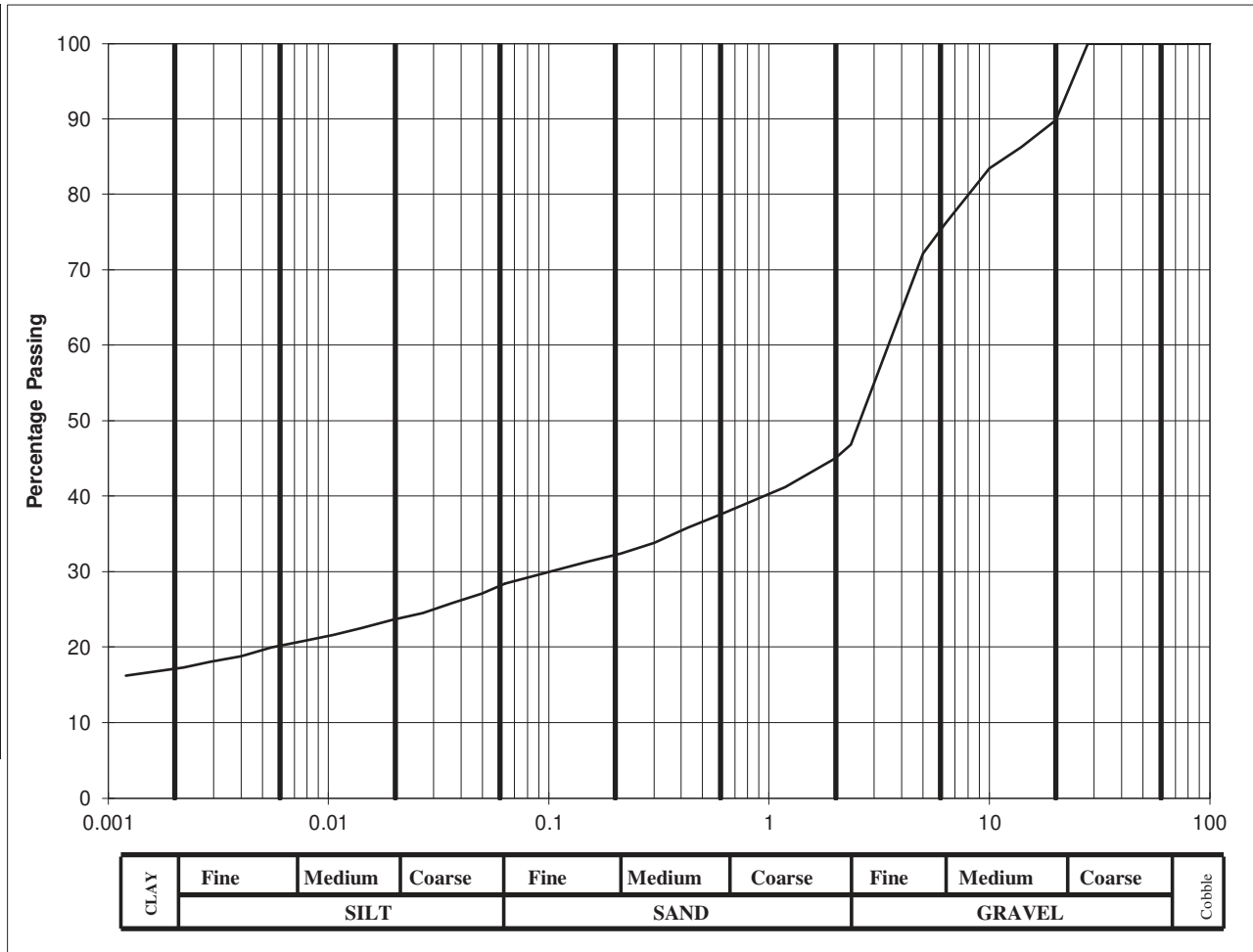
Lab. No :	23/1396
Sample No :	PM07

Hole ID :	TP 03
Depth, m :	1.00

Material description :	sandy slightly gravelly silty CLAY
Remarks :	Soils with clay or silt content between 15% - 35% can be classified as clay or silt depending on the field Engineers assessment of in-situ behaviour. Where material is for re-use and therefore disturbed, only soils with clay or silt >35% are classified as clay or silt

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	0.0630	28
90	100	0.0200	23
75	100	0.0060	20
63	100	0.0020	17
50	100		
37.5	100		
28	100		
20	89.8		
14	86.2		
10	83.4		
6.3	76		
5.0	72.1		
2.36	46.8		
2.00	45		
1.18	41.2		
0.600	37.5		
0.425	35.8		
0.300	33.8		
0.212	32.4		
0.150	31.3		
0.063	28		

Cobbles, %	0
Gravel, %	55
Sand, %	17
Silt, %	11
Clay, %	17



Client :	Louth County Council
Project :	Mullavalley, Louth Village

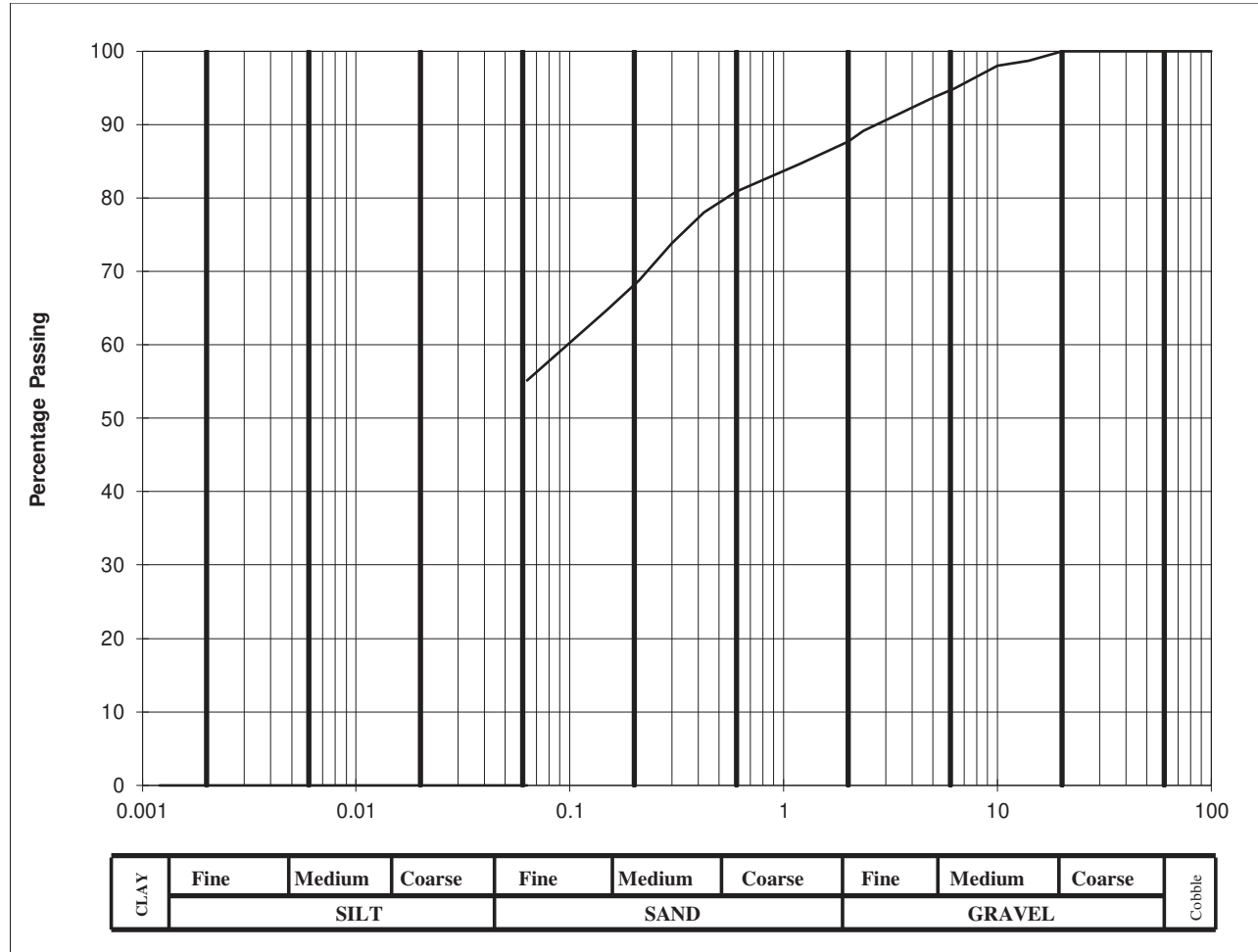
Lab. No :	23/1497
Sample No :	PM16

Hole ID :	TP 05
Depth, m :	1.00

Material description :	slightly sandy gravelly silty CLAY
Remarks :	Soils with clay or silt content between 15% - 35% can be classified as clay or silt depending on the field Engineers assessment of in-situ behaviour. Where material is for re-use and therefore disturbed, only soils with clay or silt >35% are classified as clay or silt

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	0.0630	
90	100	0.0200	
75	100	0.0060	
63	100	0.0020	
50	100		
37.5	100		
28	100		
20	100		
14	98.7		
10	98		
6.3	94.9		
5.0	93.6		
2.36	89.1		
2.00	87.7		
1.18	84.6		
0.600	80.8		
0.425	78		
0.300	73.8		
0.212	68.8		
0.150	64.8		
0.063	55		

Cobbles, %	0
Gravel, %	12
Sand, %	33
Clay / Silt, %	55



Client :	Louth County Council
Project :	Ardee road, Dunleer

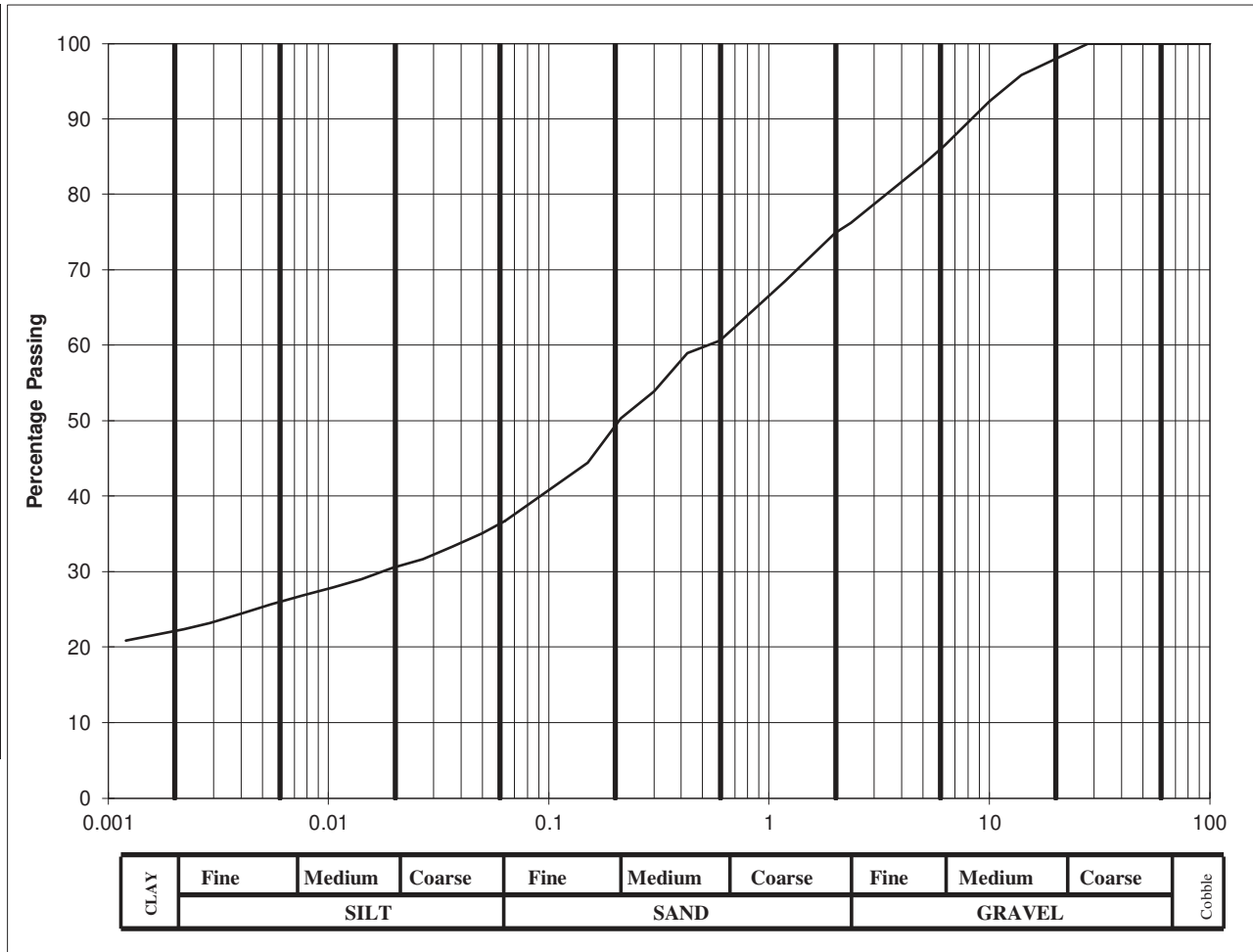
Lab. No :	23/1398
Sample No :	PM09

Hole ID :	TP 07
Depth, m :	1.00

Material description :	slightly sandy slightly gravelly silty CLAY
Remarks :	Soils with clay or silt content between 15% - 35% can be classified as clay or silt depending on the field Engineers assessment of in-situ behaviour. Where material is for re-use and therefore disturbed, only soils with clay or silt >35% are classified as clay or silt

BS Sieve size, mm	Percent passing	Hydrometer analysis	
		Diameter, mm	% passing
100	100	0.0630	37
90	100	0.0200	31
75	100	0.0060	26
63	100	0.0020	22
50	100		
37.5	100		
28	100		
20	97.9		
14	95.8		
10	92.3		
6.3	86.5		
5.0	83.9		
2.36	76.2		
2.00	74.9		
1.18	68.5		
0.600	60.6		
0.425	58.9		
0.300	53.9		
0.212	50.3		
0.150	44.4		
0.063	37		

Cobbles, %	0
Gravel, %	25
Sand, %	38
Silt, %	15
Clay, %	22



Client :	Louth County Council
Project :	Mullavalley, Louth Village

Lab. No :	23/1499
Sample No :	PM12

Hole ID :	TP 09
Depth, m :	1.00

Material description :	sandy slightly gravelly silty CLAY
Remarks :	Soils with clay or silt content between 15% - 35% can be classified as clay or silt depending on the field Engineers assessment of in-situ behaviour. Where material is for re-use and therefore disturbed, only soils with clay or silt >35% are classified as clay or silt

Chemical Testing
In accordance with BS 1377: Part 3

Client	Louth County Council
Site	Ardee road, Dunleer
S.I. File No	6181 / 23
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	2nd October 2023

Hole Id	Depth (mBGL)	Sample No	Lab Ref	pH Value	Water Soluble Sulphate Content (2:1 Water-soil extract) (SO ₃) g/L	Water Soluble Sulphate Content (2:1 Water-soil extract) (SO ₃) %	Acid Soluble Sulphate Content (2:1 Water-soil extract) (SO ₄) g/L	Acid Soluble Sulphate Content (2:1 Water-soil extract) (SO ₄) %	Chloride ion Content (water:soil ratio 2:1) %	% passing 2mm
TP01	1.00	PM03	23/1395	8.35	0.120	0.086				71.8
TP03	1.00	PM07	23/1396	8.44	0.127	0.094				73.9
TP05	1.00	PM16	23/1397	8.52	0.119	0.053				45.0
TP07	1.00	PM09	23/1398	8.65	0.127	0.112				87.7
TP09	1.00	PM12	23/1399	8.92	0.123	0.092				74.9

Appendix 8
Environmental Laboratory Test Results



Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US

Tel: (01244) 528777
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

Site Investigations Ltd
The Grange
Carhugar
12th Lock Road
Lucan
Co. Dublin

Attention: Stephen Letch

CERTIFICATE OF ANALYSIS

Date of report Generation: 26 September 2023
Customer: Site Investigations Ltd
Sample Delivery Group (SDG): 230916-30
Your Reference: 6181
Location: Ardee Road, Dunleer
Report No: 705240
Order Number: 57/A/23

We received 4 samples on Friday September 15, 2023 and 4 of these samples were scheduled for analysis which was completed on Tuesday September 26, 2023. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden.

All sample data is provided by the customer. The reported results relate to the sample supplied, and on the basis that this data is correct.

Incorrect sampling dates and/or sample information will affect the validity of results.

The customer is not permitted to reproduce this report except in full without the approval of the laboratory.

Approved By:

Sonia McWhan
Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
28638784	TP01		0.50	
28638785	TP04		0.50	
28638786	TP07		0.50	
28638787	TP09		0.50	

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

Sample Descriptions

Grain Sizes

very fine	<0.063mm	fine	0.063mm - 0.1mm	medium	0.1mm - 2mm	coarse	2mm - 10mm	very coarse	>10mm
------------------	----------	-------------	-----------------	---------------	-------------	---------------	------------	--------------------	-------

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
28638784	TP01	0.50	Dark Brown	Sandy Silt Loam	Stones	None
28638785	TP04	0.50	Dark Brown	Sandy Loam	Stones	Vegetation
28638786	TP07	0.50	Dark Brown	Sandy Silt Loam	Stones	Vegetation
28638787	TP09	0.50	Dark Brown	Sandy Loam	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

Results Legend			Customer Sample Ref.				
# ISO17025 accredited. M mCERTS accredited. aq Aqueous / settled sample. diss.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery. (F) Trigger breach confirmed 1-4*\$@Sample deviation (see appendix)			Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	TP01	TP04	TP07	TP09
			0.50 Soil/Solid (S)	0.50 Soil/Solid (S)	0.50 Soil/Solid (S)	0.50 Soil/Solid (S)	
			-	-	-	-	
			15/09/2023 230916-30 28638784	15/09/2023 230916-30 28638785	15/09/2023 230916-30 28638786	15/09/2023 230916-30 28638787	
Component	LOD/Units	Method					
Moisture Content Ratio (% of as received sample)	%	PM024	21 §	12 §	20 §	15 §	
Loss on ignition	<0.7 %	TM018	3.39 § M	3.86 § M	6.55 § M	3.77 § M	
Organic Carbon, Total	<0.2 %	TM132	0.796 § M	1.15 § M	1.62 § M	1.08 § M	
pH	1 pH Units	TM133	6.74 § M	7.53 § M	8.04 § M	8.22 § M	
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6 § M	<0.6 § M	<0.6 § M	<0.6 § M	
PCB congener 28	<3 µg/kg	TM168	<3 § M	<3 § M	<3 § M	<3 § M	
PCB congener 52	<3 µg/kg	TM168	<3 § M	<3 § M	<3 § M	<3 § M	
PCB congener 101	<3 µg/kg	TM168	<3 § M	<3 § M	<3 § M	<3 § M	
PCB congener 118	<3 µg/kg	TM168	<3 § M	<3 § M	<3 § M	<3 § M	
PCB congener 138	<3 µg/kg	TM168	<3 § M	<3 § M	<3 § M	<3 § M	
PCB congener 153	<3 µg/kg	TM168	<3 § M	<3 § M	<3 § M	<3 § M	
PCB congener 180	<3 µg/kg	TM168	<3 § M	<3 § M	<3 § M	<3 § M	
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21 §	<21 §	<21 §	<21 §	
Chromium, Trivalent	<0.9 mg/kg	TM181	27.3 §	30.4 §	33.3 §	26.2 §	
Antimony	<0.6 mg/kg	TM181	<0.6 § #	0.925 § #	1.06 § #	<0.6 § #	
Arsenic	<0.6 mg/kg	TM181	12.6 § M	16.5 § M	19.2 § M	13 § M	
Barium	<0.6 mg/kg	TM181	151 § #	107 § #	238 § #	131 § #	
Cadmium	<0.02 mg/kg	TM181	0.52 § M	0.485 § M	0.182 § M	0.0533 § M	
Chromium	<0.9 mg/kg	TM181	27.3 § M	30.4 § M	33.3 § M	26.2 § M	
Copper	<1.4 mg/kg	TM181	12.9 § M	29.1 § M	32 § M	27.5 § M	
Lead	<0.7 mg/kg	TM181	23.1 § M	32.7 § M	44.6 § M	24.5 § M	
Mercury	<0.1 mg/kg	TM181	<0.1 § M	<0.1 § M	<0.1 § M	<0.1 § M	
Molybdenum	<0.1 mg/kg	TM181	<0.1 § #	1.19 § #	0.503 § #	0.354 § #	
Nickel	<0.2 mg/kg	TM181	29.7 § M	50.4 § M	44.2 § M	40.4 § M	
Selenium	<1 mg/kg	TM181	1.34 § #	<1 § #	1.11 § #	1.08 § #	
Zinc	<1.9 mg/kg	TM181	49.2 § M	78 § M	97.5 § M	69.8 § M	
PAH Total 17 (inc Coronene) Moisture Corrected	<10 mg/kg	TM410	<10 §	<10 §	<10 §	<10 §	
Coronene	<200 µg/kg	TM410	<200 §	<200 §	<200 §	<200 §	
Mineral Oil >C10-C40 (EH_2D_AL)	<5 mg/kg	TM415	<5 §	<5 §	6.21 §	10.5 §	



CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

PAH by GCMS

Results Legend			Customer Sample Ref.	TP01	TP04	TP07	TP09		
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.50	0.50	0.50	0.50		
M	mCERTS accredited.			Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
aq	Aqueous / settled sample.			-	-	-	-		
diss.filt	Dissolved / filtered sample.			-	-	-	-		
tot.unfilt	Total / unfiltered sample.			15/09/2023	15/09/2023	15/09/2023	15/09/2023		
	Subcontracted - refer to subcontractor report for accreditation status.			230916-30	230916-30	230916-30	230916-30		
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery			28638784	28638785	28638786	28638787		
(F)	Trigger breach confirmed								
1-4**	Sample deviation (see appendix)								
Component	LOD/Units	Method							
Naphthalene	<9 µg/kg	TM218	<9	<9	<9	<9			
			§ M	§ M	§ M	§ M			
Acenaphthylene	<12 µg/kg	TM218	<12	<12	<12	<12			
			§ M	§ M	§ M	§ M			
Acenaphthene	<8 µg/kg	TM218	<8	<8	<8	<8			
			§ M	§ M	§ M	§ M			
Fluorene	<10 µg/kg	TM218	<10	<10	<10	<10			
			§ M	§ M	§ M	§ M			
Phenanthrene	<15 µg/kg	TM218	<15	<15	<15	<15			
			§ M	§ M	§ M	§ M			
Anthracene	<16 µg/kg	TM218	<16	<16	<16	<16			
			§ M	§ M	§ M	§ M			
Fluoranthene	<17 µg/kg	TM218	<17	<17	<17	<17			
			§ M	§ M	§ M	§ M			
Pyrene	<15 µg/kg	TM218	<15	<15	<15	<15			
			§ M	§ M	§ M	§ M			
Benz(a)anthracene	<14 µg/kg	TM218	<14	<14	<14	<14			
			§ M	§ M	§ M	§ M			
Chrysene	<10 µg/kg	TM218	<10	<10	<10	<10			
			§ M	§ M	§ M	§ M			
Benzo(b)fluoranthene	<15 µg/kg	TM218	<15	<15	<15	<15			
			§ M	§ M	§ M	§ M			
Benzo(k)fluoranthene	<14 µg/kg	TM218	<14	<14	<14	<14			
			§ M	§ M	§ M	§ M			
Benzo(a)pyrene	<15 µg/kg	TM218	<15	<15	<15	<15			
			§ M	§ M	§ M	§ M			
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	<18	<18	<18	<18			
			§ M	§ M	§ M	§ M			
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	<23	<23	<23	<23			
			§ M	§ M	§ M	§ M			
Benzo(g,h,i)perylene	<24 µg/kg	TM218	<24	<24	<24	<24			
			§ M	§ M	§ M	§ M			
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	<118	<118	<118	<118			
			§	§	§	§			



CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

TPH CWG (S)

Results Legend		Customer Sample Ref.	TP01	TP04	TP07	TP09		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.		0.50	0.50	0.50	0.50		
aq	Aqueous / settled sample.		Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
diss.filt	Dissolved / filtered sample.		-	-	-	-		
tot.unfilt	Total / unfiltered sample.		-	-	-	-		
*	Subcontracted - refer to subcontractor report for accreditation status.		15/09/2023	15/09/2023	15/09/2023	15/09/2023		
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		230916-30	230916-30	230916-30	230916-30		
(F)	Trigger breach confirmed		28638784	28638785	28638786	28638787		
1-4*	@Sample deviation (see appendix)							
Component	LOD/Units	Method						
GRO Surrogate % recovery**	%	TM089	105	104	102	116		
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/kg	TM089	<10	<10	<10	<10		
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/kg	TM089	<10	<10	<10	<10		
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/kg	TM089	<10	<10	<10	<10		
Aliphatics >C10-C12 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	<1000		
Aliphatics >C12-C16 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	<1000		
Aliphatics >C16-C21 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	<1000		
Aliphatics >C21-C35 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000	4370	4800	4270		
Aliphatics >C35-C44 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	<1000		
Total Aliphatics >C10-C44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	<5000	<5000	5340	<5000		
Total Aliphatics & Aromatics >C10-C44 (EH_2D_Total_#1)	<10000 µg/kg	TM414	<10000	11200	13400	14300		
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/kg	TM089	<10	<10	<10	<10		
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/kg	TM089	<10	<10	<10	<10		
Aromatics >EC8-EC10 (HS_1D_AR)	<10 µg/kg	TM089	<10	<10	<10	<10		
Aromatics > EC10-EC12 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	<1000		
Aromatics > EC12-EC16 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	<1000		
Aromatics > EC16-EC21 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	2590		
Aromatics > EC21-EC35 (EH_2D_AR_#1)	<1000 µg/kg	TM414	1190	5010	6310	5920		
Aromatics >EC35-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	<1000		
Aromatics > EC40-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	<1000		
Total Aromatics > EC10-EC44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	<5000	6460	8040	9520		
Total Aliphatics & Aromatics >C5-C44 (EH_2D_Total_#1+HS_1D_Total)	<10000 µg/kg	TM414	<10000	<10000	13400	<10000		
GRO >C5-C6 (HS_1D)	<20 µg/kg	TM089	<20	<20	<20	<20		
GRO >C6-C7 (HS_1D)	<20 µg/kg	TM089	<20	<20	<20	<20		
GRO >C7-C8 (HS_1D)	<20 µg/kg	TM089	<20	<20	<20	<20		
GRO >C8-C10 (HS_1D)	<20 µg/kg	TM089	<20	<20	<20	<20		
GRO >C10-C12 (HS_1D)	<20 µg/kg	TM089	<20	<20	<20	<20		
Total Aliphatics >C5-C10 (HS_1D_AL_TOTAL)	<50 µg/kg	TM089	<50	<50	<50	<50		
Total Aromatics >EC5-EC10 (HS_1D_AR_TOTAL)	<50 µg/kg	TM089	<50	<50	<50	<50		
GRO >C5-C10 (HS_1D_TOTAL)	<20 µg/kg	TM089	<20	<20	<20	<20		



CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

VOC MS (S)

Results Legend			Customer Sample Ref.	TP01	TP04	TP07	TP09		
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference						
M	mCERTS accredited.			0.50	0.50	0.50	0.50		
aq	Aqueous / settled sample.			Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)		
diss.filt	Dissolved / filtered sample.			-	-	-	-		
tot.unfilt	Total / unfiltered sample.			-	-	-	-		
*	Subcontracted - refer to subcontractor report for accreditation status.			15/09/2023	15/09/2023	15/09/2023	15/09/2023		
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery			230916-30	230916-30	230916-30	230916-30		
(F)	Trigger breach confirmed			28638784	28638785	28638786	28638787		
1-4*	@ Sample deviation (see appendix)								
Component	LOD/Units	Method							
Dibromofluoromethane**	%	TM116	112	113	114	118			
			§	§	§	§			
Toluene-d8**	%	TM116	99.6	97.9	91	99.4			
			§	§	§	§			
4-Bromofluorobenzene**	%	TM116	87	81	76.1	73.4			
			§	§	§	§			
Methyl Tertiary Butyl Ether	<0.5 µg/kg	TM116	<0.5	<0.5	<0.5	<0.5			
			§ M	§ M	§ M	§ M			
Benzene	<1 µg/kg	TM116	<1	<1	<1	<1			
			§ M	§ M	§ M	§ M			
Toluene	<1 µg/kg	TM116	<1	<1	<1	1.55			
			§ M	§ M	§ M	§ M			
Ethylbenzene	<1 µg/kg	TM116	<1	<1	<1	<1			
			§ M	§ M	§ M	§ M			
p/m-Xylene	<2 µg/kg	TM116	<2	<2	<2	<2			
			§ #	§ #	§ #	§ #			
o-Xylene	<2 µg/kg	TM116	<2	<2	<2	<2			
			§ M	§ M	§ M	§ M			



CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.114
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	Ardee Road, Dunleer
Natural Moisture Content (%)	26
Dry Matter Content (%)	79.4

Case	
SDG	230916-30
Lab Sample Number(s)	28638784
Sampled Date	
Customer Sample Ref.	TP01
Depth (m)	0.50

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	0.796
Loss on Ignition (%)	3.39
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg) (EH_2D_AL)	<5
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	6.74
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00117	<0.0005	0.0117	<0.005	0.5	2	25
Barium	0.0422	<0.0002	0.422	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	0.00137	<0.001	0.0137	<0.01	0.5	10	70
Copper	0.00161	<0.0003	0.0161	<0.003	2	50	100
Mercury Dissolved (CVAf)	0.0000137	<0.00001	0.000137	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	0.000893	<0.0004	0.00893	<0.004	0.4	10	40
Lead	0.00117	<0.0002	0.0117	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.0113	<0.001	0.113	<0.01	4	50	200
Chloride	2.2	<2	22	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	17.9	<10	179	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	3.5	<3	35	<30	500	800	1000

Leach Test Information

Date Prepared	18-Sep-2023
pH (pH Units)	7.31
Conductivity (µS/cm)	25
Volume Leachant (Litres)	0.876

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Leachates prepared in accordance with BS EN 12457 will be carried out at room temperature (20±5°C)
 Stated limits are for guidance only and ALS Laboratories (UK) Limited cannot be held responsible for any discrepancies with current legislation



CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.105
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	Ardee Road, Dunleer
Natural Moisture Content (%)	15.6
Dry Matter Content (%)	86.5

Case	
SDG	230916-30
Lab Sample Number(s)	28638785
Sampled Date	
Customer Sample Ref.	TP04
Depth (m)	0.50

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	1.15
Loss on Ignition (%)	3.86
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg) (EH_2D_AL)	<5
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	7.53
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00106	<0.0005	0.0106	<0.005	0.5	2	25
Barium	0.00382	<0.0002	0.0382	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	0.00112	<0.001	0.0112	<0.01	0.5	10	70
Copper	0.00425	<0.0003	0.0425	<0.003	2	50	100
Mercury Dissolved (CVAf)	0.0000158	<0.00001	0.000158	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	0.00179	<0.0004	0.0179	<0.004	0.4	10	40
Lead	0.00206	<0.0002	0.0206	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00212	<0.001	0.0212	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	0.576	<0.5	5.76	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	26.5	<10	265	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	5.83	<3	58.3	<30	500	800	1000

Leach Test Information

Date Prepared	18-Sep-2023
pH (pH Units)	7.73
Conductivity (µS/cm)	37
Volume Leachant (Litres)	0.885

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Leachates prepared in accordance with BS EN 12457 will be carried out at room temperature (20±5°C)
 Stated limits are for guidance only and ALS Laboratories (UK) Limited cannot be held responsible for any discrepancies with current legislation



CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.117
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	Ardee Road, Dunleer
Natural Moisture Content (%)	29.2
Dry Matter Content (%)	77.4

Case	
SDG	230916-30
Lab Sample Number(s)	28638786
Sampled Date	
Customer Sample Ref.	TP07
Depth (m)	0.50

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	1.62
Loss on Ignition (%)	6.55
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg) (EH_2D_AL)	6.21
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.04
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00109	<0.0005	0.0109	<0.005	0.5	2	25
Barium	0.145	<0.0002	1.45	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	0.00102	<0.001	0.0102	<0.01	0.5	10	70
Copper	0.0038	<0.0003	0.038	<0.003	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	<0.003	<0.003	<0.03	<0.03	0.5	10	30
Nickel	0.00114	<0.0004	0.0114	<0.004	0.4	10	40
Lead	0.000746	<0.0002	0.00746	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.00961	<0.001	0.0961	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	<2	<2	<20	<20	1000	20000	50000
Total Dissolved Solids	75	<10	750	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	6.14	<3	61.4	<30	500	800	1000

Leach Test Information

Date Prepared	18-Sep-2023
pH (pH Units)	8.27
Conductivity (µS/cm)	103
Volume Leachant (Litres)	0.873

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Leachates prepared in accordance with BS EN 12457 will be carried out at room temperature (20±5°C)
 Stated limits are for guidance only and ALS Laboratories (UK) Limited cannot be held responsible for any discrepancies with current legislation

26/09/2023 07:46:40

07:46:31 26/09/2023



CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference	
Mass Sample taken (kg)	0.107
Mass of dry sample (kg)	0.090
Particle Size <4mm	>95%

Site Location	Ardee Road, Dunleer
Natural Moisture Content (%)	18.8
Dry Matter Content (%)	84.2

Case	
SDG	230916-30
Lab Sample Number(s)	28638787
Sampled Date	
Customer Sample Ref.	TP09
Depth (m)	0.50

Landfill Waste Acceptance Criteria Limits

Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
3	5	6
-	-	10
-	-	-
1	-	-
500	-	-
100	-	-
-	>6	-
-	-	-
-	-	-

Solid Waste Analysis	Result
Total Organic Carbon (%)	1.08
Loss on Ignition (%)	3.77
Sum of BTEX (mg/kg)	-
Sum of 7 PCBs (mg/kg)	<0.021
Mineral Oil (mg/kg) (EH_2D_AL)	10.5
PAH Sum of 17 (mg/kg)	<10
pH (pH Units)	8.22
ANC to pH 6 (mol/kg)	-
ANC to pH 4 (mol/kg)	-

Eluate Analysis	C ₂ Conc ⁿ in 10:1 eluate (mg/l)		A ₂ 10:1 conc ⁿ leached (mg/kg)		Limit values for compliance leaching test using BS EN 12457-3 at L/S 10 l/kg		
	Result	Limit of Detection	Result	Limit of Detection			
Arsenic	0.00224	<0.0005	0.0224	<0.005	0.5	2	25
Barium	0.2	<0.0002	2	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	0.00104	<0.001	0.0104	<0.01	0.5	10	70
Copper	0.00597	<0.0003	0.0597	<0.003	2	50	100
Mercury Dissolved (CVAf)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00504	<0.003	0.0504	<0.03	0.5	10	30
Nickel	0.00176	<0.0004	0.0176	<0.004	0.4	10	40
Lead	0.000536	<0.0002	0.00536	<0.002	0.5	10	50
Antimony	0.00107	<0.001	0.0107	<0.01	0.06	0.7	5
Selenium	<0.001	<0.001	<0.01	<0.01	0.1	0.5	7
Zinc	0.015	<0.001	0.15	<0.01	4	50	200
Chloride	<2	<2	<20	<20	800	15000	25000
Fluoride	<0.5	<0.5	<5	<5	10	150	500
Sulphate (soluble)	11.8	<2	118	<20	1000	20000	50000
Total Dissolved Solids	114	<10	1140	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	8.1	<3	81	<30	500	800	1000

Leach Test Information

Date Prepared	18-Sep-2023
pH (pH Units)	8.48
Conductivity (µS/cm)	156
Volume Leachant (Litres)	0.883

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
 Leachates prepared in accordance with BS EN 12457 will be carried out at room temperature (20±5°C)
 Stated limits are for guidance only and ALS Laboratories (UK) Limited cannot be held responsible for any discrepancies with current legislation

26/09/2023 07:46:40

07:46:31 26/09/2023



CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

Table of Results - Appendix

Method No	Description
TM152	Analysis of Aqueous Samples by ICP-MS
TM168	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM218	The determination of PAH in soil samples by GC-MS
TM256	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM415	Determination of Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID
PM115	Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM018	Determination of Loss on Ignition
TM090	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM116	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM123	The Determination of Total Dissolved Solids in Water
TM132	ELTRA CS800 Operators Guide
TM133	Determination of pH in Soil and Water using the GLpH pH Meter
TM259	Determination of Phenols in Waters and Leachates by HPLC
TM410	Determination of Coronene in soils by GCMS
TM104	Determination of Fluoride using the Kone Analyser
TM183	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM414	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID
PM024	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM089	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM151	Determination of Hexavalent Chromium using Kone analyser
TM181	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Laboratories (UK) Limited Hawarden (Method codes TM).



CERTIFICATE OF ANALYSIS

Validated

SDG: 230916-30
Client Ref.: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

Test Completion Dates

Lab Sample No(s) Customer Sample Ref.	28638784	28638785	28638786	28638787
	TP01	TP04	TP07	TP09
AGS Ref.				
Depth	0.50	0.50	0.50	0.50
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Anions by Kone (w)	20-Sep-2023	20-Sep-2023	20-Sep-2023	20-Sep-2023
CEN 10:1 Leachate (1 Stage)	18-Sep-2023	18-Sep-2023	18-Sep-2023	18-Sep-2023
CEN Readings	21-Sep-2023	21-Sep-2023	21-Sep-2023	21-Sep-2023
Chromium III	20-Sep-2023	20-Sep-2023	20-Sep-2023	20-Sep-2023
Coronene	21-Sep-2023	21-Sep-2023	21-Sep-2023	21-Sep-2023
Dissolved Metals by ICP-MS	21-Sep-2023	21-Sep-2023	21-Sep-2023	21-Sep-2023
Dissolved Organic/Inorganic Carbon	26-Sep-2023	26-Sep-2023	26-Sep-2023	26-Sep-2023
EPH by GCxGC-FID	22-Sep-2023	22-Sep-2023	22-Sep-2023	22-Sep-2023
EPH CWG GC (S)	20-Sep-2023	20-Sep-2023	20-Sep-2023	20-Sep-2023
Fluoride	22-Sep-2023	21-Sep-2023	22-Sep-2023	21-Sep-2023
GRO by GC-FID (S)	20-Sep-2023	19-Sep-2023	19-Sep-2023	19-Sep-2023
Hexavalent Chromium (s)	20-Sep-2023	20-Sep-2023	20-Sep-2023	20-Sep-2023
Loss on Ignition in soils	20-Sep-2023	20-Sep-2023	19-Sep-2023	19-Sep-2023
Mercury Dissolved	22-Sep-2023	22-Sep-2023	22-Sep-2023	22-Sep-2023
Metals in solid samples by OES	20-Sep-2023	20-Sep-2023	20-Sep-2023	20-Sep-2023
Moisture at 105C	18-Sep-2023	18-Sep-2023	18-Sep-2023	18-Sep-2023
PAH 16 & 17 Calc	21-Sep-2023	21-Sep-2023	21-Sep-2023	21-Sep-2023
PAH by GCMS	20-Sep-2023	20-Sep-2023	20-Sep-2023	20-Sep-2023
PCBs by GCMS	22-Sep-2023	22-Sep-2023	22-Sep-2023	22-Sep-2023
pH	20-Sep-2023	20-Sep-2023	20-Sep-2023	20-Sep-2023
pH Value of Filtered Water	21-Sep-2023	21-Sep-2023	21-Sep-2023	21-Sep-2023
Phenols by HPLC (W)	21-Sep-2023	21-Sep-2023	21-Sep-2023	21-Sep-2023
Sample description	16-Sep-2023	16-Sep-2023	16-Sep-2023	16-Sep-2023
Total Dissolved Solids on Leachates	20-Sep-2023	20-Sep-2023	20-Sep-2023	20-Sep-2023
Total Organic Carbon	22-Sep-2023	22-Sep-2023	22-Sep-2023	22-Sep-2023
TPH CWG GC (S)	20-Sep-2023	20-Sep-2023	20-Sep-2023	20-Sep-2023
VOC MS (S)	19-Sep-2023	19-Sep-2023	19-Sep-2023	19-Sep-2023



CERTIFICATE OF ANALYSIS

SDG: 230916-30
Client Ref: 6181

Report Number: 705240
Location: Ardee Road, Dunleer

Superseded Report:

Appendix

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 15 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of 15 days after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

General

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials and soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anorthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

Appendix 9
Waste Classification Report



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:

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



9KU9Z-2NXQ3-G9011

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

Job name

6181

Description/Comments

Client: Louth County Council
Engineer: Doherty Finegan Kelly

Project

Ravel

Site

Ardee Road, Dunleer, Co. Louth

Classified by

Name: **Stephen Letch**
Date: **06 Oct 2023 10:49 GMT**
Telephone: **00353 86817 9449**
Company: **Site Investigations Ltd**
The Grange
12th Lock Road
Lucan
K78 F598

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

Hazardous Waste Classification
Most recent 3 year Refresher

Date

09 Oct 2019
04 Oct 2022

Next 3 year Refresher due by Oct 2025

Purpose of classification

2 - Material Characterisation

Address of the waste

Ravel, Ardee Road, Dunleer, Co. Louth

Post Code N/A

SIC for the process giving rise to the waste

43130 Test drilling and boring

Description of industry/producer giving rise to the waste

Site Investigation

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

Soils recovered for environmental testing

Description of the waste

Natural soils



Job summary

#	Sample name	Depth [m]	Classification Result	Hazard properties	WAC Results		Page
					Inert	Non Haz	
1	TP01-0.50	0.50	Non Hazardous		Pass	Pass	3
2	TP04-0.50	0.50	Non Hazardous		Pass	Pass	7
3	TP07-0.50	0.50	Non Hazardous		Pass	Pass	11
4	TP09-0.50	0.50	Non Hazardous		Pass	Pass	15

Related documents

#	Name	Description
1	230916-30.hwol	ALS Hawarden .hwol file used to populate the Job
2	Rilta Suite NEW	waste stream template used to create this Job

WAC results

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate the samples in this Job: "Ireland"

The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

Report

Created by: Stephen Letch

Created date: 06 Oct 2023 10:49 GMT

Appendices	Page
Appendix A: Classifier defined and non EU CLP determinands	19
Appendix B: Rationale for selection of metal species	20
Appendix C: Version	21



Classification of sample: TP01-0.50

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

Sample details

Sample name:	LoW Code:
TP01-0.50	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	
Moisture content:	
21%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 21% Wet Weight Moisture Correction applied (MC)

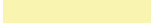
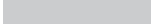


#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>					
3	antimony { antimony trioxide }				<0.6 mg/kg	1.197	<0.718 mg/kg	<0.0000718 %		<LOD
	051-005-00-X	215-175-0	1309-64-4							
4	arsenic { arsenic pentoxide }				12.6 mg/kg	1.534	15.268 mg/kg	0.00153 %	✓	
	033-004-00-6	215-116-9	1303-28-2							
5	barium { barium sulphide }				151 mg/kg	1.233	147.143 mg/kg	0.0147 %	✓	
	016-002-00-X	244-214-4	21109-95-5							
6	cadmium { cadmium sulfate }				0.52 mg/kg	1.855	0.762 mg/kg	0.0000762 %	✓	
	048-009-00-9	233-331-6	10124-36-4							
7	copper { dicopper oxide; copper (I) oxide }				12.9 mg/kg	1.126	11.474 mg/kg	0.00115 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	23.1 mg/kg		18.249 mg/kg	0.00182 %	✓	
	082-001-00-6									
9	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
10	molybdenum { molybdenum(VI) oxide }				<0.1 mg/kg	1.5	<0.15 mg/kg	<0.000015 %		<LOD
	042-001-00-9	215-204-7	1313-27-5							
11	nickel { nickel sulfate }				29.7 mg/kg	2.637	61.865 mg/kg	0.00619 %	✓	
	028-009-00-5	232-104-9	7786-81-4							
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.34 mg/kg	1.405	1.487 mg/kg	0.000149 %	✓	
	034-002-00-8									
13	zinc { zinc sulphate }				49.2 mg/kg	2.469	95.977 mg/kg	0.0096 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				27.3 mg/kg	1.462	31.521 mg/kg	0.00315 %	✓	
		215-160-9	1308-38-9							



#	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							
15	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
16	naphthalene				<0.009 mg/kg		<0.009 mg/kg	<0.000009 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
17	acenaphthylene				<0.012 mg/kg		<0.012 mg/kg	<0.000012 %		<LOD
		205-917-1	208-96-8							
18	acenaphthene				<0.008 mg/kg		<0.008 mg/kg	<0.000008 %		<LOD
		201-469-6	83-32-9							
19	fluorene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-695-5	86-73-7							
20	phenanthrene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
		201-581-5	85-01-8							
21	anthracene				<0.016 mg/kg		<0.016 mg/kg	<0.000016 %		<LOD
		204-371-1	120-12-7							
22	fluoranthene				<0.017 mg/kg		<0.017 mg/kg	<0.000017 %		<LOD
		205-912-4	206-44-0							
23	pyrene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
		204-927-3	129-00-0							
24	benzo[a]anthracene				<0.014 mg/kg		<0.014 mg/kg	<0.000014 %		<LOD
	601-033-00-9	200-280-6	56-55-3							
25	chrysene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	601-048-00-0	205-923-4	218-01-9							
26	benzo[b]fluoranthene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
27	benzo[k]fluoranthene				<0.014 mg/kg		<0.014 mg/kg	<0.000014 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
28	benzo[a]pyrene; benzo[def]chrysene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
29	indeno[123-cd]pyrene				<0.018 mg/kg		<0.018 mg/kg	<0.000018 %		<LOD
		205-893-2	193-39-5							
30	dibenz[a,h]anthracene				<0.023 mg/kg		<0.023 mg/kg	<0.000023 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
31	benzo[ghi]perylene				<0.024 mg/kg		<0.024 mg/kg	<0.000024 %		<LOD
		205-883-8	191-24-2							
32	polychlorobiphenyls; PCB				<0.021 mg/kg		<0.021 mg/kg	<0.000021 %		<LOD
	602-039-00-4	215-648-1	1336-36-3							
33	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.0005 mg/kg		<0.0005 mg/kg	<0.0000005 %		<LOD
	603-181-00-X	216-653-1	1634-04-4							
34	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
35	toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
36	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
37	coronene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
		205-881-7	191-07-1							
38	pH				6.74 pH		6.74 pH	6.74 pH		
			PH							
39	o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	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]							
Total:								0.0396 %		



Key

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



WAC results for sample: TP01-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"

The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis			Landfill Waste Acceptance Criteria Limits	
#	Determinand	User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	% 0.796	3	5
2	LOI (loss on ignition)	% 3.39	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg <0.007	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg <0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg <5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg <10	100	-
7	pH	pH 6.74	-	>6
8	ANC (acid neutralisation capacity)	mol/kg	-	-
Eluate Analysis 10:1				
9	arsenic	mg/kg 0.0117	0.5	2
10	barium	mg/kg 0.422	20	100
11	cadmium	mg/kg <0.0008	0.04	1
12	chromium	mg/kg 0.0137	0.5	10
13	copper	mg/kg 0.0161	2	50
14	mercury	mg/kg 0.0001	0.01	0.2
15	molybdenum	mg/kg <0.03	0.5	10
16	nickel	mg/kg 0.0089	0.4	10
17	lead	mg/kg 0.0117	0.5	10
18	antimony	mg/kg <0.01	0.06	0.7
19	selenium	mg/kg <0.01	0.1	0.5
20	zinc	mg/kg 0.113	4	50
21	chloride	mg/kg 22	800	15,000
22	fluoride	mg/kg <5	10	150
23	sulphate	mg/kg <20	1,000	20,000
24	phenol index	mg/kg <0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg 35	500	800
26	TDS (total dissolved solids)	mg/kg 179	4,000	60,000

Key

User supplied data



Classification of sample: TP04-0.50

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

Sample details

Sample name:	LoW Code:
TP04-0.50	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	
Moisture content:	
12%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 12% Wet Weight Moisture Correction applied (MC)

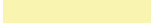
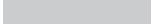


#	Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
	EU CLP index number	EC Number	CAS Number							
1	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
			TPH							
2	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>					
3	antimony { antimony trioxide }				0.925 mg/kg	1.197	0.974 mg/kg	0.0000974 %	✓	
	051-005-00-X	215-175-0	1309-64-4							
4	arsenic { arsenic pentoxide }				16.5 mg/kg	1.534	22.272 mg/kg	0.00223 %	✓	
	033-004-00-6	215-116-9	1303-28-2							
5	barium { barium sulphide }				107 mg/kg	1.233	116.146 mg/kg	0.0116 %	✓	
	016-002-00-X	244-214-4	21109-95-5							
6	cadmium { cadmium sulfate }				0.485 mg/kg	1.855	0.792 mg/kg	0.0000792 %	✓	
	048-009-00-9	233-331-6	10124-36-4							
7	copper { dicopper oxide; copper (I) oxide }				29.1 mg/kg	1.126	28.832 mg/kg	0.00288 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	32.7 mg/kg		28.776 mg/kg	0.00288 %	✓	
	082-001-00-6									
9	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
10	molybdenum { molybdenum(VI) oxide }				1.19 mg/kg	1.5	1.571 mg/kg	0.000157 %	✓	
	042-001-00-9	215-204-7	1313-27-5							
11	nickel { nickel sulfate }				50.4 mg/kg	2.637	116.942 mg/kg	0.0117 %	✓	
	028-009-00-5	232-104-9	7786-81-4							
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<1 mg/kg	1.405	<1.405 mg/kg	<0.000141 %		<LOD
	034-002-00-8									
13	zinc { zinc sulphate }				78 mg/kg	2.469	169.493 mg/kg	0.0169 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				30.4 mg/kg	1.462	39.1 mg/kg	0.00391 %	✓	
		215-160-9	1308-38-9							



#	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							
15	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
16	naphthalene				<0.009 mg/kg		<0.009 mg/kg	<0.000009 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
17	acenaphthylene				<0.012 mg/kg		<0.012 mg/kg	<0.000012 %		<LOD
		205-917-1	208-96-8							
18	acenaphthene				<0.008 mg/kg		<0.008 mg/kg	<0.000008 %		<LOD
		201-469-6	83-32-9							
19	fluorene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-695-5	86-73-7							
20	phenanthrene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
		201-581-5	85-01-8							
21	anthracene				<0.016 mg/kg		<0.016 mg/kg	<0.000016 %		<LOD
		204-371-1	120-12-7							
22	fluoranthene				<0.017 mg/kg		<0.017 mg/kg	<0.000017 %		<LOD
		205-912-4	206-44-0							
23	pyrene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
		204-927-3	129-00-0							
24	benzo[a]anthracene				<0.014 mg/kg		<0.014 mg/kg	<0.000014 %		<LOD
	601-033-00-9	200-280-6	56-55-3							
25	chrysene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	601-048-00-0	205-923-4	218-01-9							
26	benzo[b]fluoranthene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
27	benzo[k]fluoranthene				<0.014 mg/kg		<0.014 mg/kg	<0.000014 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
28	benzo[a]pyrene; benzo[def]chrysene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
29	indeno[123-cd]pyrene				<0.018 mg/kg		<0.018 mg/kg	<0.000018 %		<LOD
		205-893-2	193-39-5							
30	dibenz[a,h]anthracene				<0.023 mg/kg		<0.023 mg/kg	<0.000023 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
31	benzo[ghi]perylene				<0.024 mg/kg		<0.024 mg/kg	<0.000024 %		<LOD
		205-883-8	191-24-2							
32	polychlorobiphenyls; PCB				<0.021 mg/kg		<0.021 mg/kg	<0.000021 %		<LOD
	602-039-00-4	215-648-1	1336-36-3							
33	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.0005 mg/kg		<0.0005 mg/kg	<0.0000005 %		<LOD
	603-181-00-X	216-653-1	1634-04-4							
34	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
35	toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
36	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
37	coronene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
		205-881-7	191-07-1							
38	pH				7.53 pH		7.53 pH	7.53 pH		
			PH							
39	o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	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]							
Total:								0.0538 %		



Key

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



WAC results for sample: TP04-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"

The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis			Landfill Waste Acceptance Criteria Limits	
#	Determinand	User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	% 1.15	3	5
2	LOI (loss on ignition)	% 3.86	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg <0.007	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg <0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg <5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg <10	100	-
7	pH	pH 7.53	-	>6
8	ANC (acid neutralisation capacity)	mol/kg	-	-
Eluate Analysis 10:1				
9	arsenic	mg/kg 0.0106	0.5	2
10	barium	mg/kg 0.0382	20	100
11	cadmium	mg/kg <0.0008	0.04	1
12	chromium	mg/kg 0.0112	0.5	10
13	copper	mg/kg 0.0425	2	50
14	mercury	mg/kg 0.0001	0.01	0.2
15	molybdenum	mg/kg <0.03	0.5	10
16	nickel	mg/kg 0.0179	0.4	10
17	lead	mg/kg 0.0206	0.5	10
18	antimony	mg/kg <0.01	0.06	0.7
19	selenium	mg/kg <0.01	0.1	0.5
20	zinc	mg/kg 0.0212	4	50
21	chloride	mg/kg <20	800	15,000
22	fluoride	mg/kg 5.76	10	150
23	sulphate	mg/kg <20	1,000	20,000
24	phenol index	mg/kg <0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg 58.3	500	800
26	TDS (total dissolved solids)	mg/kg 265	4,000	60,000

Key

User supplied data



Classification of sample: TP07-0.50

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

Sample details

Sample name:	LoW Code:
TP07-0.50	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	
Moisture content:	
20%	
(wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 20% Wet Weight Moisture Correction applied (MC)

#	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							
1	TPH (C6 to C40) petroleum group				13.4 mg/kg		10.72 mg/kg	0.00107 %	✓	
			TPH							
2	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>					
3	antimony { antimony trioxide }				1.06 mg/kg	1.197	1.015 mg/kg	0.000102 %	✓	
	051-005-00-X	215-175-0	1309-64-4							
4	arsenic { arsenic pentoxide }				19.2 mg/kg	1.534	23.56 mg/kg	0.00236 %	✓	
	033-004-00-6	215-116-9	1303-28-2							
5	barium { barium sulphide }				238 mg/kg	1.233	234.857 mg/kg	0.0235 %	✓	
	016-002-00-X	244-214-4	21109-95-5							
6	cadmium { cadmium sulfate }				0.182 mg/kg	1.855	0.27 mg/kg	0.000027 %	✓	
	048-009-00-9	233-331-6	10124-36-4							
7	copper { dicopper oxide; copper (I) oxide }				32 mg/kg	1.126	28.823 mg/kg	0.00288 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	44.6 mg/kg		35.68 mg/kg	0.00357 %	✓	
	082-001-00-6									
9	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
10	molybdenum { molybdenum(VI) oxide }				0.503 mg/kg	1.5	0.604 mg/kg	0.0000604 %	✓	
	042-001-00-9	215-204-7	1313-27-5							
11	nickel { nickel sulfate }				44.2 mg/kg	2.637	93.233 mg/kg	0.00932 %	✓	
	028-009-00-5	232-104-9	7786-81-4							
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.11 mg/kg	1.405	1.248 mg/kg	0.000125 %	✓	
	034-002-00-8									
13	zinc { zinc sulphate }				97.5 mg/kg	2.469	192.605 mg/kg	0.0193 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				33.3 mg/kg	1.462	38.936 mg/kg	0.00389 %	✓	
		215-160-9	1308-38-9							



#	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							
15	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
16	naphthalene				<0.009 mg/kg		<0.009 mg/kg	<0.000009 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
17	acenaphthylene				<0.012 mg/kg		<0.012 mg/kg	<0.0000012 %		<LOD
		205-917-1	208-96-8							
18	acenaphthene				<0.008 mg/kg		<0.008 mg/kg	<0.0000008 %		<LOD
		201-469-6	83-32-9							
19	fluorene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-695-5	86-73-7							
20	phenanthrene				<0.015 mg/kg		<0.015 mg/kg	<0.0000015 %		<LOD
		201-581-5	85-01-8							
21	anthracene				<0.016 mg/kg		<0.016 mg/kg	<0.0000016 %		<LOD
		204-371-1	120-12-7							
22	fluoranthene				<0.017 mg/kg		<0.017 mg/kg	<0.0000017 %		<LOD
		205-912-4	206-44-0							
23	pyrene				<0.015 mg/kg		<0.015 mg/kg	<0.0000015 %		<LOD
		204-927-3	129-00-0							
24	benzo[a]anthracene				<0.014 mg/kg		<0.014 mg/kg	<0.0000014 %		<LOD
	601-033-00-9	200-280-6	56-55-3							
25	chrysene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	601-048-00-0	205-923-4	218-01-9							
26	benzo[b]fluoranthene				<0.015 mg/kg		<0.015 mg/kg	<0.0000015 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
27	benzo[k]fluoranthene				<0.014 mg/kg		<0.014 mg/kg	<0.0000014 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
28	benzo[a]pyrene; benzo[def]chrysene				<0.015 mg/kg		<0.015 mg/kg	<0.0000015 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
29	indeno[123-cd]pyrene				<0.018 mg/kg		<0.018 mg/kg	<0.0000018 %		<LOD
		205-893-2	193-39-5							
30	dibenz[a,h]anthracene				<0.023 mg/kg		<0.023 mg/kg	<0.0000023 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
31	benzo[ghi]perylene				<0.024 mg/kg		<0.024 mg/kg	<0.0000024 %		<LOD
		205-883-8	191-24-2							
32	polychlorobiphenyls; PCB				<0.021 mg/kg		<0.021 mg/kg	<0.0000021 %		<LOD
	602-039-00-4	215-648-1	1336-36-3							
33	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.0005 mg/kg		<0.0005 mg/kg	<0.00000005 %		<LOD
	603-181-00-X	216-653-1	1634-04-4							
34	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
35	toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-021-00-3	203-625-9	108-88-3							
36	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
37	coronene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
		205-881-7	191-07-1							
38	pH				8.04 pH		8.04 pH	8.04 pH		
			PH							
39	o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.004 mg/kg		<0.004 mg/kg	<0.0000004 %		<LOD
	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]							
Total:								0.0663 %		



Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
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 HP 3 can be discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

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

Because of determinand:

TPH (C6 to C40) petroleum group: (conc.: 0.00107%)



WAC results for sample: TP07-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"

The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis			Landfill Waste Acceptance Criteria Limits	
#	Determinand	User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	% 1.62	3	5
2	LOI (loss on ignition)	% 6.55	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg <0.007	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg <0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg 6.21	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg <10	100	-
7	pH	pH 8.04	-	>6
8	ANC (acid neutralisation capacity)	mol/kg	-	-
Eluate Analysis 10:1				
9	arsenic	mg/kg 0.0109	0.5	2
10	barium	mg/kg 1.45	20	100
11	cadmium	mg/kg <0.0008	0.04	1
12	chromium	mg/kg 0.0102	0.5	10
13	copper	mg/kg 0.038	2	50
14	mercury	mg/kg <0.0001	0.01	0.2
15	molybdenum	mg/kg <0.03	0.5	10
16	nickel	mg/kg 0.0114	0.4	10
17	lead	mg/kg 0.0074	0.5	10
18	antimony	mg/kg <0.01	0.06	0.7
19	selenium	mg/kg <0.01	0.1	0.5
20	zinc	mg/kg 0.0961	4	50
21	chloride	mg/kg <20	800	15,000
22	fluoride	mg/kg <5	10	150
23	sulphate	mg/kg <20	1,000	20,000
24	phenol index	mg/kg <0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg 61.4	500	800
26	TDS (total dissolved solids)	mg/kg 750	4,000	60,000

Key

User supplied data



Classification of sample: TP09-0.50

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

Sample details

Sample name:	LoW Code:
TP09-0.50	Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:	Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)
0.50 m	
Moisture content:	
15% (wet weight correction)	

Hazard properties

None identified

Determinands

Moisture content: 15% Wet Weight Moisture Correction applied (MC)

#	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							
1	TPH (C6 to C40) petroleum group				<10 mg/kg		<10 mg/kg	<0.001 %		<LOD
2	confirm TPH has NOT arisen from diesel or petrol				<input checked="" type="checkbox"/>					
3	antimony { antimony trioxide }				<0.6 mg/kg	1.197	<0.718 mg/kg	<0.0000718 %		<LOD
	051-005-00-X	215-175-0	1309-64-4							
4	arsenic { arsenic pentoxide }				13 mg/kg	1.534	16.949 mg/kg	0.00169 %	✓	
	033-004-00-6	215-116-9	1303-28-2							
5	barium { barium sulphide }				131 mg/kg	1.233	137.35 mg/kg	0.0137 %	✓	
	016-002-00-X	244-214-4	21109-95-5							
6	cadmium { cadmium sulfate }				0.0533 mg/kg	1.855	0.084 mg/kg	0.0000084 %	✓	
	048-009-00-9	233-331-6	10124-36-4							
7	copper { dicopper oxide; copper (I) oxide }				27.5 mg/kg	1.126	26.318 mg/kg	0.00263 %	✓	
	029-002-00-X	215-270-7	1317-39-1							
8	lead { lead compounds with the exception of those specified elsewhere in this Annex (worst case) }			1	24.5 mg/kg		20.825 mg/kg	0.00208 %	✓	
	082-001-00-6									
9	mercury { mercury dichloride }				<0.1 mg/kg	1.353	<0.135 mg/kg	<0.0000135 %		<LOD
	080-010-00-X	231-299-8	7487-94-7							
10	molybdenum { molybdenum(VI) oxide }				0.354 mg/kg	1.5	0.451 mg/kg	0.0000451 %	✓	
	042-001-00-9	215-204-7	1313-27-5							
11	nickel { nickel sulfate }				40.4 mg/kg	2.637	90.544 mg/kg	0.00905 %	✓	
	028-009-00-5	232-104-9	7786-81-4							
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				1.08 mg/kg	1.405	1.29 mg/kg	0.000129 %	✓	
	034-002-00-8									
13	zinc { zinc sulphate }				69.8 mg/kg	2.469	146.503 mg/kg	0.0147 %	✓	
	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]							
14	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				26.2 mg/kg	1.462	32.549 mg/kg	0.00325 %	✓	
		215-160-9	1308-38-9							



#	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							
15	chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.6 mg/kg	1.923	<1.154 mg/kg	<0.000115 %		<LOD
	024-001-00-0	215-607-8	1333-82-0							
16	naphthalene				<0.009 mg/kg		<0.009 mg/kg	<0.000009 %		<LOD
	601-052-00-2	202-049-5	91-20-3							
17	acenaphthylene				<0.012 mg/kg		<0.012 mg/kg	<0.000012 %		<LOD
		205-917-1	208-96-8							
18	acenaphthene				<0.008 mg/kg		<0.008 mg/kg	<0.000008 %		<LOD
		201-469-6	83-32-9							
19	fluorene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
		201-695-5	86-73-7							
20	phenanthrene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
		201-581-5	85-01-8							
21	anthracene				<0.016 mg/kg		<0.016 mg/kg	<0.000016 %		<LOD
		204-371-1	120-12-7							
22	fluoranthene				<0.017 mg/kg		<0.017 mg/kg	<0.000017 %		<LOD
		205-912-4	206-44-0							
23	pyrene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
		204-927-3	129-00-0							
24	benzo[a]anthracene				<0.014 mg/kg		<0.014 mg/kg	<0.000014 %		<LOD
	601-033-00-9	200-280-6	56-55-3							
25	chrysene				<0.01 mg/kg		<0.01 mg/kg	<0.000001 %		<LOD
	601-048-00-0	205-923-4	218-01-9							
26	benzo[b]fluoranthene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
	601-034-00-4	205-911-9	205-99-2							
27	benzo[k]fluoranthene				<0.014 mg/kg		<0.014 mg/kg	<0.000014 %		<LOD
	601-036-00-5	205-916-6	207-08-9							
28	benzo[a]pyrene; benzo[def]chrysene				<0.015 mg/kg		<0.015 mg/kg	<0.000015 %		<LOD
	601-032-00-3	200-028-5	50-32-8							
29	indeno[123-cd]pyrene				<0.018 mg/kg		<0.018 mg/kg	<0.000018 %		<LOD
		205-893-2	193-39-5							
30	dibenz[a,h]anthracene				<0.023 mg/kg		<0.023 mg/kg	<0.000023 %		<LOD
	601-041-00-2	200-181-8	53-70-3							
31	benzo[ghi]perylene				<0.024 mg/kg		<0.024 mg/kg	<0.000024 %		<LOD
		205-883-8	191-24-2							
32	polychlorobiphenyls; PCB				<0.021 mg/kg		<0.021 mg/kg	<0.000021 %		<LOD
	602-039-00-4	215-648-1	1336-36-3							
33	tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.0005 mg/kg		<0.0005 mg/kg	<0.0000005 %		<LOD
	603-181-00-X	216-653-1	1634-04-4							
34	benzene				<0.001 mg/kg		<0.001 mg/kg	<0.000001 %		<LOD
	601-020-00-8	200-753-7	71-43-2							
35	toluene				0.0015 mg/kg		0.0013 mg/kg	0.00000132 %	✓	
	601-021-00-3	203-625-9	108-88-3							
36	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.000001 %		<LOD
	601-023-00-4	202-849-4	100-41-4							
37	coronene				<0.2 mg/kg		<0.2 mg/kg	<0.00002 %		<LOD
		205-881-7	191-07-1							
38	pH				8.22 pH		8.22 pH	8.22 pH		
			PH							
39	o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.004 mg/kg		<0.004 mg/kg	<0.000004 %		<LOD
	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]							
Total:								0.0485 %		



Key

	User supplied data
	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
•	Determinand defined or amended by HazWasteOnline (see Appendix A)
	Speciated Determinand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
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 HP 3 can be discounted as this is a solid waste without a free draining liquid phase.

Hazard Statements hit:

Flam. Liq. 2; H225 "Highly flammable liquid and vapour."

Because of determinand:

toluene: (conc.: 1.32e-07%)



WAC results for sample: TP09-0.50

WAC Settings: samples in this Job constitute a single population.

WAC limits used to evaluate this sample: "Ireland"

The WAC used in this report are the WAC defined for the inert and non-hazardous classes of landfill in the Republic of Ireland. You should check the actual acceptance criteria when the disposal site is identified as they may differ from the generic WAC used in this report.

The sample PASSES the Inert (Inert waste landfill) criteria.

The sample PASSES the Non Haz (Non hazardous waste landfill) criteria.

WAC Determinands

Solid Waste Analysis			Landfill Waste Acceptance Criteria Limits	
#	Determinand	User entered data	Inert waste landfill	Non hazardous waste landfill
1	TOC (total organic carbon)	% 1.08	3	5
2	LOI (loss on ignition)	% 3.77	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg 0.0015	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg <0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg 10.5	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg <10	100	-
7	pH	pH 8.22	-	>6
8	ANC (acid neutralisation capacity)	mol/kg	-	-
Eluate Analysis 10:1				
9	arsenic	mg/kg 0.0224	0.5	2
10	barium	mg/kg 2	20	100
11	cadmium	mg/kg <0.0008	0.04	1
12	chromium	mg/kg 0.0104	0.5	10
13	copper	mg/kg 0.0597	2	50
14	mercury	mg/kg <0.0001	0.01	0.2
15	molybdenum	mg/kg 0.0504	0.5	10
16	nickel	mg/kg 0.0176	0.4	10
17	lead	mg/kg 0.0053	0.5	10
18	antimony	mg/kg 0.0107	0.06	0.7
19	selenium	mg/kg <0.01	0.1	0.5
20	zinc	mg/kg 0.15	4	50
21	chloride	mg/kg <20	800	15,000
22	fluoride	mg/kg <5	10	150
23	sulphate	mg/kg 118	1,000	20,000
24	phenol index	mg/kg <0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg 81	500	800
26	TDS (total dissolved solids)	mg/kg 1140	4,000	60,000

Key

User supplied data



Appendix A: Classifier defined and non EU CLP determinands

• 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

• confirm TPH has NOT arisen from diesel or petrol

Description/Comments: Chapter 3, section 4b requires a positive confirmation for benzo[a]pyrene to be used as a marker in evaluating Carc. 1B; H350 (HP 7) and Muta. 1B; H340 (HP 11)

Data source: WM3 1st Edition 2015

Data source date: 25 May 2015

Hazard Statements: None.

• 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

• lead compounds with the exception of those specified elsewhere in this Annex (worst case)

EU CLP index number: 082-001-00-6

Description/Comments: Worst Case: IARC considers lead compounds Group 2A; Probably carcinogenic to humans; Lead REACH Consortium, following CLP protocols, considers lead compounds from smelting industries, flue dust and similar to be Carcinogenic category 1A

Additional Hazard Statement(s): Carc. 1A; H350

Reason for additional Hazards Statement(s):

03 Jun 2015 - Carc. 1A; H350 hazard statement sourced from: IARC Group 2A (Sup 7, 87) 2006; Lead REACH Consortium www.reach-lead.eu/substanceinformation.html (worst case lead compounds). Review date 29/09/2015

• 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

• 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

• **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

• **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

• **pH** (CAS Number: PH)

Description/Comments: Appendix C4
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: None.

Appendix B: Rationale for selection of metal species

antimony {antimony trioxide}

Worst case scenario.

arsenic {arsenic pentoxide}

Arsenic pentoxide used as most hazardous species.



barium {barium sulphide}

Chromium VI at limits of detection. Barium sulphide used as the next most hazardous species. No chromate present.

cadmium {cadmium sulfate}

Cadmium sulphate used as the most hazardous species.

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected.

lead {lead compounds with the exception of those specified elsewhere in this Annex (worst case)}

Chromium VI at limits of detection. Lead compounds used as the next most hazardous species. No chromate present.

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight

molybdenum {molybdenum(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight.

nickel {nickel sulfate}

Chromium VI at limits of detection. Nickel sulphate used as the next most hazardous species. No chromate present.

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil.

zinc {zinc sulphate}

Chromium VI at limits of detection. Zinc sulphate used as the next most hazardous species. No chromate present.

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

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments.

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1.NI - Jan 2021

HazWasteOnline Classification Engine Version: 2023.271.5764.10641 (28 Sep 2023)

HazWasteOnline Database: 2023.270.5761.10634 (27 Sep 2023)

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

19th ATP - Regulation (EU) 2023/1434 of 25 April 2023

20th ATP - Regulation (EU) 2023/1435 of 25 2 May 2023

Appendix 10
Survey Data

Survey Data

Location	Irish Transverse Mercator		Elevation	Irish National Grid	
	Easting	Northing		Easting	Northing
Cable Percussive Boreholes					
BH01	705154.790	788192.010	26.66	305226.377	288177.353
BH02	705244.840	788157.690	25.29	305316.447	288143.026
Trial Pits and Dynamic Probes					
TP01	705150.190	788251.450	25.30	305221.776	288236.806
TP02	705197.850	788263.820	24.39	305269.446	288249.179
TP03	705269.880	788263.090	23.41	305341.491	288248.449
TP04	705145.660	788195.690	26.76	305217.245	288181.034
TP05	705184.720	788200.430	24.80	305256.313	288185.775
TP06	705218.760	788197.720	24.29	305290.361	288183.065
TP07	705279.030	788213.920	23.52	305350.643	288199.268
TP08	705175.210	788169.270	25.72	305246.802	288154.608
TP09	705219.910	788166.570	25.20	305291.511	288151.908
TP10	705281.600	788163.560	25.06	305353.214	288148.898
Soakaway Tests					
SA01	705176.360	788245.700	24.82	305247.951	288231.055
SA02	705294.840	788177.130	24.73	305366.457	288162.471
Slit Trenches					
ST01 Start	705281.870	788272.160	24.40	305353.483	288257.521
ST01 End	705273.110	788272.840	23.44	305344.721	288258.201
ST02 Start	705205.050	788175.830	25.15	305276.648	288161.170
ST02 End	705211.670	788174.940	25.05	305283.269	288160.280



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Client : Louth County Council

Engineer : Doherty Finegan Kelly

Project : Ravel, Ardee Road, Dunleer, Co. Louth

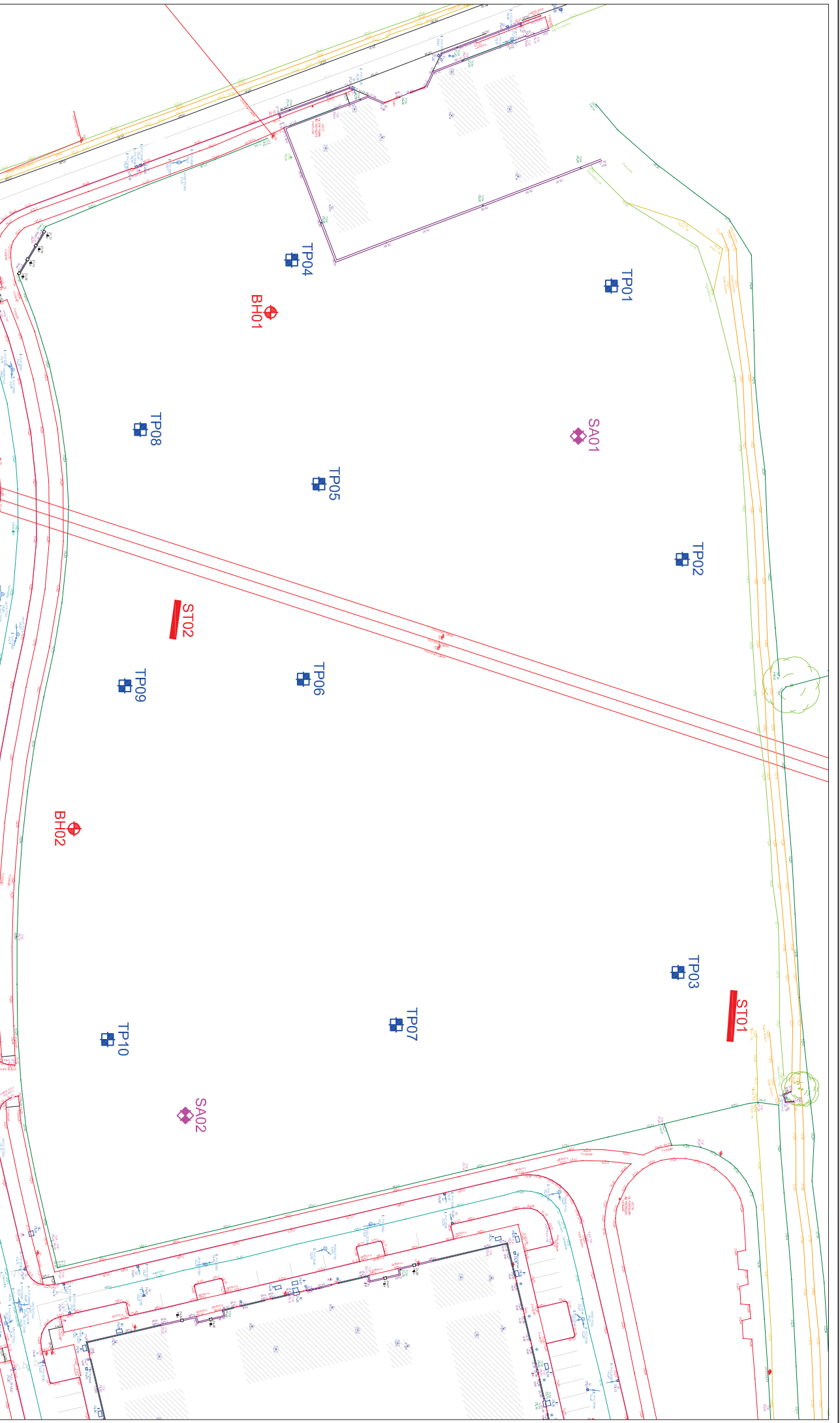
Date : 06-10-2023

Description : Site Investigation

Drawing No. : 6181:01/01

Legend:

-  Cable Percussion Borehole
-  Trial Pit
-  Soakaway Test
-  Silt Trench



Appendix G – Confirmation of Feasibility



CONFIRMATION OF FEASIBILITY

Justin Sexton
Housing Capital Civic Offices
Fair Street
Drogheda
Louth
A92P440

21 July 2023

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

**Our Ref: CDS23002129 Pre-Connection Enquiry
LH-0006, Mullavally, Louth Village, Louth**

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Housing Development of 90 unit(s) at LH-0006, Mullavally, Louth Village, Louth, (the **Development**).

Based upon the details provided we can advise the following regarding connecting to the networks;

- **Water Connection**
 - Feasible Subject to upgrades
 - There is pressure issued noted in the area (Knockfergus Housing Estate). Pressure logging would be required for the entire DMA to identify the condition of the CI Mains and if any restriction near the reservoir or inlet meter which is causing these concerns at Knockfergus. This could be undertaken at Connection Application Stage.

There are two options or a combination of both may be required to improve the pressure at the proposed development. Pressure logging would be required to ascertain the upgrades required.

Upgrading the 100mm CI mains from reservoir would help improve the pressures however, the minimum

pressure that can be achieved at the proposed development is 13.3m (61.3m-48m) assuming no headloss. Which is under the required 15m UE min service level.

Pumping the entire DMA from the reservoir site would help achieve the minimum pressure greater than 15m. However, the CI mains will be subjected to very high headloss.

- **Wastewater Connection** - Feasible without infrastructure upgrade by Irish Water
-

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before the Development can be connected to our network(s) you must submit a connection application and be granted and sign a connection agreement with Irish Water.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

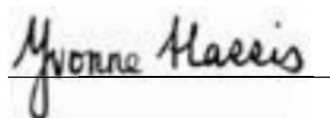
Where can you find more information?

- **Section A** - What is important to know?
- **Section B** - Details of Irish Water's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Irish Water's network(s). This is not a connection offer and capacity in Irish Water's network(s) may only be secured by entering into a connection agreement with Irish Water.

For any further information, visit www.water.ie/connections, email newconnections@water.ie or contact 1800 278 278.

Yours sincerely,



Yvonne Harris

Yvonne Harris
Head of Customer Operations

Section A - What is important to know?

What is important to know?	Why is this important?
<p>Do you need a contract to connect?</p>	<ul style="list-style-type: none"> • Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application <u>and be granted and sign</u> a connection agreement with Irish Water.
<p>When should I submit a Connection Application?</p>	<ul style="list-style-type: none"> • A connection application should only be submitted after planning permission has been granted.
<p>Where can I find information on connection charges?</p>	<ul style="list-style-type: none"> • Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
<p>Who will carry out the connection work?</p>	<ul style="list-style-type: none"> • All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. <p>*Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works</p>
<p>Fire flow Requirements</p>	<ul style="list-style-type: none"> • The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • What to do? - Contact the relevant Local Fire Authority
<p>Plan for disposal of storm water</p>	<ul style="list-style-type: none"> • The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • What to do? - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
<p>Where do I find details of Irish Water's network(s)?</p>	<ul style="list-style-type: none"> • Requests for maps showing Irish Water's network(s) can be submitted to: datarequests@water.ie

<p>What are the design requirements for the connection(s)?</p>	<ul style="list-style-type: none"> • The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this Development shall comply with <i>the Irish Water Connections and Developer Services Standard Details and Codes of Practice</i>, available at www.water.ie/connections
<p>Trade Effluent Licensing</p>	<ul style="list-style-type: none"> • Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ <p>**trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)</p>

Section B – Details of Irish Water’s Network(s)

The map included below outlines the current Irish Water infrastructure adjacent the Development: To access Irish Water Maps email

datarequests@water.ie



Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

Note: The information provided on the included maps as to the position of Irish Water’s underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Irish Water.

Whilst every care has been taken in respect of the information on Irish Water’s network(s), Irish Water assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Irish Water’s underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Irish Water’s underground network(s) is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

Appendix H – Road Safety Audit



23185-01-001

SHD SITES LOUTH - DUNLEER HOUSING

Road Safety Audit Stage 1

for

Hayes Higgins Partnership

April 2024



7, Ormonde Road
Kilkenny.
R95 N4FE

Tel: 056 7795800
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DOCUMENT CONTROL SHEET

Project Title	SHD sites Louth – Dunleer Housing
Project No.	23185-01
Client	Hayes Higgins Partnership
Document Title	Road Safety Audit Stage 1
Document No.	23185-01-001

Status	Author(s)	Reviewed By	Approved By	Issue Date
Draft 1	RB / DD	RB / DD	GF	2/2/24
Draft 2	RB / DD	RB / DD	GF	20/2/24
Final	RB / DD	RB / DD	GF	10/4/2024
	<i>As per Section 3.1</i>			

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1. INTRODUCTION

- 1.1 This report describes a Stage 1 Road Safety Audit carried out at a proposed housing development. The proposed project is off R170 Road, Dunleer, County Louth in the townland of Ravel. The audit was carried out on 13th of February 2024 in the offices of Roadplan Consulting, Kilkenny.
- 1.2 The audit team members were as follows:
 - Ray Butler, BE CEng MIEI
Auditor Number RB210538
 - Dermot Donovan, BE CEng FIEI
Auditor Number DD50250
- 1.3 Dermot Donovan visited the site on the 24th of January 2024. The audit comprised of an examination of the drawings relating to the scheme supplied by Hayes Higgins Partnership and an examination of the site.
- 1.4 The speed limit at the proposed works location on the R170 Road is 50km/h. A speed limit of 30km/h is assumed for the housing estate roads.
- 1.5 This Stage 1 Audit has been carried out in accordance with the relevant sections of TII GE-STY-01024. The team has examined only those issues within the design relating to the road safety implications of the scheme and has therefore not examined or verified the compliance of the design to any other criteria.
- 1.6 All problems described in this report are considered by the audit team to require action in order to improve the safety of the scheme and minimise accident occurrence.
- 1.7 Appendix A contains copies of the audited drawings.

2. STAGE 1 AUDIT

Location: Main access road

2.1 **Problem:** Right angle bends

There are low-radius right-angle bends on the access road. Large vehicles, refuse trucks and the like, may have to mount the footpaths to negotiate the bends putting pedestrians at risk of collisions and injury.



Recommendation:

Carry out an auto track analysis and provide additional width on curves if necessary.

Location: Main access road

2.2 **Problem:** Perpendicular parking

Where perpendicular parking is provided adjacent to a footpath parked vehicles may overhang the path making it difficult for wheelchair users or people with prams to negotiate. They may have to leave the footpath to walk on the roadway putting them at risk of injury from collision with a motor vehicle.





Figure 4.36: An example where a narrow verge is provided to ensure that vehicle overhangs do not intrude on the footway (DMURS)

Recommendation:

Provide a verge of at least 300mm to prevent vehicle overhang.

Location: Throughout

2.3 **Problem:** Unconnected crossings

Crossings are not shown to be provided at some junctions where pedestrians are likely to cross. This may increase the risk of collisions between pedestrians and vehicles. Two examples of such locations are shown in the images below.

**Recommendation:**

Provide adequate crossings, comprising dropped kerbs and tactile paving, at locations where pedestrians are expected to cross in the development.


2.4 Observation: Cycle Parking

Location: Entire Development

Some dwellings are terraced and do not have exterior access to rear gardens. Provision should be made for cycle parking so that bikes need not be wheeled through the dwellings.

3. AUDIT TEAM STATEMENT

3.1 We certify that we have examined the drawings listed in Appendix A and have inspected the site. This examination has been carried out with the sole purpose of identifying any features of the scheme that could be removed or modified to improve the safety of the scheme.

Signed.....  Ray Butler

Date16th February 2024.....

Signed.....  Dermot Donovan

Date16th February 2024.....

4. SAFETY AUDIT FEEDBACK FORM

Scheme: SHD sites Louth – Dunleer Housing


Document Number: 23185-01-001

Audit Stage: Stage 1 RSA

Date Audit Completed: 16th February 2024

Paragraph No. in Safety Audit Report	To Be Completed By Designer			To Be Completed by Audit Team Leader
	Problem accepted (yes/no)	Recommended measure Accepted (yes/no)	Describe alternative measure(s). Give reasons for not accepting recommended measure. Only complete if recommended measure is not accepted.	Alternative measures or reasons accepted by auditors (yes/no)
2.1	Yes	Yes	-----	-----
2.2	Yes	No	Wheel bumps or additional width of sidewalk will be provided	Yes
2.3	Yes	No	Raised table pedestrian crossings will be provided instead of dropped kerbs, for ease of movement of pedestrians	Yes

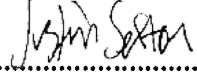
Safety Audit

Signed off  Design Team Leader

Print Name Donal Higgins

Date 20/3/24

Safety Audit

Signed off  Employer

Print Name Justin Sexton

Date 09.04.2024

Safety Audit

Signed off  Audit Team Leader

Print Name Ray Butler

Date 10/4/24

Please complete and return to: Roadplan Consulting,
7, Ormonde Road
Kilkenny
E-mail: info@roadplan.ie

APPENDIX A

List of Drawings Examined

The following drawings have been provided electronically in PDF format by Hayes Higgins and are appended.

Drawing Number	Rev	Drawing Title
01		Proposed Levels Proposed Layout 01
3586-EML-XX-02-DR-A-0003	A	Proposed Site Layout

GENERAL NOTES:

A. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL DRAWINGS, THE SPECIFICATION, AND ALL RELEVANT STANDARD DETAIL DRAWINGS.

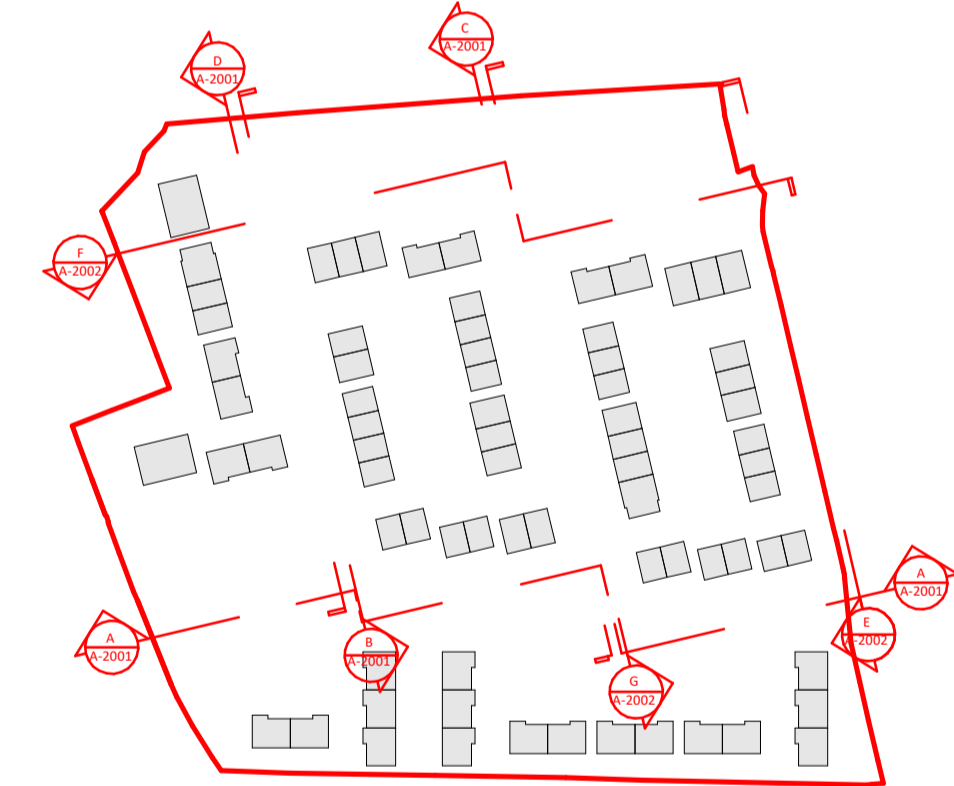
B. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL RELEVANT CIVIL, STRUCTURAL, MECHANICAL AND ELECTRICAL DRAWINGS TOGETHER WITH THE SPECIFICATIONS AND SCHEDULES.

C. ALL DIMENSIONS IN MILLIMETRES. DO NOT SCALE FROM THIS DRAWING. USE FIGURED DIMENSIONS ONLY.

D. CONTRACTOR MUST VERIFY ALL DIMENSIONS ON SITE BEFORE SETTING OUT, COMMENCING WORK, OR PRODUCING ANY SHOP DRAWINGS.



	2 Bed 3 Person Bungalow (UD) - House Type A	- 21no.
	2 Bed 4 Person House - House Type B	- 24no.
	3 Bed 5 Person House - House Type C	- 18no.
	4 Bed 7 Person House (UD) - House Type E	- 2no.
	4 Bed 7 Person House - House Type F	- 3no.
	3 Bed 5 Person House (UD+) - House Type G	- 2no.
Total Unit Numbers		- 70no.
Site Area		- 2.72ha
Density		- 26 dwellings/ha
UD units		- 25no. (36%)
Car Parking Spaces		- 125
Public Open Space		- 16%
	Site Boundary	
	House with in-curtlidge parking	
	Homezone surfacing	



Key plan
Scale 1:2000

Rev	Description	By	Ckd	Date
A	Type D swapped for Type C. Boundary adjustment.	AH	TM	29/1/24

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e ml Job No. **3586** Job Name **Dunleer Housing**

Client **Louth County Council**

Sheet Title **Proposed Site Layout**

Stage **2a**

Suitability **S2 - Suitable for Information**

Date	Scale @ A1	Drawn by	Checked by
29/01/2024	1:500	AH	TM

Drawing No. **3586-EML-XX-02-DR-A-0003** Rev **A**

Project - Originator - Volume - Level - Form - Role - Number

Appendix I – Traffic Impact Assessment



23185-02-002

PROPOSED RESIDENTIAL DEVELOPMENT
AT DUNLEER, Co. LOUTH

Traffic & Impact Assessment

for

Louth County Council

April 2024



7, Ormonde Road
Kilkenny.
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DOCUMENT CONTROL SHEET

Project Title	Proposed Residential Development at Dunleer, Co. Louth
Project No.	23185-01
Client	Louth County Council
Document Title	Traffic Impact Assessment
Document No.	23185-01-002

Status	Author(s)	Reviewed By	Approved By	Issue Date
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Final	RF	DD	GF	11/4/2024

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1. INTRODUCTION

1.1. INTRODUCTION

Roadplan Consulting was commissioned by Hayes Higgins Partnership on behalf of Louth County Council to prepare a Traffic Impact Assessment for a proposed residential development at Dunleer, Co. Louth.

In preparing this report, Roadplan Consulting has made reference to:

- The Louth 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 residential development and the impact of such trips on the operational performance of the local road network and junctions, in particular the existing R170 / Ravel Grange priority junction which provides access to the proposed development.

1.3. STUDY METHODOLOGY

The methodology adopted for this report is summarised as follows:

- Traffic counts were undertaken by Irish Traffic Surveys on Tuesday 20th of February 2024 during a 12-hour period (07:00 to 19:00). Count information was obtained at the existing R170 / Ravel Grange priority junction which provides access to the proposed development.
- 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 PICADY model of the R170 / Ravel Grange priority junction.
- 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 development related traffic was used to assess the future operational performance of the junction at the year of opening of the proposed development, 5 years after opening and 15 years after opening.

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 future development in place;
- Chapter 6 establishes the parking requirements for the development and sets out how these needs are provided for;
- Chapter 7 presents the conclusions of the report.

2. PROPOSED DEVELOPMENT

2.1. SITE LOCATION

The proposed residential development is located at Dunleer, Co. Louth. The proposed development is bounded by residential dwellings to the east, Scoil Bhríde NS to the south, agricultural lands to the north and the R170 regional road to the west as shown on *Figure 2.1 'Site Location Map'*.



Figure 2.1 – Site Location Map

2.2. DESCRIPTION OF PROPOSED DEVELOPMENT

The development will comprise of the construction of 70 no. residential units and all ancillary development works including access roads, footpaths, parking, drainage, landscaping and amenity areas.

A layout of the proposed residential development, its access point and its internal access road is shown on the site plan which is contained in *Appendix A – Drawings*.

3. EXISTING AND PROPOSED TRAFFIC CONDITIONS

3.1. EXISTING TRAFFIC FLOWS

A traffic count was undertaken by Irish Traffic Surveys on Tuesday 20th of February 2024 during a 12-hour period (07:00 to 19:00). The count data is provided in *Appendix B – Traffic Counts*. Count information was obtained at the following junction:

- R170 / Ravel Grange priority junction

The traffic flows during the AM and PM peak hours were abstracted from the surveyed data and are shown in the following tables.

R170 / Ravel Grange Priority Junction

2024 AM Peak – Base Flows

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	2	86	88
Ravel Grange	11	0	21	32
R170 (south)	57	2	0	59
Totals	68	4	107	179

2024 PM Peak – Base Flows

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	3	64	67
Ravel Grange	4	0	15	19
R170 (south)	99	4	0	103
Totals	103	7	79	189

3.2. EXISTING ROAD NETWORK

Access to the proposed residential development will be via the R170 regional road and the existing Ravel Grange housing estate access road. The R170 regional road and the Ravel Grange access road has the following characteristics at the access to the proposed residential development:

R170 Regional Road

- It is a single carriageway road that varies in width from 5.5m to 6m wide.
- There is a footpath provided on the eastern side of the R170 which provides pedestrian access to Dunleer town.
- Street lighting is provided along the R170.
- The R170 is governed by a 50km/h speed limit at the access to Ravel Grange.

Ravel Grange Access Road

- It is a single carriageway road that is 5.5m wide.
- There is a footpath provided on either side of the existing access road.
- Street lighting is provided along the existing access road.
- Ravel Grange access road is governed by a 50km/h speed limit.

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 Residential

The category of “Residential – Local Authority Houses” 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 No. of Units

	Trip rate to development	Trip rate from development
AM Peak	0.112	0.246
PM Peak	0.246	0.164

For the proposed 70 residential units, this would give the following trips to and from the proposed development.

Trip Generation – 70 Dwellings

	Trip rate to development	Trip rate from development
AM Peak	8	18
PM Peak	18	12

4.2. TRIP DISTRIBUTION

Vehicular trips to and from the proposed residential development will arrive / depart via the existing R170 / Ravel Grange priority junction. It is assumed that the distribution of development traffic at the proposed access will follow the same pattern as the distribution of existing traffic at the existing R170 / Ravel Grange priority junction.

The following diagram shows the proposed traffic distribution percentage for the AM and PM peak at the existing R170 / Ravel Grange priority junction.

AM Peak - Development Trip Distribution (Percentage)

PM Peak - Development Trip Distribution (Percentage)

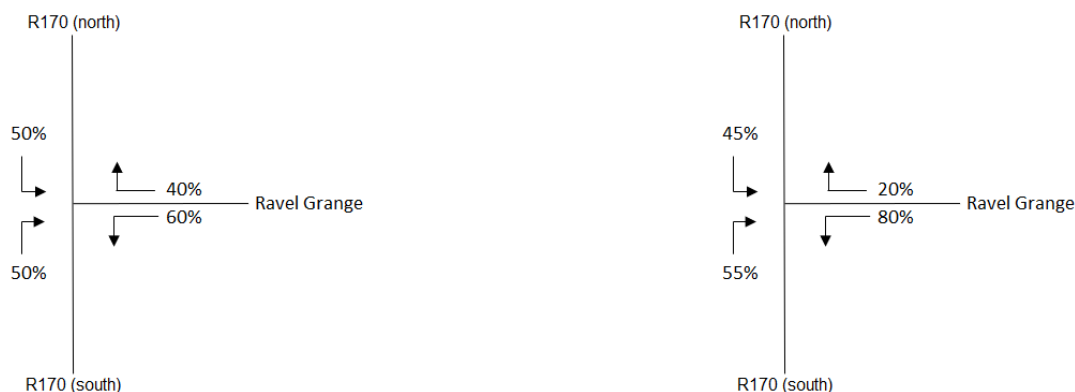
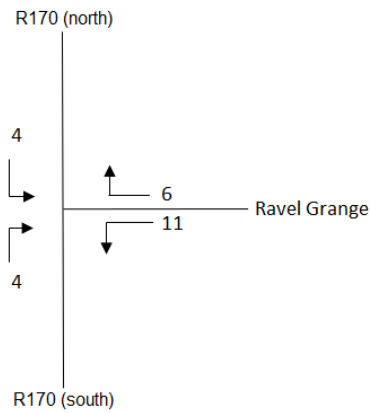


Figure 4.1 – Existing traffic distribution percentage

Using the proposed directional splits shown above and the trips generated by the proposed residential development outlined in 4.1, the following diagrams show the turning

movements of predicted development traffic at the R170 / Ravel Grange priority junction during the AM and PM peak hours.

AM Peak - Development Trip Distribution



PM Peak - Development Trip Distribution

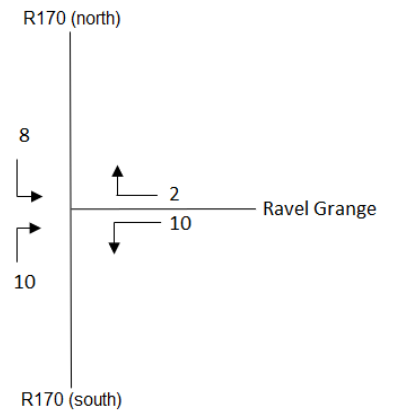


Figure 4.2 – Proposed traffic distribution percentage

4.3. FUTURE YEAR TRAFFIC GROWTH

The TII issues a range of forecasts: low growth, medium growth and high growth. Due to the location and nature of the proposed residential development, and given the recent economic expansion, we have used medium growth factors in our assessment.

The zone in which the site is located is number 169 in the TII National Traffic Model. The medium growth factors for each assessment year are as follows.

Zone	2024 Base Year	2026 Development Completion	2031 5 years after dev. completion	2041 15 years after dev. completion
169	1.00	3.81%	13.97%	16.13%

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:

- R170 / ravel Grange priority junction

5.2. R170 / RAVEL GRANGE PRIORITY JUNCTION

A capacity assessment has been undertaken using the computer program PICADY for the AM and PM peak hours.

The following table summarises the effects that the proposed development will have on this junction in 2026, 2031 and 2041 using the existing and predicted traffic flows shown in Appendix C – Traffic Flow Sheets. Full PICADY printouts are provided in Appendix E – PICADY Results.

The parameters shown in the tables 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 practical 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.

Total Delay is the total number of vehicle hours of delay to all vehicles at the junction over the time period

Year	Period	Approach	Predicted RFC value	Avg Queue (vehicles)	Queue delay (secs./veh.)
2024 Base Flows	AM Peak	R170 (north)	-	-	-
		Ravel Grange	0.06	0	7
		R170 (south)	0.00	0	5
	PM Peak	R170 (north)	-	-	-
		Ravel Grange	0.04	0	7
		R170 (south)	0.01	0	5
2026 No Development	AM Peak	R170 (north)	-	-	-
		Ravel Grange	0.07	0	7
		R170 (south)	0.00	0	5
	PM Peak	R170 (north)	-	-	-
		Ravel Grange	0.04	0	7
		R170 (south)	0.01	0	5
2026 With Development	AM Peak	R170 (north)	-	-	-
		Ravel Grange	0.10	0	7
		R170 (south)	0.01	0	5
	PM Peak	R170 (north)	-	-	-
		Ravel Grange	0.06	0	7
		R170 (south)	0.03	0	5
2031 No Development	AM Peak	R170 (north)	-	-	-
		Ravel Grange	0.08	0	7
		R170 (south)	0.00	0	5
	PM Peak	R170 (north)	-	-	-
		Ravel Grange	0.04	0	7
		R170 (south)	0.01	0	5
2031	AM Peak	R170 (north)	-	-	-

Year	Period	Approach	Predicted RFC value	Avg Queue (vehicles)	Queue delay (secs./veh.)
With Development		Ravel Grange	0.11	0	8
		R170 (south)	0.01	0	5
	PM Peak	R170 (north)	-	-	-
		Ravel Grange	0.07	0	7
		R170 (south)	0.03	0	5
2041 No Development	AM Peak	R170 (north)	-	-	-
		Ravel Grange	0.11	0	8
		R170 (south)	0.01	0	5
	PM Peak	R170 (north)	-	-	-
		Ravel Grange	0.04	0	7
		R170 (south)	0.01	0	5
2041 With Development	AM Peak	R170 (north)	-	-	-
		Ravel Grange	0.11	0	8
		R170 (south)	0.01	0	5
	PM Peak	R170 (north)	-	-	-
		Ravel Grange	0.07	0	7
		R170 (south)	0.03	0	5

At present the existing R170 / Ravel Grange priority junction operates within capacity with no queues and minimal delays during the AM and PM peak period.

In 2026, 2031 and 2041 with an increase in background flows and no development the existing R170 / Ravel Grange priority junction will operate within capacity with no queues and minimal delays during the AM and PM peak period.

In 2026, 2031 and 2041 with an increase in background flows and the proposed residential development complete the existing R170 / Ravel Grange priority junction junction will operate within capacity with no queues and minimal delays during the AM and PM peak period.

6. PARKING

6.1. CAR PARKING PROVISION

A total of 125 car 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 'Louth County Development Plan 2021-2027' lists standard provision for car parking and the table below sets out those requirements in relation to the residential development.

<i>Parking Standards for Residential Development</i>			
Land-use	Requirements	Quantity	Parking
Residential	1 car space per unit	70 Dwellings	70 spaces
Total			70 spaces

Table 6.1 – Car parking requirements from the Louth County Development Plan

The Louth County Development Plan indicates that the number of parking spaces required for the proposed residential development is 70 parking spaces.

It is proposed to provide a total of 125 car parking spaces which will cater for the proposed residential development.

6.3. BICYCLE PARKING REQUIREMENTS FROM DEVELOPMENT PLAN

The 'Louth County Development Plan 2021-2027' lists standard provision for bicycle parking and the table below sets out those requirements in relation to the residential development.

<i>Parking Standards for Residential Development</i>			
Land-use	Requirements	Quantity	Parking
Residential	1 bicycle space per unit + 1 space per 5 units for visitors	70 Dwellings	70 spaces + 14 spaces
Total			84 spaces

Table 6.2 – Bicycle parking requirements from the Louth County Development Plan

The Louth County Development Plan indicates that the number of bicycle parking spaces required for the proposed residential development is 84 bicycle parking spaces.

It is proposed to provide a total of 84 bicycle parking spaces which will cater for the proposed residential development.

7. CONCLUSIONS

The main conclusions of this study are summarised as follows:

- At present the existing R170 / Ravel Grange priority junction operates within capacity with no queues and minimal delays during the AM and PM peak period.
- Capacity analysis of the existing R170 / Ravel Grange priority junction indicates that in 2026, 2031 and 2041 with an increase in background flows and no residential development the existing R170 / Ravel Grange priority junction will operate within capacity with no queues and minimal delays during the AM and PM peak period.
- Capacity analysis of the existing R170 / Ravel Grange priority junction indicates that in 2026, 2031 and 2041 with an increase in background flows and the proposed residential development operational the existing R170 / Ravel Grange priority junction will operate within capacity with no queues and minimal delays during the AM and PM peak period.
- The development provides adequate car parking spaces and bicycle space as set-out in Chapter 6 above.
- Facilities for pedestrians are included in the internal layout.

APPENDICES

APPENDIX A – DRAWINGS

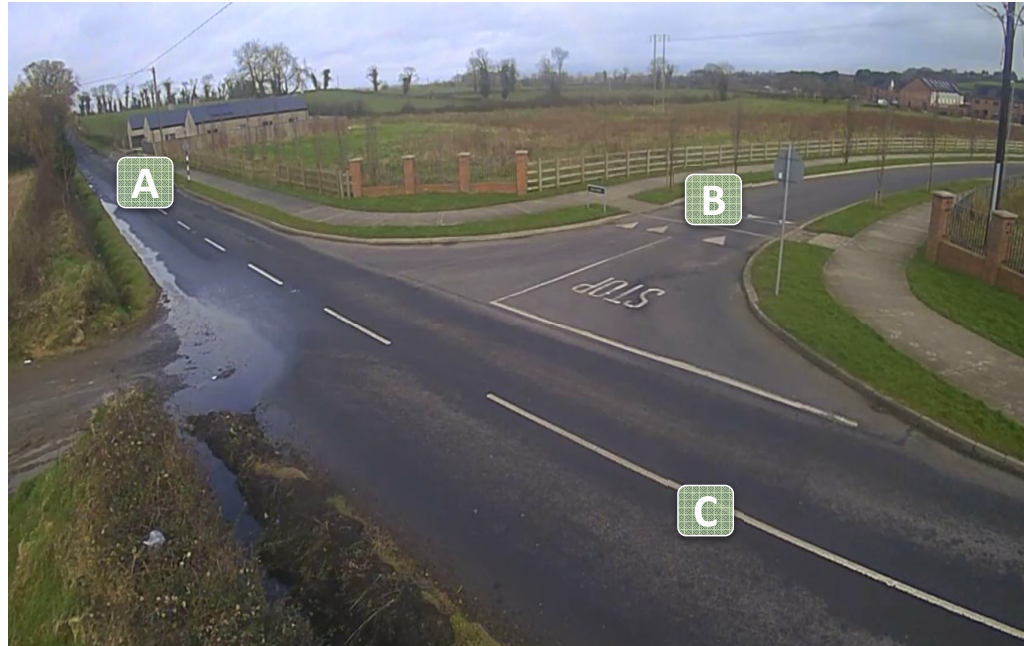
APPENDIX B – TRAFFIC COUNTS

Irish Traffic Surveys LTD

Survey Name : ITS J-822 Dunleer
Site: JTC 1
Date: 20.02.2024
Time: 07:00-19:00
Location: 53.832088, -6.402696
Classification: CAR, LGV, OGV1, OGV2, PSV, MC, PC



Site 1 Cam T12 View



Aerial View



Co-ordinates:	53.832088, -6.402696
Junction Type:	3-Arm
Queues Required:	No
Pedestrian required:	No

Irish Traffic Surveys LTD

Survey Name : ITS J-822 Dunleer
 Site: JTC 1
 Date: 20.02.2024
 Time: 07:00-19:00
 Location: 53.832088, -6.402696
 Classification: CAR, LGV, OGV1, OGV2, PSV, MC, PC

TIME	A to A								A to B								A to C							
	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT
07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
07:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	8
07:30	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	12	1	0	0	0	0	0	13
07:45	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	24	2	0	1	0	0	0	27
H/TOT	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	47	3	0	1	0	0	0	51
08:00	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	14	2	0	0	0	0	0	16
08:15	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	10	2	1	0	0	0	0	13
08:30	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	19	1	1	0	0	0	0	21
08:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	27	0	0	0	0	0	0	27
H/TOT	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	70	5	2	0	0	0	0	77
09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	1	0	0	1	0	0	25
09:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	0	1	0	0	0	0	13
09:30	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	9	0	0	0	0	0	0	9
09:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	5
H/TOT	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	47	3	1	0	1	0	0	52
10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	3	1	0	0	0	11
10:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
10:30	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	10	3	1	0	0	0	0	14
10:45	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	9	0	0	0	0	0	1	10
H/TOT	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	29	3	4	1	0	0	1	38
11:00	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	9	1	1	0	0	0	0	11
11:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	0	0	0	0	0	5
11:30	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	7	2	0	0	0	0	0	9
11:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	2	1	0	0	0	1	12
H/TOT	1	0	0	0	0	0	0	1	2	0	0	0	0	0	0	2	27	7	2	0	0	0	1	37
12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	6
12:15	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	10	0	0	0	0	0	0	10
12:30	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	6	0	0	0	0	0	0	6
12:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	2	0	0	0	0	0	7
H/TOT	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	26	3	0	0	0	0	0	29
13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	3	0	0	0	1	0	8
13:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0	7
13:30	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	10	3	0	0	0	0	0	13
13:45	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	12	0	0	0	0	0	0	12
H/TOT	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3	32	7	0	0	0	1	0	40
14:00	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	15	2	0	0	0	0	0	17
14:15	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	12	1	0	0	0	0	0	13
14:30	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	7	0	0	0	0	0	0	7
14:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	16	0	0	0	1	0	0	17
H/TOT	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	50	3	0	0	1	0	0	54
15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	20	1	0	0	0	0	0	21
15:15	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2	14	4	0	0	0	0	0	18
15:30	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	8	2	0	0	0	0	0	10
15:45	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3	7	3	0	0	0	0	0	10
H/TOT	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	6	49	10	0	0	0	0	0	59
16:00	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4	9	2	0	0	0	0	0	11
16:15	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	10	0	0	0	0	0	0	10
16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	14	4	1	0	1	0	0	20
16:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	3	0	0	0	0	0	16
H/TOT	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	46	9	1	0	1	0	0	57
17:00	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	3	13	5	0	0	0	0	0	18
17:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1	0	0	0	0	0	10
17:30	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	9	0	0	0	1	0	0	10
17:45	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	20	1	0	0	0	0	0	21
H/TOT	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0	7	51	7	0	0	1	0	0	59
18:00	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2	5	0	0	0	0	0	0	5
18:15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	0	0	0	0	1	0	12
18:30	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3	10	0	0	0	0	0	0	10
18:45	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	9
H/TOT	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5	35	0	0	0	0	1	0	36
12 HR TOT	1	0	0	0	0	0	0	1	39	4	0	0	0	0	0	43	509	60	10	2	4	2	2	589

B to A								B to B								B to C							
CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	2	0	1	0	0	0	0	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
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
5	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	3	0	1	0	0	0	0	4
3	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	6
6	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	6
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	6
12	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	20	1	0	0	0	0	0	21
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
3	1	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	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	0	4
6	1	0	0	0	0	0	7	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	9
3	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
3	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	5	1	0	0	0	0	0	6
1	0	0	0	0	0	0	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	3	1	0	0	0	0	0	4
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	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
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	4	2	0	0	0	0	0	6
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
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2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
2	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	11
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	3
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	8
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1	0	0	0	0	0	7
0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	3	1	0	0	0	0	0	4
4	1	0	0	0	0	0	5	0	0	0	0	0	0	0	0	11	3	0	0	0	0	0	14
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5
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2	1	0	0	0	0	0	3	0	0	0	0	0	0	0	0	3	1	0	0	0	0	1	5
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	2
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	0	0	0	0	0	5
3	1	0	0	0	0	0	4	0	0	0	0	0	0	0	0	13	3	0	0	0	0	1	17
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	4
1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5
2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	5
5	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	15
51	4	0	0	0	0	0	55	0	0	0	0	0	0	0	0	118	12	1	0	0	0	1	132

C to A								C to B								C to C							
CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT	CAR	LGV	OGV1	OGV2	PSV	M/C	P/C	TOT
6	1	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	0	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	1	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
32	1	0	0	1	0	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	2	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	3	0	1	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
8	0	1	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	2	0	0	0	0	0	12	1	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0
34	7	1	1	0	0	0	43	1	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0
17	4	0	0	0	0	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	1	0	0	0	0	0	14	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	0	3	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
7	1	1	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
44	6	4	0	0	0	0	54	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	2	1	0	0	0	0	6	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
8	0	0	0	0	0	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	5	1	0	0	0	0	0	0	1	0	0	1	0	0	0	0	1
1	2	1	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
17	4	2	0	0	0	0	23	2	0	0	0	0	0	0	2	0	0	1	0	0	0	0	1
3	0	1	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
3	1	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
4	0	0	0	0	0	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	0	0	0	0	0	0	9	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
19	1	1	0	0	0	0	21	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
10	1	0	0	0	0	0	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	1	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	0	0	0	0	0	12	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
8	4	0	0	0	0	1	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
36	6	0	0	0	0	1	43	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
6	1	0	0	0	0	0	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
11	4	1	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
9	1	0	0	0	0	1	11	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
36	6	1	0	0	0	1	44	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	13	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
7	2	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	1	1	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1
40	3	1	0	0	0	0	44	2	0	0	0	0	0	0	2	1	0	0	0	0	0	0	1
14	0	0	0	1	0	0	15	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0
15	4	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
15	1	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
18	0	0	1	0	0	0	19	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
62	5	0	1	1	0	0	69	1	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0
25	2	2	0	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
13	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
38	3	1	0	0	0	0	42	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
13	1	0	0	0	0	0	14	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	1
89	6	3	0	0	0	0	98	2	0	0	0	0	0	0	2	1	0	0	0	0	0	0	1
19	8	0	0	0	0	0	27	0	1	0	0	0	0	1	2	0	0	0	0	0	0	0	0
11	5	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	3	0	0	0	0	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
12	0	1	0	0	0	0	13	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
54	16	1	0	0	0	0	71	2	1	0	0	0	0	1	4	0	0	0	0	0	0	0	0
14	0	0	0	0	0	0	14	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
10	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	2
8	0	0	0	0	0	0	8	2	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
5	0	0	0	0	0	0	5	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
37	0	0	0	0	0	0	37	5	0	0	0	0	0	0	5	2	0	0	0	0	0	0	2
500	61	14	2	2	0	2	581	19	3	0	0	0	0	1	23	4	0	1	0	0	0	0	5

APPENDIX C – TRAFFIC FLOW SHEETS

R170 / Ravel Grange Priority Junction - AM Peak Hour

2023 AM Peak - Base Flows

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	2	86	88
Ravel Grange	11	0	21	32
R170 (south)	57	2	0	59
Totals	68	4	107	179

AM Peak - Development flows

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	4	0	4
Ravel Grange	6	0	11	17
R170 (south)	0	4	0	4
Totals	6	8	11	25

2026 AM Peak - No Development (Existing + 2.81%)

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	2	88	90
Ravel Grange	11	0	22	33
R170 (south)	59	2	0	61
Totals	70	4	110	184

2026 AM Peak - With Development

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	6	88	94
Ravel Grange	17	0	33	50
R170 (south)	59	6	0	65
Totals	76	12	121	209

2031 AM Peak - No Development (Existing + 13.97%)

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	2	98	100
Ravel Grange	13	0	24	36
R170 (south)	65	2	0	67
Totals	77	5	122	204

2031 AM Peak - With Development

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	6	98	104
Ravel Grange	19	0	35	53
R170 (south)	65	6	0	71
Totals	83	13	133	229

2041 AM Peak - No Development (Existing + 16.13%)

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	2	100	102
Ravel Grange	13	0	24	37
R170 (south)	66	2	0	69
Totals	79	5	124	208

2041 AM Peak - With Development

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	6	100	106
Ravel Grange	19	0	35	54
R170 (south)	66	6	0	73
Totals	85	13	135	233

R170 / Ravel Grange Priority Junction - PM Peak Hour

2023 PM Peak - Base Flows

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	3	64	67
Ravel Grange	4	0	15	19
R170 (south)	99	4	0	103
Totals	103	7	79	189

PM Peak - Development flows

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	8	0	8
Ravel Grange	2	0	10	12
R170 (south)	0	10	0	10
Totals	2	18	10	30

2026 PM Peak - No Development (Existing + 2.81%)

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	3	66	69
Ravel Grange	4	0	15	20
R170 (south)	102	4	0	106
Totals	106	7	81	194

2026 PM Peak - With Development

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	11	66	77
Ravel Grange	6	0	25	32
R170 (south)	102	14	0	116
Totals	108	25	91	224

2031 PM Peak - No Development (Existing + 13.97%)

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	3	73	76
Ravel Grange	5	0	17	22
R170 (south)	113	5	0	117
Totals	117	8	90	215

2031 PM Peak - With Development

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	11	73	84
Ravel Grange	7	0	27	34
R170 (south)	113	15	0	127
Totals	119	26	100	245

2041 PM Peak - No Development (Existing + 16.13%)

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	3	74	78
Ravel Grange	5	0	17	22
R170 (south)	115	5	0	120
Totals	120	8	92	219

2041 PM Peak - With Development

From / To	R170 (north)	Ravel Grange	R170 (south)	Totals
R170 (north)	0	11	74	86
Ravel Grange	7	0	27	34
R170 (south)	115	15	0	130
Totals	122	26	102	249

APPENDIX D – TRICS INFORMATION

Calculation Reference: AUDIT-619801-240206-0204

TRIP RATE CALCULATION SELECTION PARAMETERS:

Land Use : 03 - RESIDENTIAL
Category : B - AFFORDABLE/LOCAL AUTHORITY HOUSES
TOTAL VEHICLES

Selected regions and areas:

13	MUNSTER	
	TI TIPPERARY	2 days
15	GREATER DUBLIN	
	DL DUBLIN	2 days

This section displays the number of survey days per TRICS® sub-region in the selected set

Primary Filtering selection:

This data displays the chosen trip rate parameter and its selected range. Only sites that fall within the parameter range are included in the trip rate calculation.

Parameter: No of Dwellings
Actual Range: 8 to 48 (units:)
Range Selected by User: 8 to 120 (units:)

Parking Spaces Range: All Surveys Included

Parking Spaces per Dwelling Range: All Surveys Included

Bedrooms per Dwelling Range: All Surveys Included

Percentage of dwellings privately owned: All Surveys Included

Public Transport Provision:

Selection by: Include all surveys

Date Range: 01/01/15 to 20/11/17

This data displays the range of survey dates selected. Only surveys that were conducted within this date range are included in the trip rate calculation.

Selected survey days:

Monday 2 days
Tuesday 1 days
Friday 1 days

This data displays the number of selected surveys by day of the week.

Selected survey types:

Manual count 4 days
Directional ATC Count 0 days

This data displays the number of manual classified surveys and the number of unclassified ATC surveys, the total adding up to the overall number of surveys in the selected set. Manual surveys are undertaken using staff, whilst ATC surveys are undertaken using machines.

Selected Locations:

Suburban Area (PPS6 Out of Centre) 3
Neighbourhood Centre (PPS6 Local Centre) 1

This data displays the number of surveys per main location category within the selected set. The main location categories consist of Free Standing, Edge of Town, Suburban Area, Neighbourhood Centre, Edge of Town Centre, Town Centre and Not Known.

Selected Location Sub Categories:

Residential Zone 4

This data displays the number of surveys per location sub-category within the selected set. The location sub-categories consist of Commercial Zone, Industrial Zone, Development Zone, Residential Zone, Retail Zone, Built-Up Zone, Village, Out of Town, High Street and No Sub Category.

Inclusion of Servicing Vehicles Counts:

Servicing vehicles Included X days - Selected
Servicing vehicles Excluded 4 days - Selected

Secondary Filtering selection:

Use Class:

C3 4 days

This data displays the number of surveys per Use Class classification within the selected set. The Use Classes Order (England) 2020 has been used for this purpose, which can be found within the Library module of TRICS@.

Population within 500m Range:

All Surveys Included

Secondary Filtering selection (Cont.):

Population within 1 mile:

1,001 to 5,000	1 days
5,001 to 10,000	2 days
15,001 to 20,000	1 days

This data displays the number of selected surveys within stated 1-mile radii of population.

Population within 5 miles:

5,001 to 25,000	2 days
250,001 to 500,000	1 days
500,001 or More	1 days

This data displays the number of selected surveys within stated 5-mile radii of population.

Car ownership within 5 miles:

0.6 to 1.0	3 days
1.1 to 1.5	1 days

This data displays the number of selected surveys within stated ranges of average cars owned per residential dwelling, within a radius of 5-miles of selected survey sites.

Travel Plan:

No	4 days
----	--------

This data displays the number of surveys within the selected set that were undertaken at sites with Travel Plans in place, and the number of surveys that were undertaken at sites without Travel Plans.

PTAL Rating:

No PTAL Present	4 days
-----------------	--------

This data displays the number of selected surveys with PTAL Ratings.

TRIP RATE for Land Use 03 - RESIDENTIAL/B - AFFORDABLE/LOCAL AUTHORITY HOUSES
 TOTAL VEHICLES
 Calculation factor: 1 DWELLS
 BOLD print indicates peak (busiest) period

Time Range	ARRIVALS			DEPARTURES			TOTALS		
	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	34	0.075	4	34	0.157	4	34	0.232
08:00 - 09:00	4	34	0.112	4	34	0.246	4	34	0.358
09:00 - 10:00	4	34	0.157	4	34	0.231	4	34	0.388
10:00 - 11:00	4	34	0.209	4	34	0.157	4	34	0.366
11:00 - 12:00	4	34	0.194	4	34	0.224	4	34	0.418
12:00 - 13:00	4	34	0.254	4	34	0.149	4	34	0.403
13:00 - 14:00	4	34	0.142	4	34	0.224	4	34	0.366
14:00 - 15:00	4	34	0.239	4	34	0.194	4	34	0.433
15:00 - 16:00	4	34	0.284	4	34	0.254	4	34	0.538
16:00 - 17:00	4	34	0.246	4	34	0.164	4	34	0.410
17:00 - 18:00	4	34	0.388	4	34	0.269	4	34	0.657
18:00 - 19:00	4	34	0.246	4	34	0.209	4	34	0.455
19:00 - 20:00									
20:00 - 21:00									
21:00 - 22:00									
22:00 - 23:00									
23:00 - 24:00									
Total Rates:			2.546			2.478			5.024

This section displays the trip rate results based on the selected set of surveys and the selected count type (shown just above the table). It is split by three main columns, representing arrivals trips, departures trips, and total trips (arrivals plus departures). Within each of these main columns are three sub-columns. These display the number of survey days where count data is included (per time period), the average value of the selected trip rate calculation parameter (per time period), and the trip rate result (per time period). Total trip rates (the sum of the column) are also displayed at the foot of the table.

*To obtain a trip rate, the average (mean) trip rate parameter value (TRP) is first calculated for all selected survey days that have count data available for the stated time period. The average (mean) number of arrivals, departures or totals (whichever applies) is also calculated (COUNT) for all selected survey days that have count data available for the stated time period. Then, the average count is divided by the average trip rate parameter value, and multiplied by the stated calculation factor (shown just above the table and abbreviated here as FACT). So, the method is: COUNT/TRP*FACT. Trip rates are then rounded to 3 decimal places.*

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Parameter summary

Trip rate parameter range selected: 8 - 48 (units:)
 Survey date range: 01/01/15 - 20/11/17
 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

This section displays a quick summary of some of the data filtering selections made by the TRICS® user. The trip rate calculation parameter range of all selected surveys is displayed first, followed by the range of minimum and maximum survey dates selected by the user. Then, the total number of selected weekdays and weekend days in the selected set of surveys are shown. Finally, the number of survey days that have been manually removed from the selected set outside of the standard filtering procedure are displayed.

APPENDIX E – PICADY RESULTS

<h1>Junctions 9</h1>
<h2>PICADY 9 - Priority Intersection Module</h2>
Version: 9.5.0.6896 © Copyright TRL Limited, 2018
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: Existing Junction.j9

Path: S:\Jobs\2023\23185 3 x SHD sites Louth RSA1 + TIA\23185-01 Dunleer\Reports\Working\PICADY

Report generation date: 01/03/2024 12:24:58

- »2024, AM
- »2024, PM
- »2026 no dev, AM
- »2026 no dev, PM
- »2026 with dev, AM
- »2026 with dev, PM
- »2031 no dev, AM
- »2031 no dev, PM
- »2031 with dev, AM
- »2031 with dev, PM
- »2041 no dev, AM
- »2041 no dev, PM
- »2041 with dev, AM
- »2041 with dev, PM

Summary of junction performance

	AM				PM			
	Queue (Veh)	Delay (s)	RFC	LOS	Queue (Veh)	Delay (s)	RFC	LOS
2024								
Stream B-AC	0.1	7.03	0.06	A	0.0	6.52	0.04	A
Stream C-AB	0.0	5.38	0.00	A	0.0	5.20	0.01	A
2026 no dev								
Stream B-AC	0.1	7.03	0.07	A	0.0	6.53	0.04	A
Stream C-AB	0.0	5.37	0.00	A	0.0	5.20	0.01	A
2026 with dev								
Stream B-AC	0.1	7.33	0.10	A	0.1	6.67	0.06	A
Stream C-AB	0.0	5.41	0.01	A	0.0	5.27	0.03	A
2031 no dev								
Stream B-AC	0.1	7.18	0.08	A	0.0	6.63	0.04	A
Stream C-AB	0.0	5.37	0.00	A	0.0	5.17	0.01	A
2031 with dev								
Stream B-AC	0.1	7.48	0.11	A	0.1	6.77	0.07	A
Stream C-AB	0.0	5.40	0.01	A	0.0	5.25	0.03	A
2041 no dev								
Stream B-AC	0.1	7.19	0.08	A	0.0	6.64	0.04	A
Stream C-AB	0.0	5.36	0.00	A	0.0	5.16	0.01	A
2041 with dev								
Stream B-AC	0.1	7.49	0.11	A	0.1	6.78	0.07	A
Stream C-AB	0.0	5.40	0.01	A	0.0	5.24	0.03	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	01/03/2024
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	2024	AM	ONE HOUR	07:45	09:15	15	✓
D2	2024	PM	ONE HOUR	16:45	18:15	15	✓
D3	2026 no dev	AM	ONE HOUR	07:45	09:15	15	✓
D4	2026 no dev	PM	ONE HOUR	16:45	18:15	15	✓
D5	2026 with dev	AM	ONE HOUR	07:45	09:15	15	✓
D6	2026 with dev	PM	ONE HOUR	16:45	18:15	15	✓
D7	2031 no dev	AM	ONE HOUR	07:45	09:15	15	✓
D8	2031 no dev	PM	ONE HOUR	16:45	18:15	15	✓
D9	2031 with dev	AM	ONE HOUR	07:45	09:15	15	✓
D10	2031 with dev	PM	ONE HOUR	16:45	18:15	15	✓
D11	2041 no dev	AM	ONE HOUR	07:45	09:15	15	✓
D12	2041 no dev	PM	ONE HOUR	16:45	18:15	15	✓
D13	2041 with dev	AM	ONE HOUR	07:45	09:15	15	✓
D14	2041 with dev	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

2024, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		1.32	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Arms

Arms

Arm	Name	Description	Arm type
A	untitled		Major
B	untitled		Minor
C	untitled		Major

Major Arm Geometry

Arm	Width of carriageway (m)	Has kerbed central reserve	Has right turn bay	Visibility for right turn (m)	Blocks?	Blocking queue (PCU)
C	5.50			150.0	✓	0.00

Geometries for Arm C are measured opposite Arm B. Geometries for Arm A (if relevant) are measured opposite Arm D.

Minor Arm Geometry

Arm	Minor arm type	Lane width (m)	Visibility to left (m)	Visibility to right (m)
B	One lane	3.00	15	15

Slope / Intercept / Capacity

Priority Intersection Slopes and Intercepts

Junction	Stream	Intercept (Veh/hr)	Slope for A-B	Slope for A-C	Slope for C-A	Slope for C-B
1	B-A	490	0.091	0.230	0.145	0.329
1	B-C	633	0.099	0.251	-	-
1	C-B	661	0.262	0.262	-	-

The slopes and intercepts shown above do NOT include any corrections or adjustments.

Streams may be combined, in which case capacity will be adjusted.

Values are shown for the first time segment only; they may differ for subsequent time segments.

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D1	2024	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	88	100.000
B		ONE HOUR	✓	32	100.000
C		ONE HOUR	✓	59	100.000

Origin-Destination Data

Demand (Veh/hr)

	To			
	A	B	C	
From	A	0	2	86
	B	11	0	21
	C	57	2	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
	A	B	C	
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.06	7.03	0.1	A	29	44
C-AB	0.00	5.38	0.0	A	2	3
C-A					52	78
A-B					2	3
A-C					79	118

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	24	6	556	0.043	24	0.0	0.0	6.762	A
C-AB	2	0.40	671	0.002	2	0.0	0.0	5.376	A
C-A	43	11			43				
A-B	2	0.38			2				
A-C	65	16			65				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	29	7	552	0.052	29	0.0	0.1	6.873	A
C-AB	2	0.49	673	0.003	2	0.0	0.0	5.362	A
C-A	51	13			51				
A-B	2	0.45			2				
A-C	77	19			77				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	35	9	547	0.064	35	0.1	0.1	7.030	A
C-AB	2	0.61	676	0.004	2	0.0	0.0	5.343	A
C-A	63	16			63				
A-B	2	0.55			2				
A-C	95	24			95				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	35	9	547	0.064	35	0.1	0.1	7.030	A
C-AB	2	0.61	676	0.004	2	0.0	0.0	5.345	A
C-A	63	16			63				
A-B	2	0.55			2				
A-C	95	24			95				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	29	7	552	0.052	29	0.1	0.1	6.877	A
C-AB	2	0.49	673	0.003	2	0.0	0.0	5.365	A
C-A	51	13			51				
A-B	2	0.45			2				
A-C	77	19			77				

09:00 - 09:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	24	6	556	0.043	24	0.1	0.0	6.768	A
C-AB	2	0.40	671	0.002	2	0.0	0.0	5.376	A
C-A	43	11			43				
A-B	2	0.38			2				
A-C	65	16			65				

2024, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.78	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	2024	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	67	100.000
B		ONE HOUR	✓	19	100.000
C		ONE HOUR	✓	103	100.000

Origin-Destination Data

Demand (Veh/hr)

From	To		
	A	B	C
A	0	3	64
B	4	0	15
C	99	4	0

Vehicle Mix

Heavy Vehicle Percentages

From	To		
	A	B	C
A	0	0	0
B	0	0	0
C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.04	6.52	0.0	A	17	26
C-AB	0.01	5.20	0.0	A	4	6
C-A					90	135
A-B					3	4
A-C					59	88

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	14	4	581	0.025	14	0.0	0.0	6.355	A
C-AB	3	0.84	695	0.005	3	0.0	0.0	5.201	A
C-A	74	19			74				
A-B	2	0.56			2				
A-C	48	12			48				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	17	4	578	0.030	17	0.0	0.0	6.422	A
C-AB	4	1	702	0.006	4	0.0	0.0	5.156	A
C-A	88	22			88				
A-B	3	0.67			3				
A-C	58	14			58				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	21	5	573	0.036	21	0.0	0.0	6.517	A
C-AB	5	1	712	0.007	5	0.0	0.0	5.095	A
C-A	108	27			108				
A-B	3	0.83			3				
A-C	70	18			70				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	21	5	573	0.036	21	0.0	0.0	6.517	A
C-AB	5	1	712	0.007	5	0.0	0.0	5.097	A
C-A	108	27			108				
A-B	3	0.83			3				
A-C	70	18			70				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	17	4	578	0.030	17	0.0	0.0	6.425	A
C-AB	4	1	702	0.006	4	0.0	0.0	5.156	A
C-A	88	22			88				
A-B	3	0.67			3				
A-C	58	14			58				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	14	4	581	0.025	14	0.0	0.0	6.358	A
C-AB	3	0.84	695	0.005	3	0.0	0.0	5.204	A
C-A	74	19			74				
A-B	2	0.56			2				
A-C	48	12			48				

2026 no dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		1.32	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D3	2026 no dev	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	90	100.000
B		ONE HOUR	✓	33	100.000
C		ONE HOUR	✓	61	100.000

Origin-Destination Data

Demand (Veh/hr)

	To			
	A	B	C	
From	A	0	2	88
	B	11	0	22
	C	59	2	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
	A	B	C	
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.07	7.03	0.1	A	30	45
C-AB	0.00	5.37	0.0	A	2	3
C-A					54	81
A-B					2	3
A-C					81	121

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	25	6	557	0.045	25	0.0	0.0	6.756	A
C-AB	2	0.40	672	0.002	2	0.0	0.0	5.372	A
C-A	44	11			44				
A-B	2	0.38			2				
A-C	66	17			66				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	30	7	554	0.054	30	0.0	0.1	6.870	A
C-AB	2	0.49	674	0.003	2	0.0	0.0	5.357	A
C-A	53	13			53				
A-B	2	0.45			2				
A-C	79	20			79				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	36	9	548	0.066	36	0.1	0.1	7.031	A
C-AB	2	0.61	677	0.004	2	0.0	0.0	5.336	A
C-A	65	16			65				
A-B	2	0.55			2				
A-C	97	24			97				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	36	9	548	0.066	36	0.1	0.1	7.031	A
C-AB	2	0.61	677	0.004	2	0.0	0.0	5.338	A
C-A	65	16			65				
A-B	2	0.55			2				
A-C	97	24			97				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	30	7	554	0.054	30	0.1	0.1	6.872	A
C-AB	2	0.49	674	0.003	2	0.0	0.0	5.357	A
C-A	53	13			53				
A-B	2	0.45			2				
A-C	79	20			79				

09:00 - 09:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	25	6	557	0.045	25	0.1	0.0	6.760	A
C-AB	2	0.40	672	0.002	2	0.0	0.0	5.374	A
C-A	44	11			44				
A-B	2	0.38			2				
A-C	66	17			66				

2026 no dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.76	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D4	2026 no dev	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	69	100.000
B		ONE HOUR	✓	19	100.000
C		ONE HOUR	✓	106	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	B	C
From	A	0	3	66
	B	4	0	15
	C	102	4	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.04	6.53	0.0	A	17	26
C-AB	0.01	5.20	0.0	A	4	6
C-A					93	140
A-B					3	4
A-C					61	91

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	14	4	580	0.025	14	0.0	0.0	6.361	A
C-AB	3	0.85	696	0.005	3	0.0	0.0	5.194	A
C-A	76	19			76				
A-B	2	0.56			2				
A-C	50	12			50				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	17	4	577	0.030	17	0.0	0.0	6.429	A
C-AB	4	1	703	0.006	4	0.0	0.0	5.147	A
C-A	91	23			91				
A-B	3	0.67			3				
A-C	59	15			59				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	21	5	573	0.037	21	0.0	0.0	6.525	A
C-AB	5	1	713	0.007	5	0.0	0.0	5.083	A
C-A	111	28			111				
A-B	3	0.83			3				
A-C	73	18			73				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	21	5	573	0.037	21	0.0	0.0	6.525	A
C-AB	5	1	713	0.007	5	0.0	0.0	5.085	A
C-A	111	28			111				
A-B	3	0.83			3				
A-C	73	18			73				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	17	4	577	0.030	17	0.0	0.0	6.429	A
C-AB	4	1	703	0.006	4	0.0	0.0	5.149	A
C-A	91	23			91				
A-B	3	0.67			3				
A-C	59	15			59				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	14	4	580	0.025	14	0.0	0.0	6.364	A
C-AB	3	0.85	696	0.005	3	0.0	0.0	5.196	A
C-A	76	19			76				
A-B	2	0.56			2				
A-C	50	12			50				

2026 with dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		1.92	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
D5	2026 with dev	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	94	100.000
B		ONE HOUR	✓	50	100.000
C		ONE HOUR	✓	65	100.000

Origin-Destination Data

Demand (Veh/hr)

From	To		
	A	B	C
A	0	6	88
B	17	0	33
C	59	6	0

Vehicle Mix

Heavy Vehicle Percentages

From	To		
	A	B	C
A	0	0	0
B	0	0	0
C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.10	7.33	0.1	A	46	69
C-AB	0.01	5.41	0.0	A	6	9
C-A					54	80
A-B					6	8
A-C					81	121

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	38	9	556	0.068	37	0.0	0.1	6.944	A
C-AB	5	1	671	0.007	5	0.0	0.0	5.404	A
C-A	44	11			44				
A-B	5	1			5				
A-C	66	17			66				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	45	11	552	0.082	45	0.1	0.1	7.105	A
C-AB	6	1	673	0.009	6	0.0	0.0	5.396	A
C-A	53	13			53				
A-B	5	1			5				
A-C	79	20			79				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	55	14	546	0.101	55	0.1	0.1	7.331	A
C-AB	7	2	676	0.011	7	0.0	0.0	5.384	A
C-A	64	16			64				
A-B	7	2			7				
A-C	97	24			97				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	55	14	546	0.101	55	0.1	0.1	7.331	A
C-AB	7	2	676	0.011	7	0.0	0.0	5.386	A
C-A	64	16			64				
A-B	7	2			7				
A-C	97	24			97				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	45	11	552	0.082	45	0.1	0.1	7.110	A
C-AB	6	1	673	0.009	6	0.0	0.0	5.398	A
C-A	53	13			53				
A-B	5	1			5				
A-C	79	20			79				

09:00 - 09:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	38	9	556	0.068	38	0.1	0.1	6.954	A
C-AB	5	1	671	0.007	5	0.0	0.0	5.406	A
C-A	44	11			44				
A-B	5	1			5				
A-C	66	17			66				

2026 with dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		1.31	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
D6	2026 with dev	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	77	100.000
B		ONE HOUR	✓	31	100.000
C		ONE HOUR	✓	116	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	B	C
From	A	0	11	66
	B	6	0	25
	C	102	14	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.06	6.67	0.1	A	28	43
C-AB	0.03	5.27	0.0	A	15	22
C-A					92	137
A-B					10	15
A-C					61	91

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	23	6	582	0.040	23	0.0	0.0	6.441	A
C-AB	12	3	695	0.017	12	0.0	0.0	5.269	A
C-A	75	19			75				
A-B	8	2			8				
A-C	50	12			50				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	28	7	578	0.048	28	0.0	0.1	6.537	A
C-AB	14	4	702	0.021	14	0.0	0.0	5.238	A
C-A	90	22			90				
A-B	10	2			10				
A-C	59	15			59				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	34	9	574	0.059	34	0.1	0.1	6.670	A
C-AB	18	5	711	0.026	18	0.0	0.0	5.195	A
C-A	109	27			109				
A-B	12	3			12				
A-C	73	18			73				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	34	9	574	0.059	34	0.1	0.1	6.671	A
C-AB	18	5	711	0.026	18	0.0	0.0	5.198	A
C-A	109	27			109				
A-B	12	3			12				
A-C	73	18			73				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	28	7	578	0.048	28	0.1	0.1	6.541	A
C-AB	14	4	702	0.021	15	0.0	0.0	5.238	A
C-A	90	22			90				
A-B	10	2			10				
A-C	59	15			59				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	23	6	582	0.040	23	0.1	0.0	6.447	A
C-AB	12	3	695	0.017	12	0.0	0.0	5.272	A
C-A	75	19			75				
A-B	8	2			8				
A-C	50	12			50				

2031 no dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		1.36	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	2031 no dev	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	100	100.000
B		ONE HOUR	✓	37	100.000
C		ONE HOUR	✓	67	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	B	C
From	A	0	2	98
	B	13	0	24
	C	65	2	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.08	7.18	0.1	A	34	51
C-AB	0.00	5.37	0.0	A	2	3
C-A					59	89
A-B					2	3
A-C					90	135

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	28	7	552	0.050	28	0.0	0.1	6.856	A
C-AB	2	0.41	673	0.002	2	0.0	0.0	5.364	A
C-A	49	12			49				
A-B	2	0.38			2				
A-C	74	18			74				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	33	8	548	0.061	33	0.1	0.1	6.992	A
C-AB	2	0.49	675	0.003	2	0.0	0.0	5.347	A
C-A	58	15			58				
A-B	2	0.45			2				
A-C	88	22			88				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	41	10	542	0.075	41	0.1	0.1	7.179	A
C-AB	2	0.62	678	0.004	2	0.0	0.0	5.324	A
C-A	71	18			71				
A-B	2	0.55			2				
A-C	108	27			108				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	41	10	542	0.075	41	0.1	0.1	7.179	A
C-AB	2	0.62	678	0.004	2	0.0	0.0	5.324	A
C-A	71	18			71				
A-B	2	0.55			2				
A-C	108	27			108				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	33	8	548	0.061	33	0.1	0.1	6.996	A
C-AB	2	0.49	675	0.003	2	0.0	0.0	5.350	A
C-A	58	15			58				
A-B	2	0.45			2				
A-C	88	22			88				

09:00 - 09:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	28	7	552	0.050	28	0.1	0.1	6.867	A
C-AB	2	0.41	673	0.002	2	0.0	0.0	5.366	A
C-A	49	12			49				
A-B	2	0.38			2				
A-C	74	18			74				

2031 no dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.82	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	2031 no dev	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	76	100.000
B		ONE HOUR	✓	22	100.000
C		ONE HOUR	✓	118	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	B	C
From	A	0	3	73
	B	5	0	17
	C	113	5	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.04	6.63	0.0	A	20	30
C-AB	0.01	5.17	0.0	A	5	8
C-A					103	154
A-B					3	4
A-C					67	100

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	17	4	575	0.029	16	0.0	0.0	6.438	A
C-AB	4	1	700	0.006	4	0.0	0.0	5.170	A
C-A	85	21			85				
A-B	2	0.56			2				
A-C	55	14			55				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	20	5	572	0.035	20	0.0	0.0	6.521	A
C-AB	5	1	708	0.007	5	0.0	0.0	5.120	A
C-A	101	25			101				
A-B	3	0.67			3				
A-C	66	16			66				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	24	6	567	0.043	24	0.0	0.0	6.634	A
C-AB	7	2	719	0.009	7	0.0	0.0	5.051	A
C-A	123	31			123				
A-B	3	0.83			3				
A-C	80	20			80				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	24	6	567	0.043	24	0.0	0.0	6.634	A
C-AB	7	2	719	0.009	7	0.0	0.0	5.053	A
C-A	123	31			123				
A-B	3	0.83			3				
A-C	80	20			80				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	20	5	572	0.035	20	0.0	0.0	6.524	A
C-AB	5	1	708	0.007	5	0.0	0.0	5.122	A
C-A	101	25			101				
A-B	3	0.67			3				
A-C	66	16			66				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	17	4	575	0.029	17	0.0	0.0	6.442	A
C-AB	4	1	700	0.006	4	0.0	0.0	5.171	A
C-A	85	21			85				
A-B	2	0.56			2				
A-C	55	14			55				

2031 with dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		1.92	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
D9	2031 with dev	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	104	100.000
B		ONE HOUR	✓	54	100.000
C		ONE HOUR	✓	71	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	B	C
From	A	0	6	98
	B	19	0	35
	C	65	6	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.11	7.48	0.1	A	50	74
C-AB	0.01	5.40	0.0	A	6	9
C-A					59	89
A-B					6	8
A-C					90	135

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	41	10	551	0.074	40	0.0	0.1	7.038	A
C-AB	5	1	672	0.007	5	0.0	0.0	5.396	A
C-A	49	12			49				
A-B	5	1			5				
A-C	74	18			74				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	49	12	547	0.089	48	0.1	0.1	7.221	A
C-AB	6	1	674	0.009	6	0.0	0.0	5.386	A
C-A	58	14			58				
A-B	5	1			5				
A-C	88	22			88				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	59	15	541	0.110	59	0.1	0.1	7.473	A
C-AB	7	2	677	0.011	7	0.0	0.0	5.372	A
C-A	71	18			71				
A-B	7	2			7				
A-C	108	27			108				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	59	15	541	0.110	59	0.1	0.1	7.476	A
C-AB	7	2	677	0.011	7	0.0	0.0	5.375	A
C-A	71	18			71				
A-B	7	2			7				
A-C	108	27			108				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	49	12	547	0.089	49	0.1	0.1	7.226	A
C-AB	6	1	674	0.009	6	0.0	0.0	5.389	A
C-A	58	14			58				
A-B	5	1			5				
A-C	88	22			88				

09:00 - 09:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	41	10	551	0.074	41	0.1	0.1	7.051	A
C-AB	5	1	672	0.007	5	0.0	0.0	5.399	A
C-A	49	12			49				
A-B	5	1			5				
A-C	74	18			74				

2031 with dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		1.31	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
D10	2031 with dev	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	84	100.000
B		ONE HOUR	✓	34	100.000
C		ONE HOUR	✓	128	100.000

Origin-Destination Data

Demand (Veh/hr)

From	To		
	A	B	C
A	0	11	73
B	7	0	27
C	113	15	0

Vehicle Mix

Heavy Vehicle Percentages

From	To		
	A	B	C
A	0	0	0
B	0	0	0
C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.07	6.77	0.1	A	31	47
C-AB	0.03	5.25	0.0	A	16	24
C-A					101	152
A-B					10	15
A-C					67	100

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	26	6	578	0.044	25	0.0	0.0	6.515	A
C-AB	13	3	699	0.018	13	0.0	0.0	5.246	A
C-A	84	21			84				
A-B	8	2			8				
A-C	55	14			55				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	31	8	574	0.053	31	0.0	0.1	6.623	A
C-AB	16	4	706	0.022	16	0.0	0.0	5.211	A
C-A	99	25			99				
A-B	10	2			10				
A-C	66	16			66				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	37	9	569	0.066	37	0.1	0.1	6.775	A
C-AB	20	5	717	0.028	20	0.0	0.0	5.164	A
C-A	121	30			121				
A-B	12	3			12				
A-C	80	20			80				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	37	9	569	0.066	37	0.1	0.1	6.775	A
C-AB	20	5	717	0.028	20	0.0	0.0	5.164	A
C-A	121	30			121				
A-B	12	3			12				
A-C	80	20			80				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	31	8	574	0.053	31	0.1	0.1	6.627	A
C-AB	16	4	706	0.022	16	0.0	0.0	5.212	A
C-A	99	25			99				
A-B	10	2			10				
A-C	66	16			66				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	26	6	578	0.044	26	0.1	0.0	6.521	A
C-AB	13	3	699	0.018	13	0.0	0.0	5.247	A
C-A	83	21			83				
A-B	8	2			8				
A-C	55	14			55				

2041 no dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		1.34	A

Junction Network Options

Driving side	Lighting
Left	Normal/unknown

Traffic Demand

Demand Set Details

ID	Scenario name	Time Period name	Traffic profile type	Start time (HH:mm)	Finish time (HH:mm)	Time segment length (min)	Run automatically
D11	2041 no dev	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	102	100.000
B		ONE HOUR	✓	37	100.000
C		ONE HOUR	✓	68	100.000

Origin-Destination Data

Demand (Veh/hr)

		To		
		A	B	C
From	A	0	2	100
	B	13	0	24
	C	66	2	0

Vehicle Mix

Heavy Vehicle Percentages

		To		
		A	B	C
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.08	7.19	0.1	A	34	51
C-AB	0.00	5.36	0.0	A	2	3
C-A					60	91
A-B					2	3
A-C					92	138

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	28	7	552	0.050	28	0.0	0.1	6.862	A
C-AB	2	0.41	673	0.002	2	0.0	0.0	5.363	A
C-A	50	12			50				
A-B	2	0.38			2				
A-C	75	19			75				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	33	8	548	0.061	33	0.1	0.1	6.999	A
C-AB	2	0.49	675	0.003	2	0.0	0.0	5.346	A
C-A	59	15			59				
A-B	2	0.45			2				
A-C	90	22			90				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	41	10	542	0.075	41	0.1	0.1	7.188	A
C-AB	2	0.62	679	0.004	2	0.0	0.0	5.323	A
C-A	72	18			72				
A-B	2	0.55			2				
A-C	110	28			110				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	41	10	542	0.075	41	0.1	0.1	7.188	A
C-AB	2	0.62	679	0.004	2	0.0	0.0	5.323	A
C-A	72	18			72				
A-B	2	0.55			2				
A-C	110	28			110				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	33	8	548	0.061	33	0.1	0.1	7.003	A
C-AB	2	0.49	675	0.003	2	0.0	0.0	5.349	A
C-A	59	15			59				
A-B	2	0.45			2				
A-C	90	22			90				

09:00 - 09:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	28	7	552	0.050	28	0.1	0.1	6.872	A
C-AB	2	0.41	673	0.002	2	0.0	0.0	5.363	A
C-A	50	12			50				
A-B	2	0.38			2				
A-C	75	19			75				

2041 no dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		0.81	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	2041 no dev	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	77	100.000
B		ONE HOUR	✓	22	100.000
C		ONE HOUR	✓	120	100.000

Origin-Destination Data

Demand (Veh/hr)

From	To		
	A	B	C
A	0	3	74
B	5	0	17
C	115	5	0

Vehicle Mix

Heavy Vehicle Percentages

From	To		
	A	B	C
A	0	0	0
B	0	0	0
C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.04	6.64	0.0	A	20	30
C-AB	0.01	5.16	0.0	A	5	8
C-A					105	157
A-B					3	4
A-C					68	102

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	17	4	575	0.029	16	0.0	0.0	6.441	A
C-AB	4	1	701	0.006	4	0.0	0.0	5.165	A
C-A	86	22			86				
A-B	2	0.56			2				
A-C	56	14			56				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	20	5	571	0.035	20	0.0	0.0	6.524	A
C-AB	5	1	709	0.007	5	0.0	0.0	5.113	A
C-A	103	26			103				
A-B	3	0.67			3				
A-C	67	17			67				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	24	6	566	0.043	24	0.0	0.0	6.639	A
C-AB	7	2	720	0.009	7	0.0	0.0	5.043	A
C-A	125	31			125				
A-B	3	0.83			3				
A-C	81	20			81				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	24	6	566	0.043	24	0.0	0.0	6.639	A
C-AB	7	2	720	0.009	7	0.0	0.0	5.043	A
C-A	125	31			125				
A-B	3	0.83			3				
A-C	81	20			81				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	20	5	571	0.035	20	0.0	0.0	6.528	A
C-AB	5	1	709	0.007	5	0.0	0.0	5.115	A
C-A	103	26			103				
A-B	3	0.67			3				
A-C	67	17			67				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	17	4	575	0.029	17	0.0	0.0	6.445	A
C-AB	4	1	701	0.006	4	0.0	0.0	5.165	A
C-A	86	22			86				
A-B	2	0.56			2				
A-C	56	14			56				

2041 with dev, AM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		1.90	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	2041 with dev	AM	ONE HOUR	07:45	09:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	106	100.000
B		ONE HOUR	✓	54	100.000
C		ONE HOUR	✓	72	100.000

Origin-Destination Data

Demand (Veh/hr)

	To			
	A	B	C	
From	A	0	6	100
	B	19	0	35
	C	66	6	0

Vehicle Mix

Heavy Vehicle Percentages

	To			
	A	B	C	
From	A	0	0	0
	B	0	0	0
	C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.11	7.49	0.1	A	50	74
C-AB	0.01	5.40	0.0	A	6	9
C-A					60	90
A-B					6	8
A-C					92	138

Main Results for each time segment

07:45 - 08:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	41	10	551	0.074	40	0.0	0.1	7.044	A
C-AB	5	1	672	0.007	5	0.0	0.0	5.395	A
C-A	49	12			49				
A-B	5	1			5				
A-C	75	19			75				

08:00 - 08:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	49	12	547	0.089	48	0.1	0.1	7.228	A
C-AB	6	1	674	0.009	6	0.0	0.0	5.385	A
C-A	59	15			59				
A-B	5	1			5				
A-C	90	22			90				

08:15 - 08:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	59	15	540	0.110	59	0.1	0.1	7.483	A
C-AB	7	2	678	0.011	7	0.0	0.0	5.371	A
C-A	72	18			72				
A-B	7	2			7				
A-C	110	28			110				

08:30 - 08:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	59	15	540	0.110	59	0.1	0.1	7.486	A
C-AB	7	2	678	0.011	7	0.0	0.0	5.373	A
C-A	72	18			72				
A-B	7	2			7				
A-C	110	28			110				

08:45 - 09:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	49	12	547	0.089	49	0.1	0.1	7.231	A
C-AB	6	1	674	0.009	6	0.0	0.0	5.386	A
C-A	59	15			59				
A-B	5	1			5				
A-C	90	22			90				

09:00 - 09:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	41	10	551	0.074	41	0.1	0.1	7.054	A
C-AB	5	1	672	0.007	5	0.0	0.0	5.396	A
C-A	49	12			49				
A-B	5	1			5				
A-C	75	19			75				

2041 with dev, PM

Data Errors and Warnings

Severity	Area	Item	Description
Warning	Major arm width	Arm C - Major arm geometry	For two-way major roads, please interpret results with caution if the total major carriageway width is less than 6m.
Warning	Vehicle Mix		HV% is zero for all movements / time segments. Vehicle Mix matrix should be completed whether working in PCUs or Vehs. If HV% at the junction is genuinely zero, please ignore this warning.

Junction Network

Junctions

Junction	Name	Junction type	Major road direction	Use circulating lanes	Junction Delay (s)	Junction LOS
1	untitled	T-Junction	Two-way		1.30	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	2041 with dev	PM	ONE HOUR	16:45	18:15	15	✓

Vehicle mix varies over turn	Vehicle mix varies over entry	Vehicle mix source	PCU Factor for a HV (PCU)
✓	✓	HV Percentages	2.00

Demand overview (Traffic)

Arm	Linked arm	Profile type	Use O-D data	Average Demand (Veh/hr)	Scaling Factor (%)
A		ONE HOUR	✓	85	100.000
B		ONE HOUR	✓	34	100.000
C		ONE HOUR	✓	130	100.000

Origin-Destination Data

Demand (Veh/hr)

From	To		
	A	B	C
A	0	11	74
B	7	0	27
C	115	15	0

Vehicle Mix

Heavy Vehicle Percentages

From	To		
	A	B	C
A	0	0	0
B	0	0	0
C	0	0	0

Results

Results Summary for whole modelled period

Stream	Max RFC	Max Delay (s)	Max Queue (Veh)	Max LOS	Average Demand (Veh/hr)	Total Junction Arrivals (Veh)
B-AC	0.07	6.78	0.1	A	31	47
C-AB	0.03	5.24	0.0	A	16	24
C-A					103	155
A-B					10	15
A-C					68	102

Main Results for each time segment

16:45 - 17:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	26	6	578	0.044	25	0.0	0.0	6.518	A
C-AB	13	3	700	0.018	13	0.0	0.0	5.241	A
C-A	85	21			85				
A-B	8	2			8				
A-C	56	14			56				

17:00 - 17:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	31	8	574	0.053	31	0.0	0.1	6.627	A
C-AB	16	4	707	0.022	16	0.0	0.0	5.204	A
C-A	101	25			101				
A-B	10	2			10				
A-C	67	17			67				

17:15 - 17:30

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	37	9	568	0.066	37	0.1	0.1	6.780	A
C-AB	20	5	718	0.028	20	0.0	0.0	5.156	A
C-A	123	31			123				
A-B	12	3			12				
A-C	81	20			81				

17:30 - 17:45

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	37	9	568	0.066	37	0.1	0.1	6.780	A
C-AB	20	5	718	0.028	20	0.0	0.0	5.156	A
C-A	123	31			123				
A-B	12	3			12				
A-C	81	20			81				

17:45 - 18:00

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	31	8	574	0.053	31	0.1	0.1	6.628	A
C-AB	16	4	707	0.022	16	0.0	0.0	5.205	A
C-A	101	25			101				
A-B	10	2			10				
A-C	67	17			67				

18:00 - 18:15

Stream	Total Demand (Veh/hr)	Junction Arrivals (Veh)	Capacity (Veh/hr)	RFC	Throughput (Veh/hr)	Start queue (Veh)	End queue (Veh)	Delay (s)	Unsignalised level of service
B-AC	26	6	578	0.044	26	0.1	0.0	6.524	A
C-AB	13	3	700	0.018	13	0.0	0.0	5.241	A
C-A	85	21			85				
A-B	8	2			8				
A-C	56	14			56				

Appendix J – SUDS / Green Infrastructure Feasibility Checklist



SUDS/Green Infrastructure feasibility checklist – 23D048 – February 2024

SuDS Measures	Measures to be used on this site	Rationale for selecting/not selecting measure
Source Control		
Swales	N	There is limited suitable space within the site for same.
Tree Pits	Y	Tree pits will be included in landscape design. Not included in the SuDS calculations, given the poor infiltration rate on site, but they will contribute.
Rainwater Butts	TBC	Usage will be reviewed with architect and client.
Rainwater harvesting	TBC	Will be reviewed with the architect and client to see if it is a viable option.
Soakaways	N	Not viable due to impermeable ground conditions
Infiltration trenches	N	Not required.
Permeable pavement	N	Permeable surfacing will not be provided to allow infiltration directly to the ground due to the impermeable ground conditions.
Green Roofs	N	Not viable due to nature of development
Filter strips	N	Filter strips maybe included in landscape design. Not included in the SuDS calculations, due to the impermeable ground conditions, but they will contribute.
Bio-retention systems/Raingardens	Y	Raingardens may be included in landscape design. Not included in the SuDS calculations, due to the impermeable ground conditions, but they will contribute in a small way.
Blue Roofs	N	Not cost effective over the lifespan due to maintenance.
Filter Drain	N	Not currently proposed.
Site Control		
Detention Basins	N	No available room on site for large bodies of water and poses a potential drowning hazard.
Retentions basins	N	No available room on site for large bodies of water and poses a potential drowning hazard.
Regional Control		
Ponds	N	No available room on site for large bodies of water and poses a potential drowning hazard
Wetlands	N	No available room on site for large bodies of water and poses a potential drowning hazard.
Other		
Petrol/Oil interceptor	Y	Included in overall drainage design
Attenuation tank – only as a last resort where other measures are not feasible	Y	Provided on site. Site storage for 1/100 storm + 20% climate change with hydrobrake connection to mains.

Appendix K – DMURS Statement of Consistency





HAYES HIGGINS PARTNERSHIP
CHARTERED ENGINEERS • PROJECT MANAGERS

DMURS Statement of Consistency

For

Development at Ravel, Dunleer, Co. Louth

Louth County Council



Comhairle Contae **Lú**
Louth County Council

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Contents

1. Introduction
2. Smarter Travel
3. Creating a Better Environment
4. Key Design Principles
5. Conclusion



DOCUMENT CONTROL SHEET

	Client	Louth County Council							
	Project Title	Development at Ravel, Dunleer, Community Facilities & Associated Works via Modern Methods of Construction							
	Project Ref.	23D046							
	Document Title	DMURS Statement of Consistency							
	Document No.	23D046							
	This Document Comprises	DCS	PD	TOC	Text	-	-	-	Appendices
		1	-	1	5				0
Check									

Revision	Status	Author	Reviewed By	Approved By	Issue Dates
P	S 179 A	RM	LM	DH	April 2024



1. Introduction

Hayes Higgins Partnership has been commissioned to prepare a DMURS Statement of Consistency alongside a Civil Engineering Services Report for the proposed development at Ravel, Dunleer, County Louth.

The site is located at Ravel, Dunleer, County Louth. The existing site is a greenfield site measuring approximately 3.17 ha and is zoned A1 Existing Residential/A2 New Residential/G1 Community Facilities. The site is bound by residential units to the east, a primary school to the south, agricultural lands to the north & the R170 road/existing housing to the west. Resident car parking is provided within the site. An objective of the current Louth County Council Development Plan is to 'focus on creating places where people want to live and delivering well designed and located housing that is adaptable and resilient to the impacts of climate change and capable of meeting the current and future housing needs of the County' (LCDP 2021-2027, Volume 1, Chapter 3 – Housing)

The proposed development will comprise the construction of 70no. houses including 9no. 2-bed bungalows, 24no. two storey 2-bed houses, 18no. two storey 3-bed houses, 5no. two storey 4-bed houses, and 2no. 3-bed bungalows, and 12no. sheltered accommodation 2-bed bungalows on a site of 3.17 hectares in the townland of Ravel, Dunleer, Co. Louth.

The development will also include the construction of new connections to the existing estate road; provision of new cycleway, footpath, and public lighting along the boundary with the R170; new estate roads and homezones within the site; 123no. car parking spaces including both on-street and in-curtilage parking; cycle parking; hard and soft landscaping including public open spaces, playground, and private gardens; boundary treatments; ESB substation; lighting; laying of underground sewers, mains and pipes; underground pump station and attenuation tank; and all associated works.

The proposed development will utilise existing services in the vicinity of the site.

The objective of DMURS is 'to put well-designed streets at the heart of sustainable communities' (DMURS, 2019)

'Well designed streets can create connected physical, social and transport networks that promote real alternatives to car journeys, namely walking, cycling or public transport' (DMURS, 2019)

The aim of DMURS is to encourage a more sustainable approach to design and to better the experience of all road users, through reduction in traffic speeds, encourage non-motorised traffic, and essentially healthier environments and communities, thereby providing safe, attractive & comfortable streets for all users.

2. Smarter Travel

Smarter Travel - A Sustainable Transport Future - A New Transport Policy for Ireland 2009-2020, sets out five (5) key goals:

- a. To reduce overall travel demand*
- b. To maximise the efficiency of transport network*
- c. To reduce reliance on fossil fuels*
- d. To reduce transport emissions*
- e. To improve accessibility to public transport*

Planning Guidelines: Local Area Plans 2013

For local area plans focused on meeting the needs of communities in newly developing areas, the emphasis should be on:

- providing compact, walkable neighbourhoods incorporating a variety of house types with mixed tenure;*
- providing conveniently-located neighbourhood facilities commensurate with projected population, including playground/play areas;*
- providing a mix of residential and commercial uses with adequate local employment opportunities;*
- designing in active streets and designing out anti-social behaviour through urban master planning, encouraging good mixture of uses and adaptability of buildings; and*
- measures to encourage local people to adopt healthier, smarter ways to travel around their local communities, especially walking and cycling.*

Louth County Development Plan 2021 – 2027

Strategic Objective SO 15

Ensure the proper integration of transportation and land use planning through the increased use of sustainable transport modes and the minimisation of travel demand to achieve a sustainable, integrated and low carbon transport system with excellent connectivity both within and beyond the County.

Strategic Objective SO 17

Facilitate the development of infrastructural projects, which will underpin sustainable development throughout the County during the period of the Plan.

Housing Policy Objective HOU 3

To support the delivery of social housing in Louth in accordance with the Council's Social Housing Delivery Programme and Government Policy as set out in Rebuilding Ireland: Action Plan for Housing and Homelessness.

Movement Policy Objective MOV 06

To promote and support the principles of universal design ensuring that all environments are inclusive and are accessible to and can be used to the fullest extent possible by all users regardless of age, ability or disability.

The concept of smarter travel is further exemplified through the 'Principles for Quality Design and Layout' such as 'Placemaking'. 'The design approach aims to add value to a development. This takes account of the location, character, topography, history and any other issues that have shaped the area in which a development is located.' Chapter 3, Housing, Louth County Development Plan, 2021-2027

3. Creating A Better Environment



UK manual for streets (2007) – detail principles that should influence layout and design of streets – principles include:

- a. Connectivity and permeability
- b. Sustainability
- c. Safety
- d. Legibility
- e. Sense of place

The basic concepts of DMURS are identified through the following principles, namely see DMURS 2019

- i. Connectivity – ‘ A core objective of a segregated approach to street design is the creation of a highly functional traffic network’
- ii. Comfort
- iii. Active Edge and
- iv. Pedestrian Facilities

- i. Connectivity

DMURS provides guidance on the hierarchy of needs of pedestrians, cyclists, public transport and private vehicles.

The attached image from DMURS shows the prioritisation of considerations.

The Ravel, Dunleer development proposed plan aligns with consideration of pedestrians throughout the residential estate, ensuring that connectivity is provided to the main road via different access routes, through intended newly constructed pedestrian walkways and links, as well as dropped kerbs and tactile paving to assist with the movement of visually impaired persons.

Although the site is not within immediate connection to any bus routes, access is provided for easy access to link roads for bus routes.

The proposed residential development has been thoughtfully designed to accommodate and promote inter-connectivity between all modes of movements, with a strong leaning towards pedestrian movements, especially noted in the movements across the residential estate.

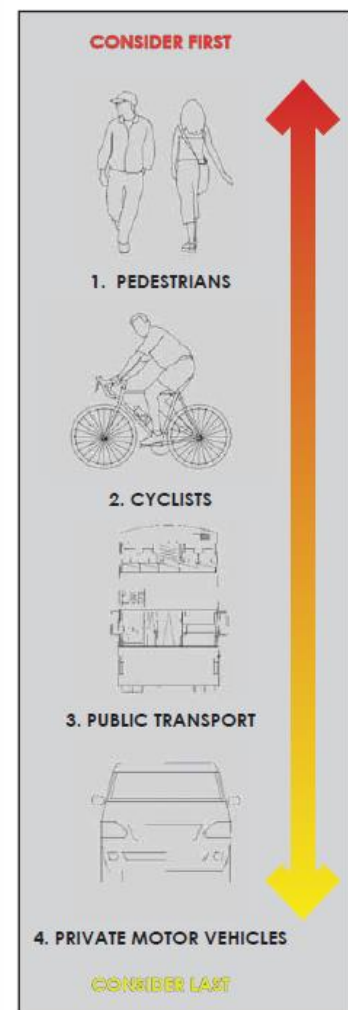


Figure 2.21: User hierarchy that promotes and prioritises sustainable forms of transportation

There is one main road and vehicle access to the residential estate as per accompanying layout and drawings. Through-access roads have been avoided where possible to reduce traffic speed and 'passing-through' traffic. Horizontally straight roads have been accompanied by chicanes and speed humps to reduce the speed of traffic within the residential estate which is likely to have a 30km/h speed limit.

The proposed residential development abides by the principle of integrated and non-segregated connectivity of DMURS.

ii. Comfort

The traffic facilities have been designed to allow for best usage of movement, through adequate pedestrian walkway, cycleway and road widths, along with appropriate turning radii. Footpaths and cycle paths have been kept clear of roadside furniture and clutter which would impede or impair the free flow movement of traffic. Where possible, throughout the site, careful thought has provided non-isolating walkways ensuring persons have freedom of movement. The use of landscaping techniques and layout ensure the inclusivity of all road users and the encouragement of free movement within the designated areas.

iii. Active Edge

The residential units each have access to the road, enlivening the frontage of the homes and access, with incorporated cul-de-sacs providing a sense of bounded communities.

iv. Pedestrian Facilities

The proposed residential development has been designed to facilitate and enhance pedestrian movement and connectivity, allowing all units to have direct access to pedestrian facilities and equally providing surveillance and openness of the footpaths increasing the sense of security and safety.

The development has some speed reducing elements incorporated into the design, such as chicanes, slight bends and speed humps as traffic calming facilities, and the development will likely have a 30km/h speed limit..

The pedestrian facilities are 1.8m wide, providing adequate passing space for two persons passing one another comfortably.

DMURS guidelines provides 1.8m to 2.5m widths for areas of low pedestrian activity and moderate pedestrian activity respectively. Considering the location of the

development & the projected number of pedestrians/cyclists the design is considered suitable.

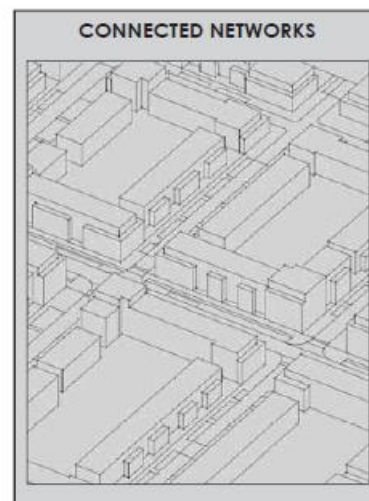
The footpath for the proposed residential development provides connectivity throughout the estate and access to the main network in the area, providing suitable and comfortable access to the transport links, retail and healthcare facilities.

Cyclepaths are also provided along the existing road, ensuring dedicated cycle lanes and widths of 2.0m, establishing a fully integrated network for cyclists, encouraging the usage of such means of transportation.

Design Principle 1:

To support the creation of integrated street networks which promote higher levels of permeability and legibility for all users, and in particular more sustainable forms of transport.

Chapter 3 of this Manual is concerned with the creation and management of permeable and legible street networks.



4. DMURS Design Principles from DMURS 2019 2.2.3 (Key Design Principles)

DMURS gives insight into the four core principles towards a balanced approach to road and street design. The four principles are

- i. Connected Networks
- ii. Multi-Functional Streets
- iii. Pedestrian Focus
- iv. Multidisciplinary Approach

i. Design Principle – Connected Networks

The proposed development consists of a few local streets which provide access to the dwellings, and throughout the design, careful consideration has been carried out to allow for the greatest connectivity between pedestrians and cyclists, promoting the different modes of transportation and reducing the usage of motorised transportation.

The proposed development is well-connected to the local road network, and allow for the ease of access between individuals and main roads.

The main point of entry / exit into the site is well demarcated and as provides a positive gateway and means of notification to all users and drivers, of the change of conditions, speeds etc.

ii. Design Principle – Multi-functional streets

The roads, streets and proposed development layout have considered future potential development and networks to the east of the second field and a hierarchical approach to the design with the DMURS principles increasing the attractiveness of usage for pedestrians and vehicles.

A series of raised pedestrian crossings will also be accommodated into the site, to allow for enhanced flow of pedestrians, reduced traffic speeds and inclusivity of all persons within the residential estate.

Open spaces are also incorporated into the design ensuring there are sufficient buffer zones to noise, providing areas of calm and enhancing the visibility of the proposed estate.

Incorporated footpaths provide cross site links and multi-functional usage, creating balance between all users and residents, creating a facilitated movements.

Design Principle 2:

The promotion of multi-functional, place-based streets that balance the needs of all users within a self-regulating environment.

Chapter 4 of this Manual is concerned with the creation of self-regulating streets that cater for the various place and movement functions of a street.



iii. Design Principle 3 – Pedestrian Focus

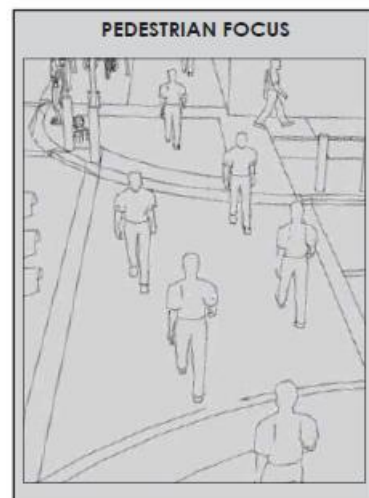
The pedestrian focus of the proposed development design, encourages connectivity throughout the site, heavily focused on pedestrians, along all lines of access.

The encompassing design provides an integrated sense of community and connectivity, providing passive observation of all persons within the estate and increased sense of safety and security.

Design Principle 3:

The quality of the street is measured by the quality of the pedestrian environment.

Chapter 4 of this Manual also provides design standards for the creation of a safe, comfortable and attractive pedestrian environment.



iv. Design Principle 4 – Multidisciplinary Approach

The design of the proposed development, has been developed through the incorporated workmanship of the design team, comprising of eml Architects, Ait Landscape Architects, working together with Hayes Higgins Partnership Consulting Civil and Structural Engineers, providing civil, structural, environmental and mechanical and electrical engineering collaborative approach to the highest standards of design and development of the proposal for the residential estate, that complies with the DMURS recommendations.

Design Principle 4:

Greater communication and co-operation between design professionals through the promotion of a plan-led, multidisciplinary approach to design.

Chapter 5 of this Manual is concerned with the implementation of a more integrated approach to street design.



5. Conclusion

Hayes Higgins Partnership, Consulting Engineers were appointed by Louth County Council to provide Civil and Structural, Mechanical and Electrical, and Environmental advice for the proposed residential development at Ravel, Dunleer, County Louth.

The report aims to demonstrate that the proposed residential development achieves the objectives described in DMURS, in co-ordination with the client, various designers and consultants to encourage the use of non-motorised modes of transportation over the use of private vehicles.

With regard to the aforementioned, the proposed development is in keeping with the guidelines and objectives for the Design of Urban Roads and Streets.