Environmental Impact Assessment Report

Volume 2: Appendices

For AZRA Property Company Limited.

Proposed Large-scale Residential Development consisting of 716no. residential units and 1no. childcare facility.

In the Townlands of Castlefarm, Rusk, Clonee and Loughsallagh, Dunboyne, County Meath

Prepared By: -

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In Association with: -

PLUS Architects, AWN Consulting, B- Fluid, Digital Dimensions, ParkHood Landscape Architects,
Waterman Moylan Consulting Engineers, John Cronin and Associates

JUNE 2023

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APPENDIX 7.1

NRA CRITERIA FOR RATING THE MAGNITUDE AND SIGNIFICANCE OF IMPACTS AT EIA STAGE NATIONAL ROADS AUTHORITY (NRA, 2009)

Table 1 Criteria for Rating Site Attributes – Estimation of Importance of Soil and Geology Attributes (NRA)

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying route is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes. Geological feature of high value on a local scale (County Geological Site). Well drained and/or high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying route is moderate on a local scale	Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed wastes. Moderately drained and/or moderate fertility soils. Small existing quarry or pit. Sub-economic extractable mineral resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying route is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

Table 2 Criteria for Rating Site Attributes – Estimation of Importance of Hydrogeological Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	Groundwater supports river, wetland or surface water body ecosystem protected by EU legislation e.g. SAC or SPA status.
Very High	Attribute has a high quality or value on a regional or national scale	Regionally Important Aquifer with multiple well fields. Groundwater supports river, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Inner source protection area for regionally important water source.
High	Attribute has a high quality or value on a local scale	Regionally Important Aquifer. Groundwater provides large proportion of baseflow to local rivers. Locally important potable water source supplying >1000 homes. Outer source protection area for regionally important water source. Inner source protection area for locally important water source.
Medium	Attribute has a medium quality or value on a local scale	Locally Important Aquifer. Potable water source supplying >50 homes. Outer source protection area for locally important water source.
Low	Attribute has a low quality or value on a local scale	Poor Bedrock Aquifer Potable water source supplying <50 homes

Table 3 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Soil/ Geology Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss of high proportion of future quarry or pit reserves. Irreversible loss of high proportion of local high fertility soils. Removal of entirety of geological heritage feature. Requirement to excavate/remediate entire waste site. Requirement to excavate and replace high proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Loss of moderate proportion of future quarry or pit reserves. Removal of part of geological heritage feature. Irreversible loss of moderate proportion of local high fertility soils. Requirement to excavate/remediate significant proportion of waste site. Requirement to excavate and replace moderate proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Loss of small proportion of future quarry or pit reserves. Removal of small part of geological heritage feature. Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils. Requirement to excavate/remediate small proportion of waste site. Requirement to excavate and replace small proportion of peat, organic soils and/or soft mineral soils beneath alignment.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	No measurable changes in attributes
Minor Beneficial	Results in minor improvement of attribute quality	Minor enhancement of geological heritage feature
Moderate Beneficial	Results in moderate improvement of attribute quality	Moderate enhancement of geological heritage feature
Major Beneficial	Results in major improvement of attribute quality	Major enhancement of geological heritage feature

Table 4 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrogeological Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	Removal of large proportion of aquifer. Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. Potential high risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >2% annually.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Removal of moderate proportion of aquifer. Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems. Potential medium risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >1% annually.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Removal of small proportion of aquifer. Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems. Potential low risk of pollution to groundwater from routine run-off. Calculated risk of serious pollution incident >0.5% annually.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Calculated risk of serious pollution incident <0.5% annually.

Table 5 Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	Magnitude of Importance			
	Negligible	**Small Adverse**	**Moderate Adverse**	**Large Adverse**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

APPENDIX 7.2
SITE INVESTIGATIONS REPORT (2022)

APPENDIX 7.2 SITE INVESTIGATION REPORT

S.I. Ltd Contract No: 5998

Client:	Azra Property Company Ltd
Engineer:	Waterman Moylan
Contractor:	Site Investigations Ltd

Station Road,
Dunboyne, Co. Meath
Site Investigation Report

Prepared by:

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Stephen Letch

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Contents: Page No.

Appendices:

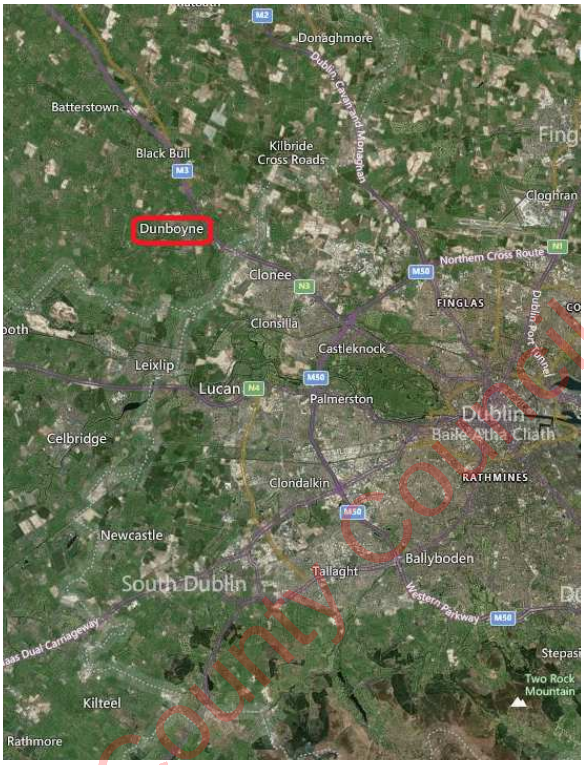
1. Introduction

On the instructions of Waterman Moylan, Site Investigations Ltd (SIL) was appointed to complete a ground investigation at Station Road, Dunboyne, Co. Meath. The investigation was completed for a residential development on the site, on behalf of the Client, Azra Property Company Ltd and was completed in June 2022.

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

2. Site Location

The site is located on Station Road, Dunboyne, close to the Co. Dublin border. The first map below shows the location of the site to the north west of Dublin city centre and the second map shows the location of the site to the south east of Dunboyne town centre.



3. Fieldwork

The fieldworks comprised a programme of cable percussive boreholes, trial pits with dynamic probes and soakaway tests. All fieldwork was carried out in accordance with BS 5930:2015, Engineers Ireland GI Specification and Related Document 2nd Edition 2016 and Eurocode 7: Geotechnical Design. The fieldworks comprised of the following:

- 3 No. cable percussive boreholes
- 15 No. trial pits with dynamic probes
- 3 No. soakaway tests

3.1. Cable Percussive Borehole

Cable percussion boring was undertaken at 3 No. locations using a Dando 150 rig and constructed 200mm diameter boreholes. The boreholes terminated at depths ranging from 2.30mbgl (BH03) to 4.20mbgl (BH01) after 1.5 hours chiselling with no further progress. 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=13-(1,1/2,3,44)). 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 3.00mbgl where N=50-(4,5/50 for 275mm)).

The cable percussive borehole logs are presented in Appendix 1.

3.2. Trial Pits with Dynamic Probes

15 No. trial pits were excavated using a wheeled excavator. Due to an issue with access to land, TP15 was cancelled and left out of this report. The pits were logged and photographed by SIL geotechnical engineer and representative disturbed bulk samples were recovered as the pits were excavated, which were returned to the laboratory for testing. The trial pits were backfilled with the arisings upon completion.

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} x 2.5 = SPT N value

Cohesive Soils: C_u = 15 x DPH N_{100} + 30 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.

The trial pit logs with the dynamic probe results are presented in Appendix 2 along with the pit photographs.

3.3. Soakaway Tests

At 3 No. locations, soakaway tests were completed and logged by SIL geotechnical engineer. The soakaway test is used to identify possible areas for storm water drainage. The pit was filled with water and the level of the groundwater was recorded over time. As stipulated by BRE Special Digest 365, 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 provided in Appendix 3.

3.4. 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 7.

4. Laboratory Testing

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

- 3 No. Moisture contents
- 3 No. Atterberg limits
- 3 No. Particle size gradings
- 3 No. pH, sulphate and chloride contents

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

- 5 No. Suite I analysis
- 3 No. loss on ignition tests

The geotechnical laboratory test results are presented in Appendix 4 with the environmental tests reported in Appendix 5 and a Waste Classification Report in Appendix 6.

5. Ground Conditions

5.1. MADE GROUND

MADE GROUND was encountered at TP01 and TP02 to 0.70mbgl and 0.90mbgl respectively. The material consists of cohesive grey brown and grey sandy slightly gravelly silty clay soils with cobbles and boulders and anthropogenic material of scrap metal and plastic bag fragments logged.

5.2. Overburden

The natural ground conditions in the boreholes and trial pits are dominated by cohesive brown overlying black slightly sandy slightly gravelly silty CLAY with cobbles and boulders. TP01, TP02, TP03, TP07 and TP16 to the north of the site did record some granular GRAVEL and SAND deposits.

These natural soils are over-consolidated lodgment till which is encountered across the North Dublin and Meath region with several papers discussing the engineering characteristics of the soil. The brown soils are the weathered surface of the underlying black clays and the gravel and cobbles are generally angular to subrounded and predominantly limestone in origin.

The SPT tests recorded N-values of 13 to 17 at 1.00mbgl, indicating firm to stiff soils, and then 22 to 26 in BH01 and BH02 at 2.00mbgl with BH03 recoding a refusal.

Laboratory tests of the shallow cohesive soils recorded CLAY soils with low to intermediate plasticity indices of 14% to 16% recorded. The particle size distribution curves were poorly sorted straight-line curves with 37 to 64% fines content.

5.3. Groundwater

Groundwater details in the boreholes and trial pits during the fieldworks are noted on the logs in Appendix 1 and 2. The boreholes remained dry during the drilling process whereas groundwater was logged in eight of the fifteen trial pits, at depths ranging from 1.40mbgl to 2.80mbgl with slow ingress rates.

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 to a maximum depth of 0.90mbgl. 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 to stiff brown grey slightly sandy slightly gravelly silty CLAY at 1.00mbgl and the SPT N-value at this depth ranges from 13 to 17.

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 to intermediate plasticity indexes recorded in the laboratory for the soils encountered on site, this correlation is C_u=6N. Therefore, using the lower value of 9, this indicates that the undrained shear strength of the CLAY is 78kN/m^2. This can be used to calculate the ultimate bearing capacity, and this has been calculated to be 416kN/m^2. Finally, a factor of safety is applied and with a factor of 3, an allowable bearing capacity of 140kN/m^2 would be anticipated using the lower SPT values.

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 3.1. 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.

In granular soils, the N_{100} value is used to correlate the SPT N-value. The SPT N-value can then be used to calculate the allowable bearing capacity, as per Terzaghi and Peck, using the correlation of SPT N-value x 10 = ABC.

The table below shows the allowable bearing capacities for N_{100} values 1 to 10 at 1.00mbgl and these can be used provide the allowable bearing capacity at each probe location.

N_{100} Value	Cohesive Soils			Granular Soils	
	C_u	ULS	ABC	SPT N-value	ABC
1	45	245	82	2.5	25
2	60	324	110	5	50
3	75	400	135	7.5	75
4	90	480	160	10	100
5	105	555	185	12.5	125
6	120	630	210	15	150
7	135	705	235	17.5	175
8	150	780	260	20	200
9	165	855	285	22.5	225
10	180	930	310	250	250

The dynamic probes generally recorded values of 2 at 1.00mbgl and this would indicate slightly lower bearing capacities of 110kN/m^2. However, lower values of 1 were recorded and this indicates that soft spots may be encountered on site and therefore, it would be recommended that a suitably qualified Engineer should inspect the founding strata before the foundations are placed.

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.

- The foundation is to be 1m wide.
- 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/m^3.
- 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 pits indicate that excavations in the cohesive soils should be stable for a short while. TP16, however, recorded GRAVEL from 0.60mbgl and when the water ingressed at 1.40mbgl, this led to major pit wall instability. All slopes should be evaluated upon excavation and regular inspections should be completed during construction to ensure that all slopes are stable and battered back if required. 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, nearby construction and tides.

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 not encountered in the boreholes but was recorded in eight of the fifteen trial pits 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 medium. 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. Soakaway Test

The soakaway tests failed the soakaway test specification as the water level did not fall sufficiently enough to complete the tests. The BRE Digest stipulates that the pit should half empty within 24hrs, and extrapolation indicates this condition would not be satisfied. The tests were 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.

6.4. Contamination

Environmental testing was carried out on five samples from the investigation and the results are shown in Appendix 5. For material to be removed from site, Suite I (Rilta Suite) 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.

Following this analysis of the solid test results, the leachate results generally remained within the Inert thresholds.

Five 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.

6.5. Aggressive Ground Conditions

The chemical test results in Appendix 4 indicate pH values between 8.21 and 8.23, 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 126mg/l as SO_3. The BRE Special Digest 1:2005 – '*Concrete in Aggressive Ground'* guidelines require SO_4 values and after conversion ($SO_4 = SO_3 \times 1.2$), the maximum value of 151mg/l shows Class 1 conditions and no special precautions are required.

Appendix 1

Cable Percussive Borehole Logs

Cable Percussion Borehole Log

Contract No:	5998			Borehole No:	BH01
Contract:	Station Road	Easting:	702198.250	Date Started:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741359.231	Date Completed:	07/06/2022
Client:	Azra Property Company Ltd	Elevation:	67.17	Drilled By:	J. O'Toole
Engineer:	Waterman Moylan	Borehole Diameter:	200mm	Status:	FINAL

Depth (m)	Stratum Description	Level (mOD) Depth	Samples Depth	Type	Result	Water Strike	Backfill
	TOPSOIL.						
0.20	Brown sandy slightly gravelly silty CLAY.	66.97					
0.60	Light brown sandy slightly gravelly silty CLAY.	66.57					
			1.00 1.00	B C	JOT01 N=13 (1,1/2,3,4,4)		
1.20	Firm becoming stiff dark brown slightly sandy slightly gravelly silty CLAY with low cobble content.	65.97					
			2.00 2.00	B C	JOT02 N=22 (2,5/5,5,6,6)		
			3.00 3.00	B C	JOT03 N=50 (4,5/50 for 275mm)		
3.10	Very stiff black slightly sandy slightly gravelly silty CLAY with low cobble content.	64.07					
			4.00 4.00	B C	JOT04 50 (25 for 90mm/50 for 10mm)		
4.10	Obstruction - possible boulders.	63.07					
4.20	End of Borehole at 4.20m	62.97	4.20	C	50 (25 for 5mm/50 for 5mm)		

Chiselling:

From:	To:	Time:
3.20	3.30	01:00
4.10	4.20	01:30

Water Strikes:

Strike:	Rose:	Depth Sealed

Water Details:

Date:	Hole Depth:	Water Depth:
07/06	4.20	Dry

Installation:

From:	To:	Pipe:

Backfill:

From:	To:	Type:
0.00	4.20	Arisings

Remarks:
Borehole terminated due to obstruction.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water
C: Cone SPT
S: Split spoon SPT

Contract No:	# Cable Percussion Borehole Log				Borehole No:
5998					**BH02**
Contract:	Station Road	Easting:	702208.122	Date Started:	08/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741252.548	Date Completed:	08/06/2022
Client:	Azra Property Company Ltd	Elevation:	66.28	Drilled By:	J. O'Toole
Engineer:	Waterman Moylan	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		
		TOPSOIL.								
	0.20	Stiff brown grey slightly sandy slightly gravelly silty CLAY with low cobble content.		66.0	66.08					
0.5				65.5						
1.0						1.00 1.00	B C	JOT05 N=17 (2,2/3,4,5,5)		
				65.0						
1.5										
	1.70	Stiff black slightly sandy slightly gravelly silty CLAY with low cobble content.		64.5	64.58					
2.0						2.00 2.00	B C	JOT06 N=26 (2,4/5,7,7,7)		
				64.0						
2.5				63.5						
3.0						3.00 3.00	B C	JOT07 50 (6,8/50 for 125mm)		
				63.0						
	3.40	Obstruction - possible boulders.			62.88					
3.5	3.50	End of Borehole at 3.50m			62.78	3.50	C	50 (25 for 5mm/50 for 10mm)		
				62.5						
4.0				62.0						
4.5				61.5						

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 D: Disturbed U: Undisturbed ES: Environmental W: Water C: Cone SPT S: Split spoon SPT
3.40	3.50	01:30				08/06	3.50	Dry				0.00	3.50	Arisings		

Contract No: 5998	Cable Percussion Borehole Log				Borehole No: **BH03**
Contract:	Station Road	Easting:	702398.924	Date Started:	08/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741169.375	Date Completed:	08/06/2022
Client:	Azra Property Company Ltd	Elevation:	65.30	Drilled By:	J. O'Toole
Engineer:	Waterman Moylan	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		
		TOPSOIL.								
	0.20	Firm brown grey slightly sandy slightly gravelly silty CLAY with low cobble content.			65.10					
				65.0						
0.5										
				64.5						
1.0						1.00	B	JOT08		
						1.00	C	N=13 (1,2/2,3,4,4)		
				64.0						
	1.40	Firm dark brown slightly sandy slightly gravelly silty CLAY with low cobble content.			63.90					
1.5										
	1.80	Stiff black slightly sandy slightly gravelly silty CLAY with low cobble content.		63.5	63.50					
2.0						2.00	B	JOT09		
						2.00	C	50 (25 for 125mm/50 for 15mm)		
	2.20	Obstruction - possible boulders.			63.10	2.20	C	50 (25 for 5mm/50 for 10mm)		
	2.30	End of Borehole at 2.30m		63.0	63.00					
2.5										
				62.5						
3.0										
				62.0						
3.5										
				61.5						
4.0										
				61.0						
4.5										
				60.5						

Chiselling:			Water Strikes:			Water Details:			Installation:			Backfill:			Remarks:
From:	To:	Time:	Strike:	Rose:	Depth Sealed	Date:	Hole Depth:	Water Depth:	From:	To:	Pipe:	From:	To:	Type:	
2.20	2.30	01:30				08/06	2.30	Dry				0.00	2.30	Arisings	Borehole terminated due to obstruction.

Legend:
B: Bulk
D: Disturbed
U: Undisturbed
ES: Environmental
W: Water
C: Cone SPT
S: Split spoon SPT

Appendix 2

Trial Pit and Dynamic Probe Logs and Photographs

Trial Pit and Dynamic Probe Log

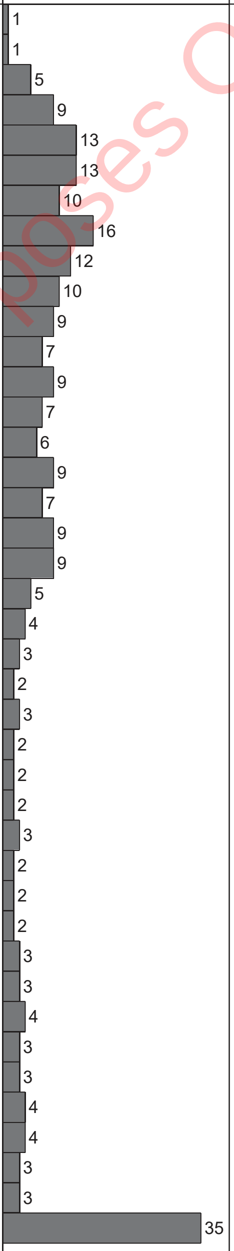
Contract No: 5998				Trial Pit No:	**TP01**
Contract:	Station Road	Easting:	702212.360	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741429.158	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	65.55	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.40 x 0.60 x 3.10	Scale:	1:25

Depth (mbgl)	Stratum Description	Level (mOD) Depth
	TOPSOIL.	
0.20	MADE GROUND: grey brown sandy slightly gravelly silty clay with medium cobble, low boulder content and some plastic bag fragments.	65.35
0.70	Stiff grey brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	64.85
1.40	Medium dense becoming loose grey silty sandy fine to coarse, subangular to subrounded GRAVEL of limestone with high cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded of limestone.	64.15
2.70	Firm grey slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter).	62.85
2.90	Loose grey silty sandy fine to coarse, subangular to subrounded GRAVEL of limestone with high cobble and boulder content. Sand is fine to coarse. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter).	62.65
3.10		62.45

Pit terminated at 3.10m

Samples Depth	Type
0.50	ES
1.00	B
2.00	B

Probe



Water Strike

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

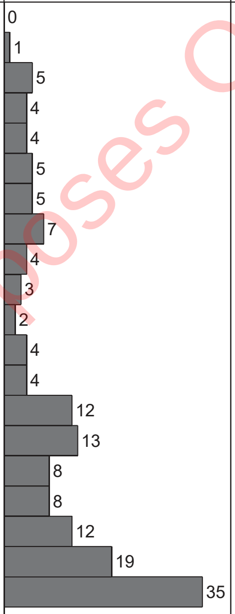
Contract No: 5998	# Trial Pit and Dynamic Probe Log	Trial Pit No: **TP02**

Contract:	Station Road	Easting:	702292.326	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741399.777	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	65.85	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.50 x 0.60 x 3.10	Scale:	1:25

Level (mbgl) Depth	Stratum Description	Level (mOD) Depth:	Samples Depth	Samples Type	Water Strike
0.20	TOPSOIL.	65.65			
0.90	MADE GROUND: grey sandy slightly gravelly silty clay with high cobble, medium boulder content and some scrap metal fragments.	64.95			
1.40	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, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	64.45	1.00	B	
2.80	Medium dense becoming dense grey silty sandy fine to coarse, subangular to subrounded GRAVEL of limestone with high cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded of limestone.	63.05	2.00	B	▼
2.90	Grey brown silty sandy fine to coarse, subangular to subrounded GRAVEL of limestone with high cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded of limestone.	62.95			
3.10	Stiff grey slightly sandy slightly gravelly silty CLAY with medium cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter).	62.75	3.00	B	

Pit terminated at 3.10m

Probe



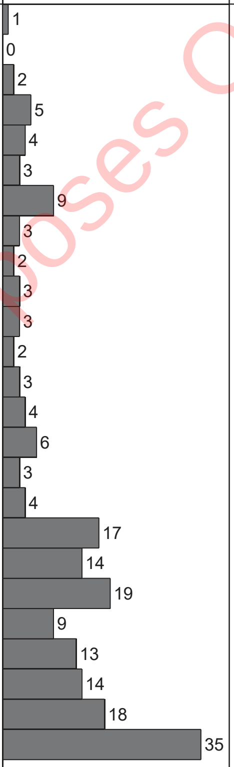
Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Scheduled depth.	Pit walls stable.	2.80 Slow	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5998	# Trial Pit and Dynamic Probe Log				Trial Pit No: **TP03**
Contract:	Station Road	Easting:	702389.351	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741398.929	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	65.58	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.40 x 0.60 x 3.10	Scale:	1:25

Level (mbgl) Depth	Stratum Description	Level (mOD) Depth:
	TOPSOIL.	
0.20	Firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	65.38
1.40	Stiff dark grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	64.18
1.60	Very stiff dark grey slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	63.98
2.20	Dense grey silty slightly gravelly fine to coarse SAND with occasional silt bands. Gravel is fine to coarse, subangular to subrounded of limestone.	63.38
3.10	**Pit terminated at 3.10m**	62.48

Samples Depth	Type
1.00	B
2.00	B
3.00	B

Probe



Water Strike

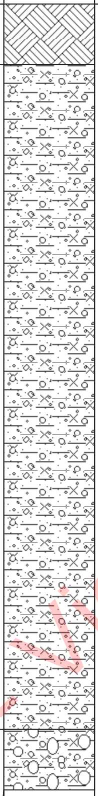
Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Scheduled depth.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5998	# Trial Pit and Dynamic Probe Log				Trial Pit No: **TP04**
Contract:	Station Road	Easting:	702338.174	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741269.812	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	66.90	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.70 x 0.60 x 2.60	Scale:	1:25

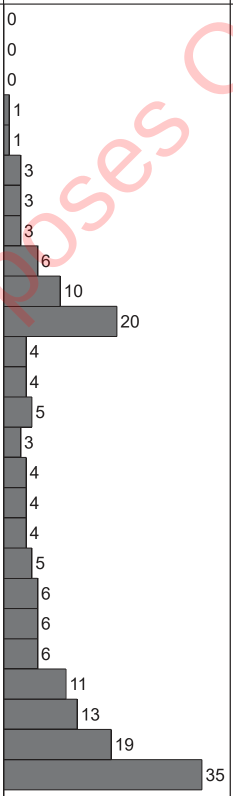
Level (mbgl) Depth	Stratum Description	Level (mOD) Depth:	Samples Depth	Samples Type	Water Strike
0.20	TOPSOIL.	66.70			
2.40	Firm becoming stiff brown grey slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	64.50	1.00	B	
2.60	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter). Obstruction - possible boulders.	64.30	2.50	B	

Pit terminated at 2.60m

Legend



Probe



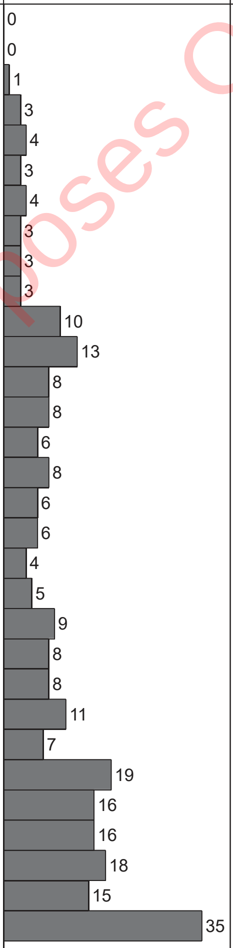
Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Strength of soil.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5998	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP05**
Contract:	Station Road	Easting:	702402.393	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741278.874	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	66.34	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.90 x 0.60 x 2.80	Scale:	1:25

Level (mbgl) Depth	Stratum Description	Level (mOD) Depth:	Samples Depth	Samples Type
	TOPSOIL.			
0.20	Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	66.14	0.50 1.00	ES B
1.40	Stiff becoming very stiff grey brown slightly sandy gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	64.94	2.00	B
2.80	Obstruction - possible boulders.	63.54		

Pit terminated at 2.80m

Probe



Water Strike

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Trial Pit and Dynamic Probe Log

Contract No: 5998				Trial Pit No:	**TP06**
Contract:	Station Road	Easting:	702267.725	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741254.576	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	66.58	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.50 x 0.60 x 2.50	Scale:	1:25

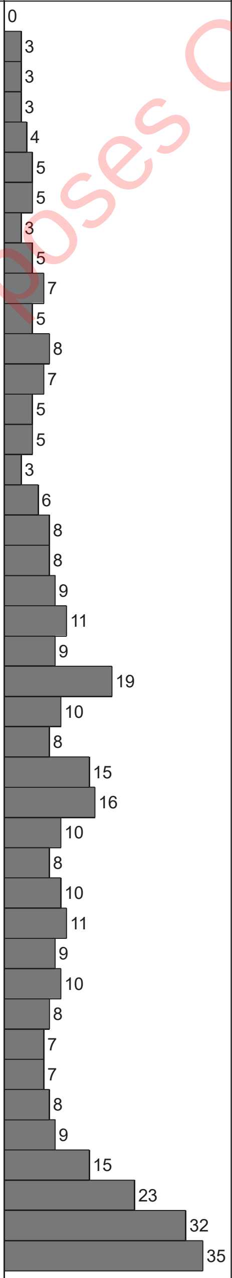
Level (mbgl) Depth	Stratum Description	Legend	Level (mOD) Depth:	Samples Depth	Samples Type	Water Strike
	TOPSOIL.	▨				
0.30	Stiff grey brown sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.		66.28			
0.70	Stiff grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.		65.88	1.00	B	
1.80	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter).		64.78	2.00	B	
2.50	Obstruction - possible boulders.		64.08			

Pit terminated at 2.50m

Level (mbgl) Scale: 0.5, 1.0, 1.5, 2.0, 2.5, 3.0, 3.5, 4.0, 4.5

Level (mOD) Scale: 66.5, 66.0, 65.5, 65.0, 64.5, 64.0, 63.5, 63.0, 62.5, 62.0

Probe



Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Strength of soil.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Trial Pit and Dynamic Probe Log

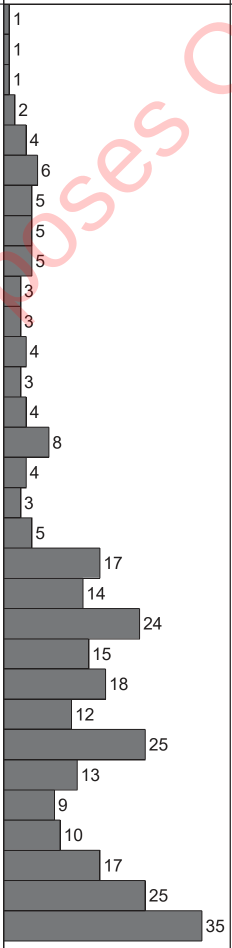
Contract No:	5998			Trial Pit No:	**TP07**
Contract:	Station Road	Easting:	702360.125	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741200.872	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	65.64	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.50 x 0.60 x 2.60	Scale:	1:25

Depth (mbgl)	Stratum Description	Level (mOD) Depth	Water Strike
0.20	TOPSOIL.	65.44	
1.20	Firm becoming stiff brown grey slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	64.44	
1.90	Stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 300mm diameter).	63.74	▼
2.10	Dense grey brown silty sandy fine to coarse, subangular to subrounded GRAVEL of limestone with high cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded of limestone.	63.54	
2.60	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter).	63.04	
	Obstruction - possible boulders.		

Pit terminated at 2.60m

Samples Depth	Type
1.00	B
1.50	B
2.00	B
2.50	B

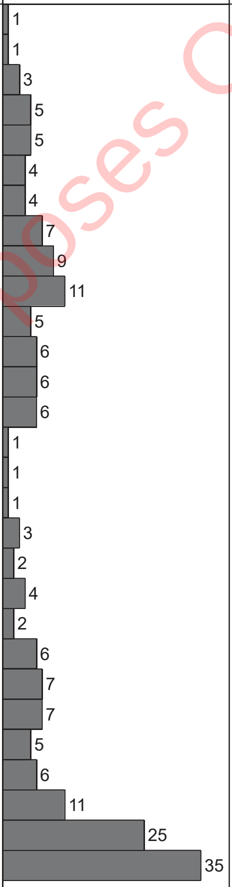
Probe



Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders.	Pit walls stable.	1.90 Slow	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5998	**Trial Pit and Dynamic Probe Log**				Trial Pit No: **TP08**
Contract:	Station Road	Easting:	702450.882	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741225.563	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	65.15	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.40 x 0.60 x 2.10	Scale:	1:25

Level (mbgl) Depth	Stratum Description	Legend	Level (mOD) Depth:	Samples Depth	Samples Type
	TOPSOIL.	▨			
0.20	Firm becoming stiff grey brown slightly sandy gravelly silty CLAY with high cobble content and lenses of very clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	▨	64.95	1.00 2.00	B B
2.10	Obstruction - possible boulders. **Pit terminated at 2.10m**		63.05		

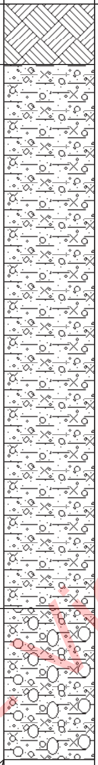
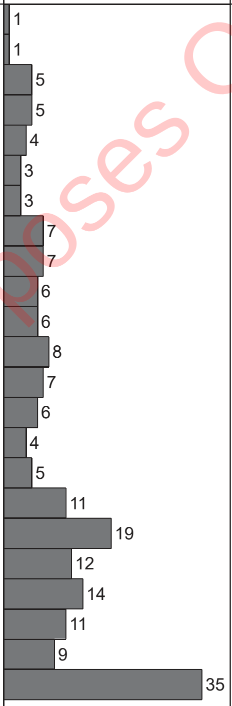

Probe

0.1	1
0.2	1
0.3	3
0.4	5
0.5	5
0.6	4
0.7	4
0.8	7
0.9	9
1.0	11
1.1	5
1.2	6
1.3	6
1.4	6
1.5	1
1.6	1
1.7	1
1.8	3
1.9	2
2.0	4
2.1	2
2.2	6
2.3	7
2.4	7
2.5	5
2.6	6
2.7	11
2.8	25
2.9	35

Water Strike: ▼ 2.10

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders.	Pit walls stable.	2.10 Seepage	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5998	Trial Pit and Dynamic Probe Log				Trial Pit No: **TP09**
Contract:	Station Road	Easting:	702234.254	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741154.195	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	66.51	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.60 x 0.60 x 2.50	Scale:	1:25

Level (mbgl)		Stratum Description	Legend	Level (mOD)		Samples		Probe	Water Strike
Scale:	Depth			Scale:	Depth:	Depth	Type		
		TOPSOIL.							
	0.20	Stiff becoming very stiff grey brown slightly sandy gravelly silty CLAY with high cobble content and lenses of very clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.			66.31				
0.5				66.0					
1.0				65.5		1.00	B		
1.5				65.0					
2.0	2.00	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter).		64.5	64.51	2.00	B		
2.5	2.50	Obstruction - possible boulders. **Pit terminated at 2.50m**		64.0	64.01				
3.0				63.5					
3.5				63.0					
4.0				62.5					
4.5				62.0					

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

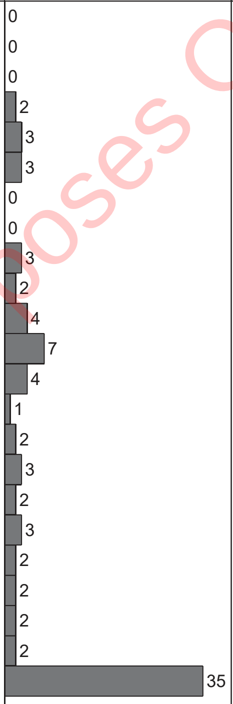
Contract No: 5998	**Trial Pit and Dynamic Probe Log**			Trial Pit No:	**TP10**
Contract:	Station Road	Easting:	702373.569	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741135.064	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	65.43	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.50 x 0.60 x 2.30	Scale:	1:25

Depth (mbgl)	Stratum Description	Level (mOD) Depth	Water Strike
	TOPSOIL.		
0.20	Firm grey brown slightly sandy gravelly silty CLAY with high cobble content and lenses of very clayey sandy gravel. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	65.23	
1.50	Firm grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 300mm diameter).	63.93	
2.10	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter). Obstruction - possible boulders.	63.33	▼
2.30		63.13	

Pit terminated at 2.30m

Samples Depth	Type
0.50	ES
1.00	B
2.00	B
2.20	B

Probe

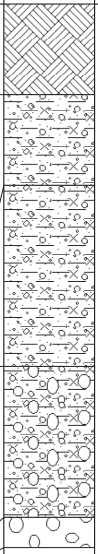


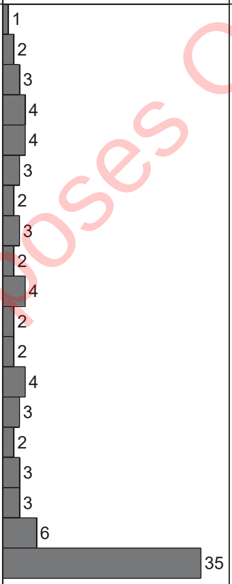
Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders.	Pit walls stable.	2.30 Slow	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Trial Pit and Dynamic Probe Log

Contract No:	5998			Trial Pit No:	**TP11**
Contract:	Station Road	Easting:	702299.539	Date:	08/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741040.755	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	65.32	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.40 x 0.60 x 1.80	Scale:	1:25

Level (mbgl) Depth	Stratum Description	Level (mOD) Depth	Samples Depth	Samples Type
	TOPSOIL.			
0.30	Stiff light brown sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	65.02		
0.60	Firm grey brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	64.72	1.00	B
1.20	Stiff dark grey slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter).	64.12	1.50	B
1.70	Obstruction - possible boulders.	63.62		
1.80	**Pit terminated at 1.80m**	63.52		





Water Strike: ▼ 1.80

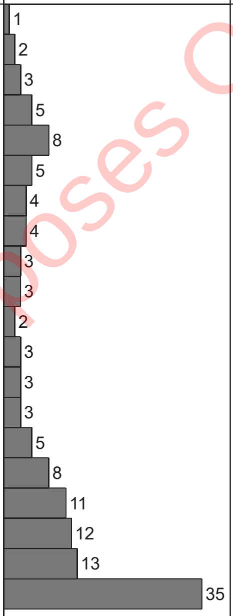
Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders.	Pit walls stable.	1.80 Slow	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5998	Trial Pit and Dynamic Probe Log				Trial Pit No: **TP12**
Contract:	Station Road	Easting:	702368.220	Date:	08/06/2022
Location:	Dunboyne, Co. Meath	Northing:	740987.448	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	64.76	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.40 x 0.60 x 1.70	Scale:	1:25

Level (mbgl) Depth	Stratum Description	Level (mOD) Depth:	Samples Depth	Samples Type	Water Strike
0.20	TOPSOIL.	64.56			
0.40	Stiff light brown sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	64.36			
0.80	Stiff grey brown slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	63.96			
1.30	Firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	63.46	1.00	B	
1.60	Firm becoming stiff dark grey slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter).	63.16	1.50	B	▼
1.70	Obstruction - possible boulders.	63.06			

Pit terminated at 1.70m

Probe



Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders.	Pit walls stable.	1.60 Slow	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

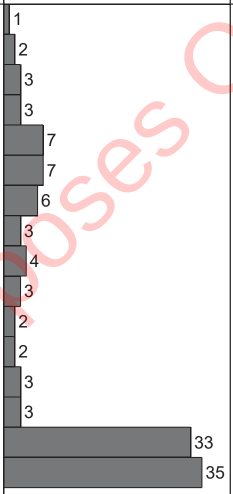
Contract No: 5998	# Trial Pit and Dynamic Probe Log				Trial Pit No: **TP13**
Contract:	Station Road	Easting:	702304.376	Date:	08/06/2022
Location:	Dunboyne, Co. Meath	Northing:	740966.878	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	65.07	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.20 x 0.60 x 1.90	Scale:	1:25

Depth (mbgl)	Stratum Description	Level (mOD)
0.30	TOPSOIL.	64.77
1.20	Firm brown grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	63.87
1.60	Firm dark grey slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter).	63.47
1.90	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter).	63.17
	Obstruction - possible boulders.	

Pit terminated at 1.90m

Samples Depth	Type
0.50	ES
1.00	B
1.50	B
1.80	B

Probe



Water Strike: ▼ 1.90

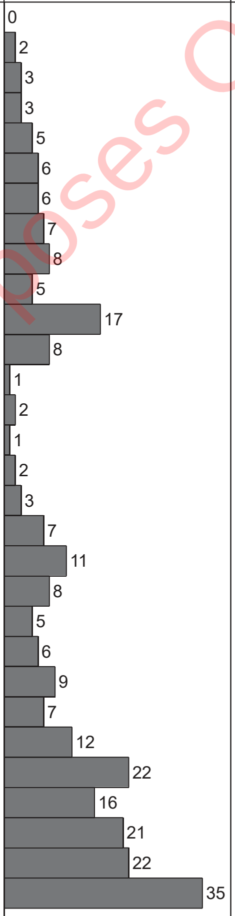
Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders.	Pit walls stable.	1.90 Slow	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5998	# Trial Pit and Dynamic Probe Log				Trial Pit No: **TP14**
Contract:	Station Road	Easting:	702199.068	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741319.480	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	67.46	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.60 x 0.60 x 2.40	Scale:	1:25

Level (mbgl) Depth	Stratum Description	Level (mOD) Depth:	Samples Depth	Samples Type
	TOPSOIL.			
0.20	Firm becoming stiff grey brown slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter).	67.26	0.50	ES
0.80	Firm grey slightly sandy slightly gravelly silty CLAY with medium cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	66.66	1.00	B
1.90	Stiff grey slightly sandy slightly gravelly silty CLAY with high cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.	65.56	2.00	B
2.10		65.36	2.30	B
2.40	Very stiff black slightly sandy slightly gravelly silty CLAY with high cobble and low boulder content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles and boulders are subangular to subrounded of limestone (up to 400mm diameter). Obstruction - possible boulders.	65.06		

Pit terminated at 2.40m

Probe



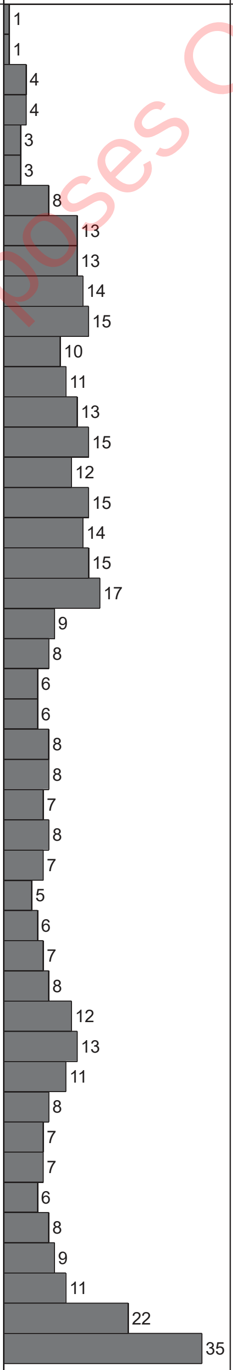
Water Strike

Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Obstruction - possible boulders.	Pit walls stable.	Dry	-	B = Bulk disturbed D = Small disturbed CBR = Undisturbed CBR ES = Environmental

Contract No: 5998	Trial Pit and Dynamic Probe Log				Trial Pit No: **TP16**
Contract:	Station Road	Easting:	702267.627	Date:	07/06/2022
Location:	Dunboyne, Co. Meath	Northing:	741632.223	Excavator:	JCB 3CX
Client:	Azra Property Company Ltd	Elevation:	64.98	Logged By:	M. Kaliski
Engineer:	Waterman Moylan	Dimensions (LxWxD) (m):	3.40 x 0.60 x 2.20	Scale:	1:25

Level (mbgl) Scale:	Level (mbgl) Depth	Stratum Description	Legend	Level (mOD) Scale:	Level (mOD) Depth:	Samples Depth	Samples Type	Water Strike
		TOPSOIL.						
	0.30	Firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content. Sand is fine to coarse. Gravel is fine to coarse, subangular to subrounded of limestone. Cobbles are subangular to subrounded of limestone.			64.68			
0.5				64.5				
	0.60	Medium dense grey silty sandy fine to coarse, subangular to subrounded GRAVEL of limestone with high cobble content. Sand is fine to coarse. Cobbles are subangular to subrounded of limestone.			64.38			
1.0				64.0		1.00	B	
1.5				63.5				▼
2.0				63.0		2.00	B	
	2.20	Obstruction - possible boulders. **Pit terminated at 2.20m**			62.78			
2.5				62.5				
3.0				62.0				
3.5				61.5				
4.0				61.0				
4.5				60.5				

Probe



Termination:	Pit Wall Stability:	Groundwater Rate:	Remarks:	Key:
Pit wall instability.	Major pit wall collapse below 0.60mbgl.	1.40 Slow	-	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

TP11 Sidewall

TP11 Spoil

TP12 Sidewall

TP12 Spoil

TP13 Sidewall

TP13 Spoil

TP14 Sidewall

TP14 Spoil

TP16 Sidewall

TP16 Spoil

Appendix 3

Soakaway Test Results

SOAKAWAY TEST

Project Reference:	5998
Contract name:	Station Road
Location:	Dunboyne, Co. Meath
Test No:	SA01
Date:	08/06/2022

Ground Conditions

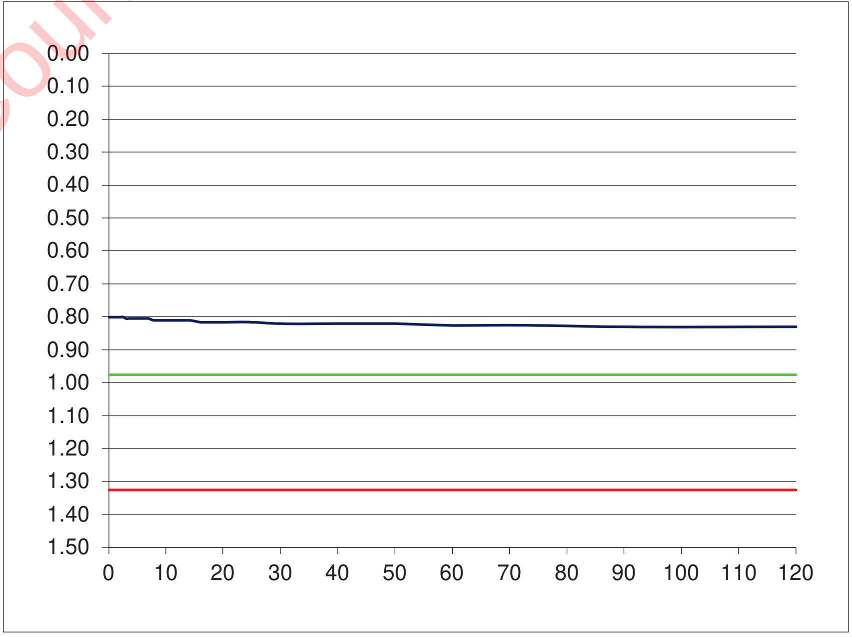
From	To	
0.00	0.20	TOPSOIL.
0.20	0.40	Light brown very silty gravelly SAND with low cobble content.
0.40	1.50	Firm grey brown sandy slightly gravelly silty CLAY with high cobble content.

Remarks:

Obstruction at 1.50mbgl - pit terminated and test completed.

Elapsed Time (mins)	Fall of Water (m)
0	0.80
0.5	0.80
1	0.80
1.5	0.80
2	0.80
2.5	0.80
3	0.81
3.5	0.81
4	0.81
4.5	0.81
5	0.81
6	0.81
7	0.81
8	0.81
9	0.81
10	0.81
12	0.81
14	0.81
16	0.82
18	0.82
20	0.82
25	0.82
30	0.82
40	0.82
50	0.82
60	0.83
75	0.83
90	0.83
120	0.83

Pit Dimensions (m)		
Length (m)	2.90	m
Width (m)	0.60	m
Depth	1.50	m
Water		
Start Depth of Water	0.80	m
Depth of Water	0.70	m
75% Full	0.98	m
25% Full	1.33	m
75%-25%	0.35	m
Volume of water (75%-25%)	**0.61**	m3
Area of Drainage	**10.50**	m2
Area of Drainage (75%-25%)	**4.19**	m2
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**

SOAKAWAY TEST

Project Reference:	5998
Contract name:	Station Road
Location:	Dunboyne, Co. Meath
Test No:	SA02
Date:	08/06/2022

Ground Conditions

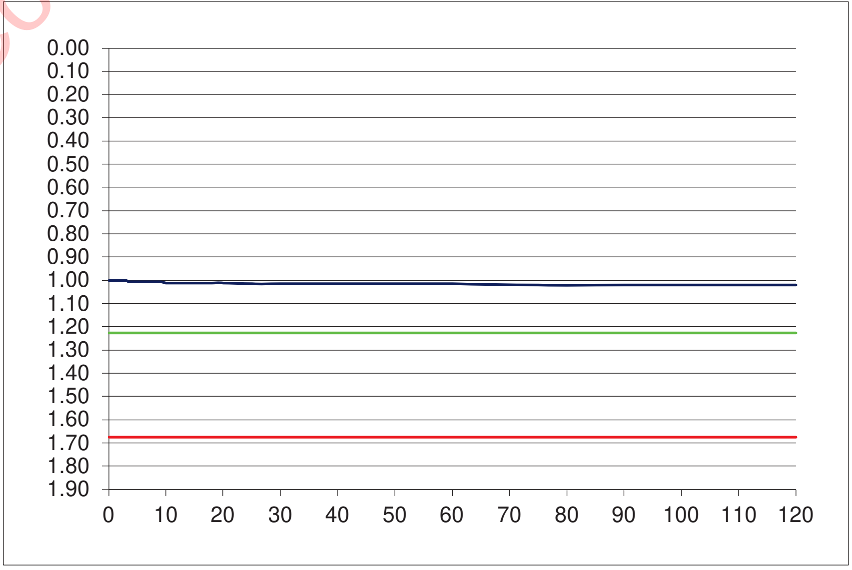
From	**To**	
0.00	0.30	TOPSOIL.
0.30	1.00	Soft light grey brown slightly sandy slightly gravelly silty CLAY.
1.00	1.60	Firm grey brown slightly sandy slightly gravelly silty CLAY with low cobble content.
1.60	1.90	Stiff grey slightly sandy gravelly silty CLAY with low cobble content.

Remarks:

Obstruction at 1.90mbgl - pit terminated and test completed.

Elapsed Time (mins)	Fall of Water (m)
0	1.00
0.5	1.00
1	1.00
1.5	1.00
2	1.00
2.5	1.00
3	1.00
3.5	1.01
4	1.01
4.5	1.01
5	1.01
6	1.01
7	1.01
8	1.01
9	1.01
10	1.01
12	1.01
14	1.01
16	1.01
18	1.01
20	1.01
25	1.02
30	1.02
40	1.02
50	1.02
60	1.02
75	1.02
90	1.02
120	1.02

Pit Dimensions (m)		
Length (m)	3.20	m
Width (m)	0.60	m
Depth	1.90	m
Water		
Start Depth of Water	1.00	m
Depth of Water	0.90	m
75% Full	1.23	m
25% Full	1.68	m
75%-25%	0.45	m
Volume of water (75%-25%)	**0.86**	m3
Area of Drainage	**14.44**	m2
Area of Drainage (75%-25%)	**5.34**	m2
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** m/min or **Fail** m/s

SOAKAWAY TEST

Project Reference:	5998
Contract name:	Station Road
Location:	Dunboyne, Co. Meath
Test No:	SA03
Date:	08/06/2022

Ground Conditions

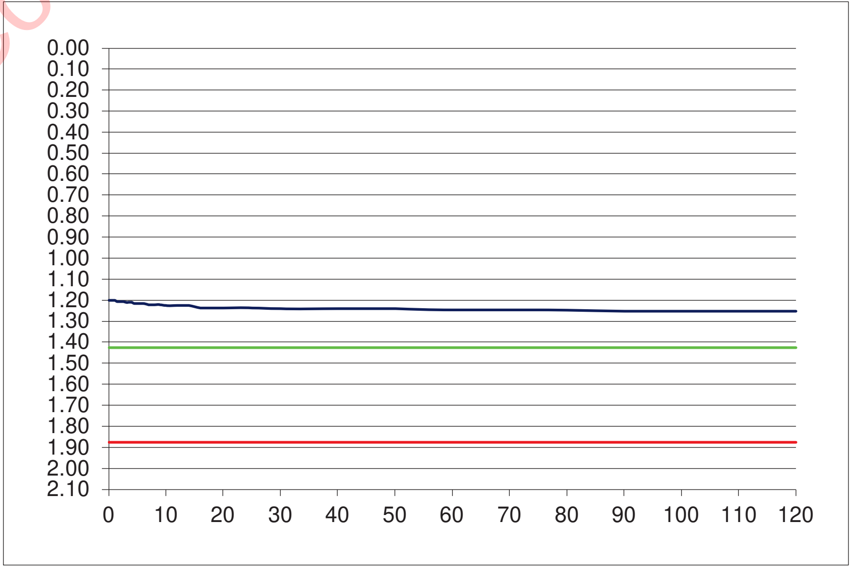
From	**To**	
0.00	0.30	TOPSOIL.
0.30	0.80	MADE GROUND: black brown sandy gravelly silty clay with high cobble and low boulder content.
0.80	1.80	Grey slightly silty sandy GRAVEL with high cobble content.
1.80	2.10	Stiff dark grey slightly sandy gravelly silty CLAY with low cobble content.

Remarks:

-

Elapsed Time (mins)	Fall of Water (m)
0	1.20
0.5	1.20
1	1.20
1.5	1.21
2	1.21
2.5	1.21
3	1.21
3.5	1.21
4	1.21
4.5	1.22
5	1.22
6	1.22
7	1.22
8	1.22
9	1.22
10	1.23
12	1.23
14	1.23
16	1.24
18	1.24
20	1.24
25	1.24
30	1.24
40	1.24
50	1.24
60	1.25
75	1.25
90	1.25
120	1.25

Pit Dimensions (m)		
Length (m)	3.30	m
Width (m)	0.60	m
Depth	2.10	m
Water		
Start Depth of Water	1.20	m
Depth of Water	0.90	m
75% Full	1.43	m
25% Full	1.88	m
75%-25%	0.45	m
Volume of water (75%-25%)	**0.89**	m3
Area of Drainage	**16.38**	m2
Area of Drainage (75%-25%)	**5.49**	m2
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

SA03 Sidewall

SA03 Spoil

Appendix 4

Geotechnical Laboratory Test Results

Classification Tests
In accordance with BS 1377: Part 2

Client	Azra Property Company Ltd.
Site	Station Road, Dunboyne
S.I. File No	5998 / 22
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	20th June 2022

Hole ID	Depth	Sample No	Lab Ref No.	Sample Type	Natural Moisture Content %	Liquid Limit %	Plastic Limit %	Plastic Index %	Min. Dry Density Mg/m^3	Bulk 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
TP02	1.00	MK06	22/792	B	25.0	34	20	14			54.5		CL
TP07	1.00	MK22	22/793	B	20.4	36	20	16			74.2		CI
TP11	1.00	MK38	22/794	B	28.4	38	22	16			71.4		CI

Printed 22/06/2022

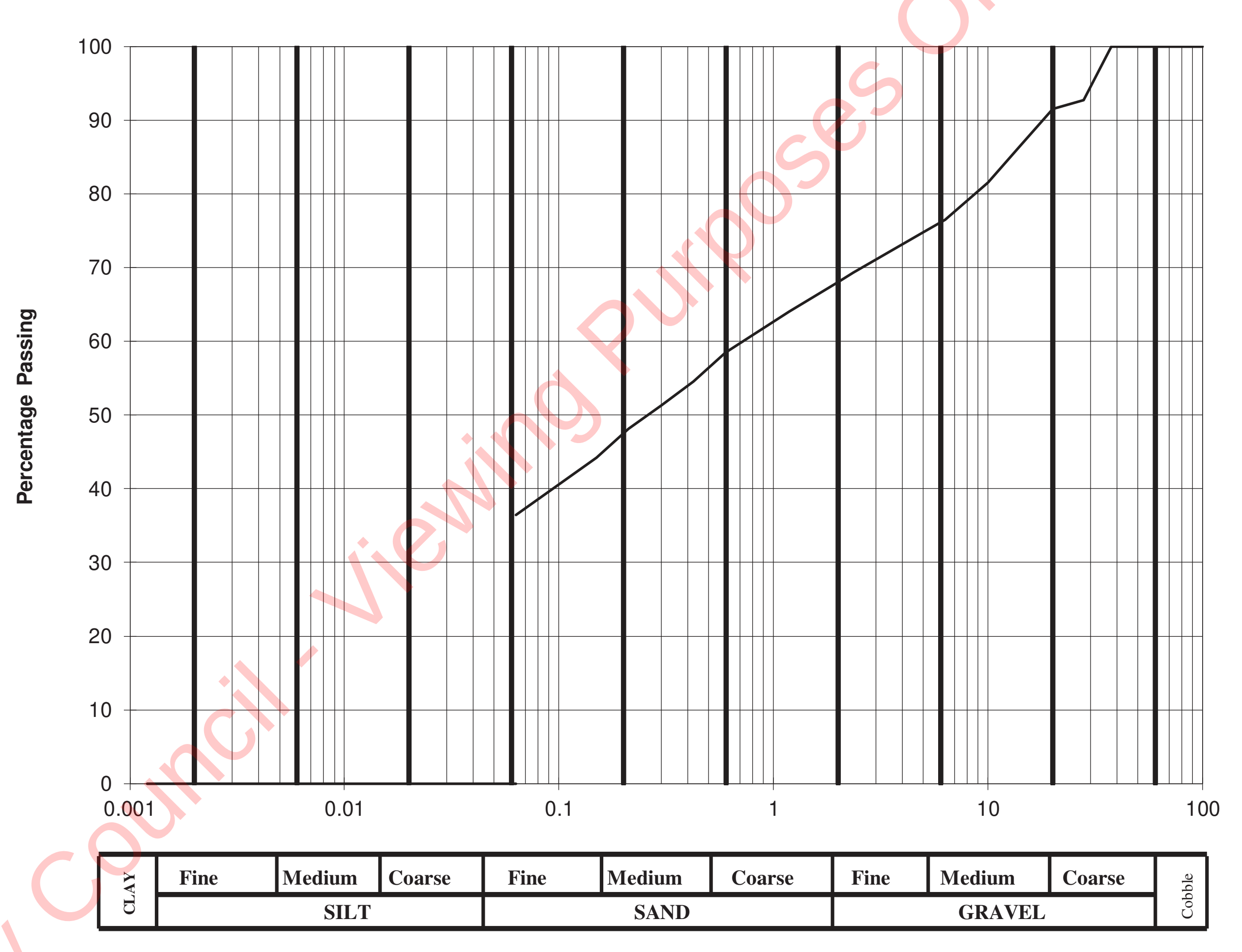
_________________________Paddy McGonagle
Site Investigations Ltd

BS 1377 Particle Size Analysis

Site Investigations Limited

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	92.7		
20	91.5		
14	86.4		
10	81.5		
6.3	76.5		
5.0	74.8		
2.36	69.3		
2.00	68		
1.18	64		
0.600	58.5		
0.425	54.5		
0.300	51.3		
0.212	48.1		
0.150	44.2		
0.063	37		

Cobbles, %	0
Gravel, %	32
Sand, %	31
Clay / Silt, %	37



Client :	Azra Property Company Ltd.
Project :	Station Road, Dunboyne

Lab. No :	22/792
Sample No :	MK06

Hole ID :	TP 02
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

File No: 5502
Printed 22/06/2022

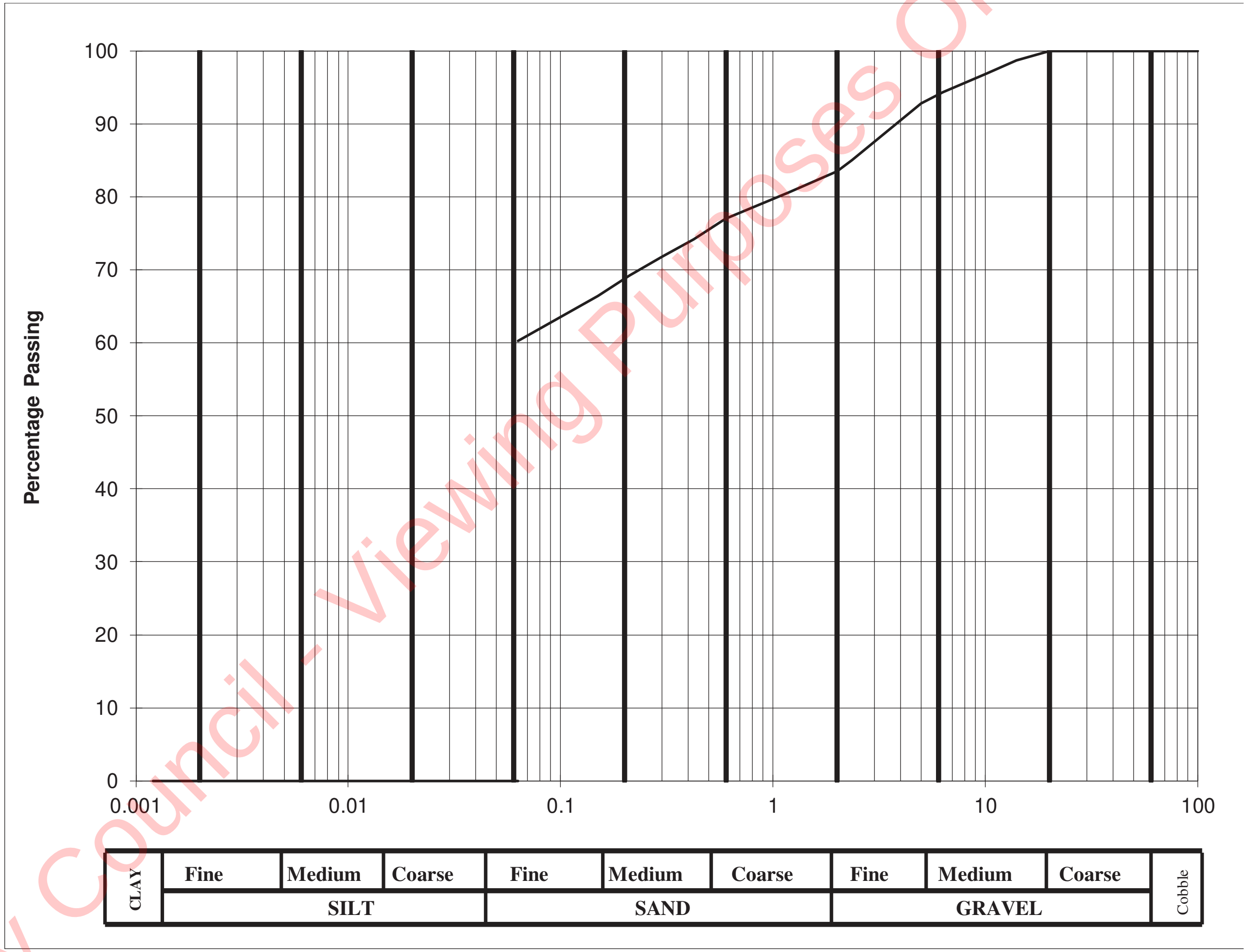
Paddy McGonagle
Site Investigations Ltd

BS 1377 Particle Size Analysis

Site Investigations Limited

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	96.8		
6.3	94.3		
5.0	92.8		
2.36	85		
2.00	83.5		
1.18	80.6		
0.600	77		
0.425	74.2		
0.300	71.8		
0.212	69.2		
0.150	66.4		
0.063	60		

Cobbles, %	0
Gravel, %	17
Sand, %	24
Clay / Silt, %	60



Client :	Azra Property Company Ltd.
Project :	Station Road, Dunboyne

Lab. No :	22/793
Sample No :	MK22

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

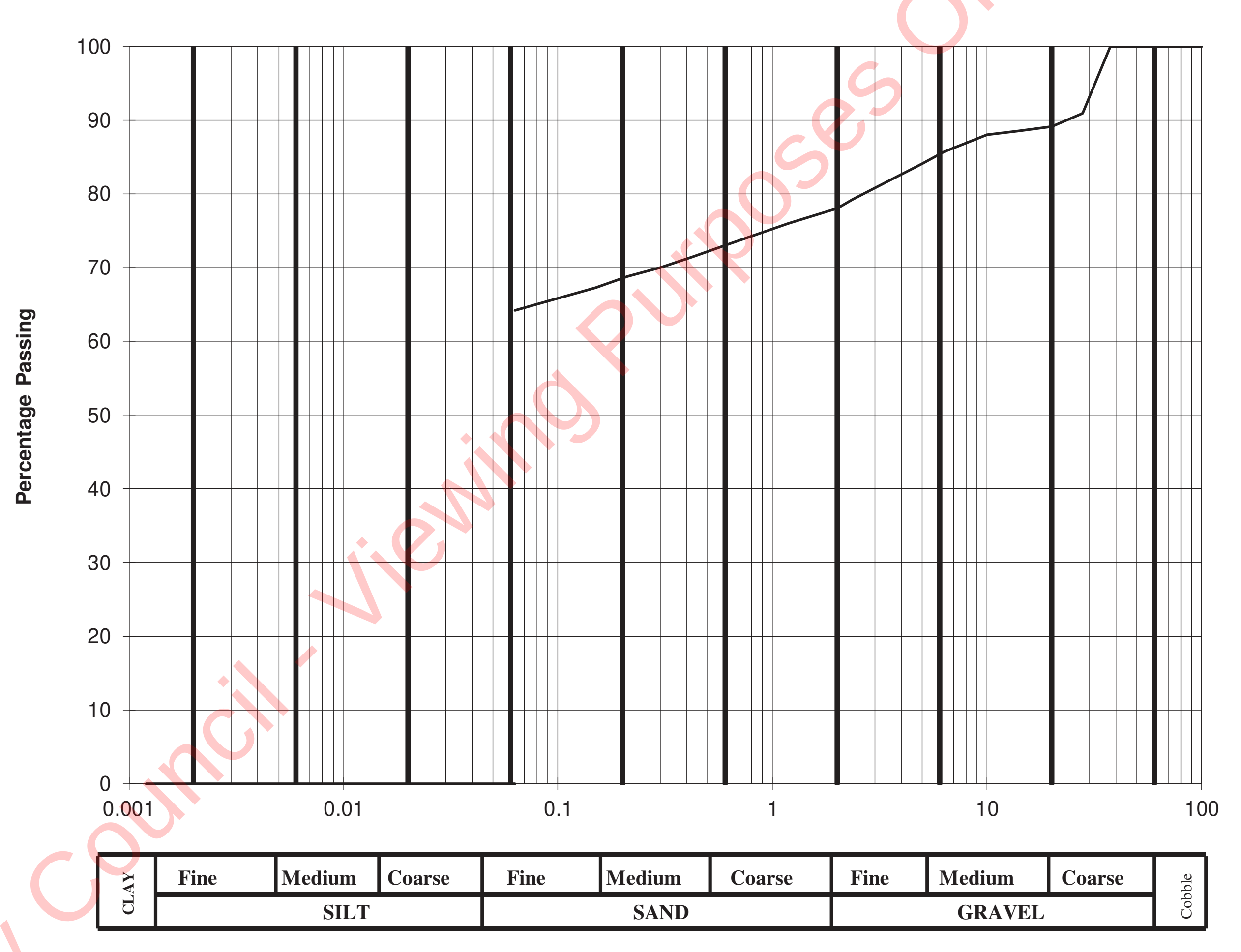
File No: 5502
Printed 22/06/2022

_________________________Paddy McGonagle
Site Investigations Ltd

BS 1377 Particle Size Analysis

BS Sieve size, mm	Percent passing	Hydrometer analysis Diameter, mm	Hydrometer analysis % passing
100	100	**0.0630**	
90	100	**0.0200**	
75	100	**0.0060**	
63	100	**0.0020**	
50	100		
37.5	100		
28	90.9		
20	89.1		
14	88.5		
10	88		
6.3	85.7		
5.0	84.1		
2.36	79.2		
2.00	78		
1.18	76		
0.600	73		
0.425	71.4		
0.300	70		
0.212	68.8		
0.150	67.3		
0.063	64		

Cobbles, %	0
Gravel, %	22
Sand, %	14
Clay / Silt, %	64



Client :	Azra Property Company Ltd.	Lab. No :	22/794	Hole ID :	TP 11
Project :	Station Road, Dunboyne	Sample No :	MK38	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

File No: 5502
Printed 22/06/2022

Paddy McGonagle
Site Investigations Ltd

Chemical Testing
In accordance with BS 1377: Part 3

Client	Azra Property Company Ltd.
Site	Station Road, Dunboyne
S.I. File No	5998 / 22
Test Lab	Site Investigations Ltd., Carhugar The Grange, 12th Lock Rd., Lucan Co. Dublin. Tel (01) 6108768 Email:info@siteinvestigations.ie
Report Date	20th June 2022

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) %	Loss on Ignition (Organic Content) %	Chloride ion Content (water:soil ratio 2:1) %	% passing 2mm	Remarks
TP02	1.00	MK06	22/792	8.23	0.126	0.086		0.08	68.0	
TP07	1.00	MK22	22/793	8.31	0.123	0.103		0.09	83.5	
TP11	1.00	MK38	22/794	8.21	0.122	0.095		0.11	78.0	

Printed 22/06/2022

_______________________Paddy McGonagle
Site Investigations Ltd.

Appendix 5

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:	21 June 2022
Customer:	Site Investigations Ltd
Sample Delivery Group (SDG):	220614-14
Your Reference:	5998
Location:	Station Road, Dunboyne
Report No:	651446
Order Number:	33/A

We received 5 samples on Monday June 13, 2022 and 5 of these samples were scheduled for analysis which was completed on Tuesday June 21, 2022. 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 Life Sciences Ltd 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

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

ilac-MRA

UKAS TESTING
1291

ALS Life Sciences Limited. Registered Office: Units 7 & 8 Hawarden Business Park, Manor Road, Hawarden, Deeside, CH5 3US. Registered in England and Wales No. 4057291.

Version: 3.3 Version Issued: 21/06/2022

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
26423579	TP1		0.50 - 0.50	09/06/2022
26423577	TP5		0.50 - 0.50	09/06/2022
26423576	TP10		0.50 - 0.50	09/06/2022
26423575	TP13		0.50 - 0.50	09/06/2022
26423574	TP14		0.50 - 0.50	09/06/2022

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

Results Legend

- X Test
- N No Determination Possible

Sample Types -

- S - Soil/Solid
- UNS - Unspecified Solid
- GW - Ground Water
- SW - Surface Water
- LE - Land Leachate
- PL - Prepared Leachate
- PR - Process Water
- SA - Saline Water
- TE - Trade Effluent
- TS - Treated Sewage
- US - Untreated Sewage
- RE - Recreational Water
- DW - Drinking Water Non-regulatory
- UNL - Unspecified Liquid
- SL - Sludge
- G - Gas
- OTH - Other

Lab Sample No(s)			26423579			26423577			26423576			26423575			26423574		
Customer Sample Reference			TP1			TP5			TP10			TP13			TP14		
AGS Reference																	
Depth (m)			0.50 - 0.50			0.50 - 0.50			0.50 - 0.50			0.50 - 0.50			0.50 - 0.50		
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
Anions by Kone (w)	All	NDPs: 0 Tests: 5	X			X			X			X			X		
CEN Readings	All	NDPs: 0 Tests: 5	X			X			X			X			X		
Chromium III	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Coronene	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 5	X			X			X			X			X		
Dissolved Organic/Inorganic Carbon	All	NDPs: 0 Tests: 5	X			X			X			X			X		
EPH by GCxGC-FID	All	NDPs: 0 Tests: 5		X			X			X			X			X	
EPH CWG GC (S)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Fluoride	All	NDPs: 0 Tests: 5	X			X			X			X			X		
GRO by GC-FID (S)	All	NDPs: 0 Tests: 5			X			X			X			X			X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Loss on Ignition in soils	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Mercury Dissolved	All	NDPs: 0 Tests: 5	X			X			X			X			X		
Metals in solid samples by OES	All	NDPs: 0 Tests: 5		X			X			X			X			X	
PAH 16 & 17 Calc	All	NDPs: 0 Tests: 5		X			X			X			X			X	

CERTIFICATE OF ANALYSIS

SDG: 220614-14
Client Ref.: 5998
Report Number: 651446
Location: Station Road, Dunboyne
Superseded Report:

Results Legend

X **Test**
🟥 N **No Determination Possible**

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Lab Sample No(s)			26423579			26423577			26423576			26423575			26423574		
Customer Sample Reference			TP1			TP5			TP10			TP13			TP14		
AGS Reference																	
Depth (m)			0.50 - 0.50			0.50 - 0.50			0.50 - 0.50			0.50 - 0.50			0.50 - 0.50		
Container			1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)	1kg TUB with Handle (ALE260)	250g Amber Jar (ALE210)	60g VOC (ALE215)
Sample Type			S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
PAH by GCMS	All	NDPs: 0 Tests: 5		X			X			X			X			X	
PCBs by GCMS	All	NDPs: 0 Tests: 5		X			X			X			X			X	
pH	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Phenols by HPLC (W)	All	NDPs: 0 Tests: 5	X			X			X			X			X		
Sample description	All	NDPs: 0 Tests: 5		X			X			X			X			X	
Total Dissolved Solids on Leachates	All	NDPs: 0 Tests: 5	X			X			X			X			X		
Total Organic Carbon	All	NDPs: 0 Tests: 5		X			X			X			X			X	
TPH CWG GC (S)	All	NDPs: 0 Tests: 5		X			X			X			X			X	
VOC MS (S)	All	NDPs: 0 Tests: 5			X			X			X			X			X

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
26423579	TP1	0.50 - 0.50	Dark Brown	Sandy Loam	Stones	None
26423577	TP5	0.50 - 0.50	Light Brown	Sandy Loam	Stones	Vegetation
26423576	TP10	0.50 - 0.50	Light Brown	Sandy Loam	Stones	None
26423575	TP13	0.50 - 0.50	Dark Brown	Sandy Clay Loam	Stones	Vegetation
26423574	TP14	0.50 - 0.50	Dark Brown	Sandy Clay 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 ocurring 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.

Validated

CERTIFICATE OF ANALYSIS

SDG: 220614-14
Client Ref.: 5998
Report Number: 651446
Location: Station Road, Dunboyne
Superseded Report:

Results Legend

#	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)

		Customer Sample Ref.	TP1	TP5	TP10	TP13	TP14	
		Depth (m)	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	
		Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
		Date Sampled	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022	
		Sample Time	.	.	.	.	.	
		Date Received	13/06/2022	13/06/2022	13/06/2022	13/06/2022	13/06/2022	
		SDG Ref	220614-14	220614-14	220614-14	220614-14	220614-14	
		Lab Sample No.(s)	26423579	26423577	26423576	26423575	26423574	
		AGS Reference						
Component	**LOD/Units**	**Method**						
Moisture Content Ratio (% of as received sample)	%	PM024	14	17	17	16	17	
Loss on ignition	<0.7 %	TM018	4.98 M	5.24 M	4.62 M	4.01 M	6.22 M	
Organic Carbon, Total	<0.2 %	TM132	1.23 M	0.869 M	0.601 M	0.668 M	1.15 M	
pH	1 pH Units	TM133	8.25 M	8.27 M	7.93 M	8.47 M	8.22 M	
Chromium, Hexavalent	<0.6 mg/kg	TM151	<0.6 #	<0.6 #	<0.6 #	<0.6 #	<0.6 #	
PCB congener 28	<3 µg/kg	TM168	<3 M	<3 M	<3 M	<3 M	<3 M	
PCB congener 52	<3 µg/kg	TM168	<3 M	<3 M	<3 M	<3 M	<3 M	
PCB congener 101	<3 µg/kg	TM168	<3 M	<3 M	<3 M	<3 M	<3 M	
PCB congener 118	<3 µg/kg	TM168	<3 M	<3 M	<3 M	<3 M	<3 M	
PCB congener 138	<3 µg/kg	TM168	<3 M	<3 M	<3 M	<3 M	<3 M	
PCB congener 153	<3 µg/kg	TM168	<3 M	<3 M	<3 M	<3 M	<3 M	
PCB congener 180	<3 µg/kg	TM168	<3 M	<3 M	<3 M	<3 M	<3 M	
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168	<21	<21	<21	<21	<21	
Chromium, Trivalent	<0.9 mg/kg	TM181	10.2	7.5	8.03	5.9	6.28	
Antimony	<0.6 mg/kg	TM181	4.26 #	2.29 #	1.34 #	0.667 #	1.31 #	
Arsenic	<0.6 mg/kg	TM181	16.4 M	20.1 M	19.2 M	11.8 M	15.5 M	
Barium	<0.6 mg/kg	TM181	85.2 #	72.4 #	105 #	197 #	159 #	
Cadmium	<0.02 mg/kg	TM181	3.16 M	3.18 M	3.14 M	2.04 M	2.64 M	
Chromium	<0.9 mg/kg	TM181	10.2 M	7.5 M	8.03 M	5.9 M	6.28 M	
Copper	<1.4 mg/kg	TM181	28.1 M	45.9 M	50.6 M	12.2 M	38.7 M	
Lead	<0.7 mg/kg	TM181	42.9 M	24.4 M	22.7 M	13.7 M	19.7 M	
Mercury	<0.1 mg/kg	TM181	<0.1 M	<0.1 M	<0.1 M	<0.1 M	<0.1 M	
Molybdenum	<0.1 mg/kg	TM181	3.49 #	4.94 #	4.93 #	4.76 #	3.63 #	
Nickel	<0.2 mg/kg	TM181	37.1 M	64.3 M	67.4 M	32.1 M	56.4 M	
Selenium	<1 mg/kg	TM181	4.34 #	3.8 #	2.93 #	3.24 #	4.2 #	
Zinc	<1.9 mg/kg	TM181	187 M	137 M	122 M	87.6 M	120 M	
PAH Total 17 (inc Coronene) Moisture Corrected	<10 mg/kg	TM410	<10	<10	<10	<10	<10	
Coronene	<200 µg/kg	TM410	<200	<200	<200	<200	<200	
Mineral Oil >C10-C40 (EH_2D_AL)	<5 mg/kg	TM415	6.03	<5	<5	<5	<5	

Validated

CERTIFICATE OF ANALYSIS

SDG: 220614-14
Client Ref.: 5998
Report Number: 651446
Location: Station Road, Dunboyne
Superseded Report:

PAH by GCMS

Results Legend

#	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)

Customer Sample Ref.			TP1	TP5	TP10	TP13	TP14	
Depth (m)			0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	
Sample Type			Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
Date Sampled			09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022	
Sample Time			.	.	.	.	.	
Date Received			13/06/2022	13/06/2022	13/06/2022	13/06/2022	13/06/2022	
SDG Ref			220614-14	220614-14	220614-14	220614-14	220614-14	
Lab Sample No.(s)			26423579	26423577	26423576	26423575	26423574	
AGS Reference								
Component	**LOD/Units**	**Method**						
Naphthalene	<9 µg/kg	TM218	<9 M	<9 M	<9 M	<9 M	<9 M	
Acenaphthylene	<12 µg/kg	TM218	<12 M	<12 M	<12 M	<12 M	<12 M	
Acenaphthene	<8 µg/kg	TM218	<8 M	<8 M	<8 M	<8 M	<8 M	
Fluorene	<10 µg/kg	TM218	<10 M	<10 M	<10 M	<10 M	<10 M	
Phenanthrene	<15 µg/kg	TM218	<15 M	<15 M	<15 M	<15 M	<15 M	
Anthracene	<16 µg/kg	TM218	<16 M	<16 M	<16 M	<16 M	<16 M	
Fluoranthene	<17 µg/kg	TM218	<17 M	<17 M	<17 M	<17 M	<17 M	
Pyrene	<15 µg/kg	TM218	<15 M	<15 M	<15 M	<15 M	<15 M	
Benz(a)anthracene	<14 µg/kg	TM218	<14 M	<14 M	<14 M	<14 M	<14 M	
Chrysene	<10 µg/kg	TM218	<10 M	<10 M	<10 M	<10 M	<10 M	
Benzo(b)fluoranthene	<15 µg/kg	TM218	<15 M	<15 M	<15 M	<15 M	<15 M	
Benzo(k)fluoranthene	<14 µg/kg	TM218	<14 M	<14 M	<14 M	<14 M	<14 M	
Benzo(a)pyrene	<15 µg/kg	TM218	<15 M	<15 M	<15 M	<15 M	<15 M	
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	<18 M	<18 M	<18 M	<18 M	<18 M	
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	<23 M	<23 M	<23 M	<23 M	<23 M	
Benzo(g,h,i)perylene	<24 µg/kg	TM218	<24 M	<24 M	<24 M	<24 M	<24 M	
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	<118	<118	<118	<118	<118	

Validated

CERTIFICATE OF ANALYSIS

SDG: 220614-14
Client Ref.: 5998
Report Number: 651446
Location: Station Road, Dunboyne
Superseded Report:

TPH CWG (S)

Results Legend

#	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)

Customer Sample Ref.	TP1	TP5	TP10	TP13	TP14	
Depth (m)	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	
Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	
Date Sampled	09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022	
Sample Time	.	.	.	.	.	
Date Received	13/06/2022	13/06/2022	13/06/2022	13/06/2022	13/06/2022	
SDG Ref	220614-14	220614-14	220614-14	220614-14	220614-14	
Lab Sample No.(s)	26423579	26423577	26423576	26423575	26423574	
AGS Reference						

Component	LOD/Units	Method	TP1	TP5	TP10	TP13	TP14	
GRO Surrogate % recovery**	%	TM089	70.6	97.1	127	95.2	91	
Aliphatics >C5-C6 (HS_1D_AL)	<10 µg/kg	TM089	<10	<10	<10	<10	<10	
Aliphatics >C6-C8 (HS_1D_AL)	<10 µg/kg	TM089	<10	<10	<10	<10	<10	
Aliphatics >C8-C10 (HS_1D_AL)	<10 µg/kg	TM089	<10	<10	<10	<10	<10	
Aliphatics >C10-C12 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000 #	<1000 #	<1000 #	<1000 #	<1000 #	
Aliphatics >C12-C16 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000 #	<1000 #	<1000 #	<1000 #	<1000 #	
Aliphatics >C16-C21 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000 #	<1000 #	<1000 #	<1000 #	<1000 #	
Aliphatics >C21-C35 (EH_2D_AL_#1)	<1000 µg/kg	TM414	3970 #	1740 #	<1000 #	1090 #	2660 #	
Aliphatics >C35-C44 (EH_2D_AL_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	<1000	<1000	
Total Aliphatics >C10-C44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	<5000	<5000	<5000	<5000	<5000	
Total Aliphatics & Aromatics >C10-C44 (EH_2D_Total_#1)	<10000 µg/kg	TM414	<10000	<10000	<10000	<10000	<10000	
Aromatics >EC5-EC7 (HS_1D_AR)	<10 µg/kg	TM089	<10	<10	<10	<10	<10	
Aromatics >EC7-EC8 (HS_1D_AR)	<10 µg/kg	TM089	<10	<10	<10	<10	<10	
Aromatics >EC8-EC10 (HS_1D_AR)	<10 µg/kg	TM089	<10	<10	<10	<10	<10	
Aromatics > EC10-EC12 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000 #	<1000 #	<1000 #	<1000 #	<1000 #	
Aromatics > EC12-EC16 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000 #	<1000 #	<1000 #	<1000 #	<1000 #	
Aromatics > EC16-EC21 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000 #	<1000 #	<1000 #	<1000 #	<1000 #	
Aromatics > EC21-EC35 (EH_2D_AR_#1)	<1000 µg/kg	TM414	3480 #	<1000 #	<1000 #	<1000 #	1480 #	
Aromatics >EC35-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	<1000	1170	
Aromatics > EC40-EC44 (EH_2D_AR_#1)	<1000 µg/kg	TM414	<1000	<1000	<1000	<1000	<1000	
Total Aromatics > EC10-EC44 (EH_2D_AR_#1)	<5000 µg/kg	TM414	<5000	<5000	<5000	<5000	<5000	
Total Aliphatics & Aromatics >C5-C44 (EH_2D_Total_#1+HS_1D_Total)	<10000 µg/kg	TM414	<10000	<10000	<10000	<10000	<10000	
GRO >C5-C6 (HS_1D)	<20 µg/kg	TM089	<20	<20	<20	<20	<20	
GRO >C6-C7 (HS_1D)	<20 µg/kg	TM089	<20	<20	<20	<20	<20	
GRO >C7-C8 (HS_1D)	<20 µg/kg	TM089	<20	<20	<20	<20	<20	
GRO >C8-C10 (HS_1D)	<20 µg/kg	TM089	<20	<20	<20	<20	<20	
GRO >C10-C12 (HS_1D)	<20 µg/kg	TM089	<20	<20	<20	<20	<20	
Total Aliphatics >C5-C10 (HS_1D_AL_TOTAL)	<50 µg/kg	TM089	<50	<50	<50	<50	<50	
Total Aromatics >EC5-EC10 (HS_1D_AR_TOTAL)	<50 µg/kg	TM089	<50	<50	<50	<50	<50	
GRO >C5-C10 (HS_1D_TOTAL)	<20 µg/kg	TM089	<20	<20	<20	<20	<20	

Validated

CERTIFICATE OF ANALYSIS

SDG: 220614-14
Client Ref.: 5998
Report Number: 651446
Location: Station Road, Dunboyne
Superseded Report:

VOC MS (S)

Results Legend

#	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)

Component	LOD/Units	Method	TP1	TP5	TP10	TP13	TP14
Customer Sample Ref.			TP1	TP5	TP10	TP13	TP14
Depth (m)			0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50
Sample Type			Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Date Sampled			09/06/2022	09/06/2022	09/06/2022	09/06/2022	09/06/2022
Sample Time			.	.	.	.	.
Date Received			13/06/2022	13/06/2022	13/06/2022	13/06/2022	13/06/2022
SDG Ref			220614-14	220614-14	220614-14	220614-14	220614-14
Lab Sample No.(s)			26423579	26423577	26423576	26423575	26423574
AGS Reference							
Dibromofluoromethane**	%	TM116	112	115	115	123	118
Toluene-d8**	%	TM116	99.2	98.7	98.2	98.6	98.8
4-Bromofluorobenzene**	%	TM116	90.6	81.4	76.3	80.3	75.9
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<100 M	<10 M	<10 M	<10 M	<10 M
Benzene	<9 µg/kg	TM116	<90 M	<9 M	<9 M	<9 M	<9 M
Toluene	<7 µg/kg	TM116	<70 M	<7 M	<7 M	<7 M	<7 M
Ethylbenzene	<4 µg/kg	TM116	<40 M	<4 M	<4 M	<4 M	<4 M
p/m-Xylene	<10 µg/kg	TM116	<100 #	<10 #	<10 #	<10 #	<10 #
o-Xylene	<10 µg/kg	TM116	<100 M	<10 M	<10 M	<10 M	<10 M

12:37:33 21/06/2022

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Station Road, Dunboyne
Mass Sample taken (kg)	0.108	**Natural Moisture Content (%)**	19.8
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	83.5
Particle Size <4mm	>95%		

Case	
SDG	220614-14
Lab Sample Number(s)	26423574
Sampled Date	09-Jun-2022
Customer Sample Ref.	TP14
Depth (m)	0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Solid Waste Analysis	**Result**	**Inert Waste Landfill**	**Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon (%)	1.15	3	5	6
Loss on Ignition (%)	6.22	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.22	-	>6	-
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	<0.0005	<0.0005	<0.005	<0.005	0.5	2	25
Barium	0.00295	<0.0002	0.0295	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.0011	<0.0003	0.011	<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	0.000441	<0.0004	0.00441	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<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	<0.001	<0.001	<0.01	<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	88	<10	880	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	3.73	<3	37.3	<30	500	800	1000

Leach Test Information

Date Prepared	15-Jun-2022
pH (pH Units)	8.08
Conductivity (µS/cm)	114.00
Temperature (°C)	19.50
Volume Leachant (Litres)	0.882

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

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Validated

CERTIFICATE OF ANALYSIS

SDG: 220614-14
Client Ref.: 5998
Report Number: 651446
Location: Station Road, Dunboyne
Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Station Road, Dunboyne
Mass Sample taken (kg)	0.104	**Natural Moisture Content (%)**	15.7
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	86.4
Particle Size <4mm	>95%		

Case	
SDG	220614-14
Lab Sample Number(s)	26423575
Sampled Date	09-Jun-2022
Customer Sample Ref.	TP13
Depth (m)	0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Solid Waste Analysis	Result	Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.668	3	5	6
Loss on Ignition (%)	4.01	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.47	-	>6	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	C_2 Concⁿ in 10:1 eluate (mg/l)		A_2 10:1 concⁿ 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	<0.0005	<0.0005	<0.005	<0.005	0.5	2	25
Barium	0.000973	<0.0002	0.00973	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.000621	<0.0003	0.00621	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.00575	<0.003	0.0575	<0.03	0.5	10	30
Nickel	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<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	<0.001	<0.001	<0.01	<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	70.1	<10	701	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	7.92	<3	79.2	<30	500	800	1000

Leach Test Information

Date Prepared	14-Jun-2022
pH (pH Units)	8.80
Conductivity (µS/cm)	103.00
Temperature (°C)	17.40
Volume Leachant (Litres)	0.885

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

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Validated

CERTIFICATE OF ANALYSIS

SDG: 220614-14
Client Ref.: 5998
Report Number: 651446
Location: Station Road, Dunboyne
Superseded Report:

CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Station Road, Dunboyne
Mass Sample taken (kg)	0.110	**Natural Moisture Content (%)**	21.7
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	82.1
Particle Size <4mm	>95%		

Case	
SDG	220614-14
Lab Sample Number(s)	26423576
Sampled Date	09-Jun-2022
Customer Sample Ref.	TP10
Depth (m)	0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Solid Waste Analysis	Result	Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.601	3	5	6
Loss on Ignition (%)	4.62	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	7.93	-	>6	-
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	<0.0005	<0.0005	<0.005	<0.005	0.5	2	25
Barium	0.00383	<0.0002	0.0383	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.000514	<0.0003	0.00514	<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	0.000452	<0.0004	0.00452	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<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	0.0225	<0.001	0.225	<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	94.9	<10	949	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	8.03	<3	80.3	<30	500	800	1000

Leach Test Information

Date Prepared	14-Jun-2022
pH (pH Units)	8.01
Conductivity (µS/cm)	121.00
Temperature (°C)	18.50
Volume Leachant (Litres)	0.880

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
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CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Station Road, Dunboyne
Mass Sample taken (kg)	0.105	**Natural Moisture Content (%)**	16.3
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	86
Particle Size <4mm	>95%		

Case	
SDG	220614-14
Lab Sample Number(s)	26423577
Sampled Date	09-Jun-2022
Customer Sample Ref.	TP5
Depth (m)	0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Solid Waste Analysis	Result	Inert Waste Landfill	Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill	Hazardous Waste Landfill
Total Organic Carbon (%)	0.869	3	5	6
Loss on Ignition (%)	5.24	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	<5	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.27	-	>6	-
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	<0.0005	<0.0005	<0.005	<0.005	0.5	2	25
Barium	0.0014	<0.0002	0.014	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.000872	<0.0003	0.00872	<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	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<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	<0.001	<0.001	<0.01	<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	81	<10	810	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	4.52	<3	45.2	<30	500	800	1000

Leach Test Information

Date Prepared	14-Jun-2022
pH (pH Units)	8.61
Conductivity (µS/cm)	104.00
Temperature (°C)	18.50
Volume Leachant (Litres)	0.885

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

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CEN 10:1 SINGLE STAGE LEACHATE TEST

WAC ANALYTICAL RESULTS

REF : BS EN 12457/2

Client Reference		**Site Location**	Station Road, Dunboyne
Mass Sample taken (kg)	0.103	**Natural Moisture Content (%)**	14.7
Mass of dry sample (kg)	0.090	**Dry Matter Content (%)**	87.2
Particle Size <4mm	>95%		

Case	
SDG	220614-14
Lab Sample Number(s)	26423579
Sampled Date	09-Jun-2022
Customer Sample Ref.	TP1
Depth (m)	0.50 - 0.50

Landfill Waste Acceptance Criteria Limits

Solid Waste Analysis	**Result**	**Inert Waste Landfill**	**Stable Non-reactive Hazardous Waste in Non-Hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon (%)	1.23	3	5	6
Loss on Ignition (%)	4.98	-	-	10
Sum of BTEX (mg/kg)	-	-	-	-
Sum of 7 PCBs (mg/kg)	<0.021	1	-	-
Mineral Oil (mg/kg) (EH_2D_AL)	6.03	500	-	-
PAH Sum of 17 (mg/kg)	<10	100	-	-
pH (pH Units)	8.25	-	>6	-
ANC to pH 6 (mol/kg)	-	-	-	-
ANC to pH 4 (mol/kg)	-	-	-	-

Eluate Analysis	**C2** Conc^n in 10:1 eluate (mg/l)		**A2** 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	<0.0005	<0.0005	<0.005	<0.005	0.5	2	25
Barium	0.00452	<0.0002	0.0452	<0.002	20	100	300
Cadmium	<0.00008	<0.00008	<0.0008	<0.0008	0.04	1	5
Chromium	<0.001	<0.001	<0.01	<0.01	0.5	10	70
Copper	0.000982	<0.0003	0.00982	<0.003	2	50	100
Mercury Dissolved (CVAF)	<0.00001	<0.00001	<0.0001	<0.0001	0.01	0.2	2
Molybdenum	0.0128	<0.003	0.128	<0.03	0.5	10	30
Nickel	<0.0004	<0.0004	<0.004	<0.004	0.4	10	40
Lead	<0.0002	<0.0002	<0.002	<0.002	0.5	10	50
Antimony	<0.001	<0.001	<0.01	<0.01	0.06	0.7	5
Selenium	0.00369	<0.001	0.0369	<0.01	0.1	0.5	7
Zinc	<0.001	<0.001	<0.01	<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)	3.4	<2	34	<20	1000	20000	50000
Total Dissolved Solids	90.6	<10	906	<100	4000	60000	100000
Total Monohydric Phenols (W)	<0.016	<0.016	<0.16	<0.16	1	-	-
Dissolved Organic Carbon	5.6	<3	56	<30	500	800	1000

Leach Test Information

Date Prepared	14-Jun-2022
pH (pH Units)	7.75
Conductivity (µS/cm)	119.00
Temperature (°C)	18.00
Volume Leachant (Litres)	0.887

Solid Results are expressed on a dry weight basis, after correction for moisture content where applicable
Stated limits are for guidance only and ALS Environmental cannot be held responsible for any discrepancies with current legislation

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Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
PM115		Leaching Procedure for CEN One Stage Leach Test 2:1 & 10:1 1 Step
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM123	BS 2690: Part 121:1981	The Determination of Total Dissolved Solids in Water
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM152	ISO 17294-2:2016 Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS)	Analysis of Aqueous Samples by ICP-MS
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC
TM410	Shaker extraction-In house coronene method	Determination of Coronene in soils by GCMS
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID
TM415	Analysis of Petroleum Hydrocarbons in Environmental Media.	Determination of Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.
Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM).

Test Completion Dates

Lab Sample No(s)	26423579	26423577	26423576	26423575	26423574
Customer Sample Ref.	TP1	TP5	TP10	TP13	TP14
AGS Ref.					
Depth	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50	0.50 - 0.50
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Anions by Kone (w)	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
CEN 10:1 Leachate (1 Stage)	18-Jun-2022	18-Jun-2022	18-Jun-2022	18-Jun-2022	15-Jun-2022
CEN Readings	20-Jun-2022	20-Jun-2022	20-Jun-2022	20-Jun-2022	18-Jun-2022
Chromium III	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	16-Jun-2022
Coronene	16-Jun-2022	16-Jun-2022	16-Jun-2022	16-Jun-2022	16-Jun-2022
Dissolved Metals by ICP-MS	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	20-Jun-2022
Dissolved Organic/Inorganic Carbon	21-Jun-2022	21-Jun-2022	21-Jun-2022	21-Jun-2022	18-Jun-2022
EPH by GCxGC-FID	16-Jun-2022	16-Jun-2022	16-Jun-2022	16-Jun-2022	16-Jun-2022
EPH CWG GC (S)	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
Fluoride	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	18-Jun-2022
GRO by GC-FID (S)	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
Hexavalent Chromium (s)	16-Jun-2022	16-Jun-2022	16-Jun-2022	16-Jun-2022	16-Jun-2022
Loss on Ignition in soils	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	16-Jun-2022
Mercury Dissolved	20-Jun-2022	20-Jun-2022	20-Jun-2022	20-Jun-2022	21-Jun-2022
Metals in solid samples by OES	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
Moisture at 105C	14-Jun-2022	14-Jun-2022	14-Jun-2022	14-Jun-2022	15-Jun-2022
PAH 16 & 17 Calc	16-Jun-2022	16-Jun-2022	16-Jun-2022	16-Jun-2022	16-Jun-2022
PAH by GCMS	16-Jun-2022	15-Jun-2022	16-Jun-2022	15-Jun-2022	15-Jun-2022
PCBs by GCMS	16-Jun-2022	16-Jun-2022	16-Jun-2022	16-Jun-2022	16-Jun-2022
pH	15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022	15-Jun-2022
Phenols by HPLC (W)	20-Jun-2022	20-Jun-2022	20-Jun-2022	20-Jun-2022	21-Jun-2022
Sample description	14-Jun-2022	14-Jun-2022	14-Jun-2022	14-Jun-2022	14-Jun-2022
Total Dissolved Solids on Leachates	16-Jun-2022	16-Jun-2022	16-Jun-2022	16-Jun-2022	20-Jun-2022
Total Organic Carbon	17-Jun-2022	20-Jun-2022	20-Jun-2022	20-Jun-2022	17-Jun-2022
TPH CWG GC (S)	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022
VOC MS (S)	20-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022	17-Jun-2022

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) 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 30 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 one month 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.

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 andd 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 Anthophyllite	-
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.

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:	27 June 2022
Customer:	Site Investigations Ltd
Sample Delivery Group (SDG):	220623-63
Your Reference:	5998
Location:	Station Road, Dunboyne
Report No:	652161
Order Number:	33/A/22

We received 3 samples on Wednesday June 22, 2022 and 3 of these samples were scheduled for analysis which was completed on Monday June 27, 2022. 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 Life Sciences Ltd 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

1291

Validated

CERTIFICATE OF ANALYSIS

SDG: 220623-63
Client Ref.: 5998
Report Number: 652161
Location: Station Road, Dunboyne
Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
26475422	TP 02		1.00 - 1.00	14/06/2022
26475424	TP 07		1.00 - 1.00	14/06/2022
26475425	TP 11		1.00 - 1.00	14/06/2022

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

Validated

CERTIFICATE OF ANALYSIS

SDG: 220623-63
Client Ref.: 5998
Report Number: 652161
Location: Station Road, Dunboyne
Superseded Report:

Results Legend

- X **Test**
- 🟥 N **No Determination Possible**

Sample Types -

- S - Soil/Solid
- UNS - Unspecified Solid
- GW - Ground Water
- SW - Surface Water
- LE - Land Leachate
- PL - Prepared Leachate
- PR - Process Water
- SA - Saline Water
- TE - Trade Effluent
- TS - Treated Sewage
- US - Untreated Sewage
- RE - Recreational Water
- DW - Drinking Water Non-regulatory
- UNL - Unspecified Liquid
- SL - Sludge
- G - Gas
- OTH - Other

Lab Sample No(s)			26475422	26475424	26475425
Customer Sample Reference			TP 02	TP 07	TP 11
AGS Reference					
Depth (m)			1.00 - 1.00	1.00 - 1.00	1.00 - 1.00
Container			250g Amber Jar (ALE210)	250g Amber Jar (ALE210)	250g Amber Jar (ALE210)
Sample Type			S	S	S
Loss on Ignition in soils	All	NDPs: 0 Tests: 3	X	X	X
Sample description	All	NDPs: 0 Tests: 3	X	X	X

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
26475422	TP 02	1.00 - 1.00	Dark Brown	Clay Loam	Stones	None
26475424	TP 07	1.00 - 1.00	Dark Brown	Clay	Stones	Vegetation
26475425	TP 11	1.00 - 1.00	Dark Brown	Clay 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 ocurring 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.

Validated

CERTIFICATE OF ANALYSIS

SDG: 220623-63
Client Ref.: 5998
Report Number: 652161
Location: Station Road, Dunboyne
Superseded Report:

Results Legend	
#	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)

		Customer Sample Ref.	TP 02	TP 07	TP 11
		Depth (m)	1.00 - 1.00	1.00 - 1.00	1.00 - 1.00
		Sample Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
		Date Sampled	14/06/2022	14/06/2022	14/06/2022
		Sample Time	.	.	.
		Date Received	22/06/2022	22/06/2022	22/06/2022
		SDG Ref	220623-63	220623-63	220623-63
		Lab Sample No.(s)	26475422	26475424	26475425
		AGS Reference			
Component	**LOD/Units**	**Method**			
Moisture Content Ratio (% of as received sample)	%	PM024	25	15	22
Loss on ignition	<0.7 %	TM018	6.95 M	6.58 M	5.1 M

14:53:19 27/06/2022

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM).

Test Completion Dates

Lab Sample No(s)	26475422	26475424	26475425
Customer Sample Ref.	TP 02	TP 07	TP 11
AGS Ref.			
Depth	1.00 - 1.00	1.00 - 1.00	1.00 - 1.00
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Loss on Ignition in soils	27-Jun-2022	27-Jun-2022	27-Jun-2022
Sample description	23-Jun-2022	23-Jun-2022	23-Jun-2022

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35ºC) 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 30 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 one month 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.

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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**
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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 andd 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 Anthophyllite	-
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 6

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:

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

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

L0X8Y-UGH0D-CIE2X

Job name

5998

Description/Comments

Client: Azra Property Company Ltd
Engineer: Waterman Moylan

Project

Station Road

Site

Dunboyne, Co. Meath

Classified by

Name:
Stephen Letch
Date:
22 Jun 2022 16:34 GMT
Telephone:
00353 86817 9449

Company:
Site Investigations Ltd

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

HazWasteOnline™ Certification: **CERTIFIED**

Course	**Date**
Hazardous Waste Classification	09 Oct 2019

Next 3 year Refresher due by Oct 2022

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	2
2	TP10-0.50	0.50	Non Hazardous		Pass	Pass	6
3	TP13-0.50	0.50	Non Hazardous		Pass	Pass	10
4	TP14-0.50	0.50	Non Hazardous		Pass	Pass	14
5	TP05-0.50	0.50	Non Hazardous		Pass	Pass	18

Related documents

#	Name	Description
1	220614-14.hwol	.hwol file used to create 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: 22 Jun 2022 16:34 GMT

Classification of sample: TP01-0.50

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

Sample details

Sample name:
TP01-0.50
Sample Depth:
0.50 m
Moisture content:
14%
(wet weight correction)

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

Hazard properties

None identified

Determinands

Moisture content: 14% 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				☑							
3		antimony { antimony trioxide }				4.26	mg/kg	1.197	4.386	mg/kg	0.000439 %	✓	
		051-005-00-X	215-175-0	1309-64-4									
4		arsenic { arsenic pentoxide }				16.4	mg/kg	1.534	21.634	mg/kg	0.00216 %	✓	
		033-004-00-6	215-116-9	1303-28-2									
5		barium { ● barium sulphide }				85.2	mg/kg	1.233	90.381	mg/kg	0.00904 %	✓	
		016-002-00-X	244-214-4	21109-95-5									
6		cadmium { cadmium sulfate }				3.16	mg/kg	1.855	5.04	mg/kg	0.000504 %	✓	
		048-009-00-9	233-331-6	10124-36-4									
7		copper { dicopper oxide; copper (I) oxide }				28.1	mg/kg	1.126	27.208	mg/kg	0.00272 %	✓	
		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	42.9	mg/kg		36.894	mg/kg	0.00369 %	✓	
		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 }				3.49	mg/kg	1.5	4.503	mg/kg	0.00045 %	✓	
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel sulfate }				37.1	mg/kg	2.637	84.126	mg/kg	0.00841 %	✓	
		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 }				4.34	mg/kg	1.405	5.244	mg/kg	0.000524 %	✓	
		034-002-00-8											
13		zinc { zinc sulphate }				187	mg/kg	2.469	397.112	mg/kg	0.0397 %	✓	
		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) }				10.2	mg/kg	1.462	12.821	mg/kg	0.00128 %	✓	
			215-160-9	1308-38-9									

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6	mg/kg	1.923	<1.154	mg/kg	<0.000115 %		<LOD
16		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
17	●	acenaphthylene		205-917-1	208-96-8		<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
18	●	acenaphthene		201-469-6	83-32-9		<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
19	●	fluorene		201-695-5	86-73-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
20	●	phenanthrene		201-581-5	85-01-8		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
21	●	anthracene		204-371-1	120-12-7		<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
22	●	fluoranthene		205-912-4	206-44-0		<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		<LOD
23	●	pyrene		204-927-3	129-00-0		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
24		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
25		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
26		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
27		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
28		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
29	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
30		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
31	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
32	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<LOD
34		benzene	601-020-00-8	200-753-7	71-43-2		<0.09	mg/kg		<0.09	mg/kg	<0.000009 %		<LOD
35		toluene	601-021-00-3	203-625-9	108-88-3		<0.07	mg/kg		<0.07	mg/kg	<0.000007 %		<LOD
36	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.04	mg/kg		<0.04	mg/kg	<0.000004 %		<LOD
37	●	coronene		205-881-7	191-07-1		<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
38	●	pH			PH		8.25	pH		8.25	pH	8.25 pH		
39		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
											Total:	0.0702 %		

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 Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

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)	%	1.23	3	5
2	LOI (loss on ignition)	%	4.98	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	<0.4	6	-
4	PCBs (polychlorinated biphenyls, 7 congeners)	mg/kg	<0.021	1	-
5	Mineral oil (C10 to C40)	mg/kg	6.03	500	-
6	PAHs (polycyclic aromatic hydrocarbons)	mg/kg	<10	100	-
7	pH	pH	8.25	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	<0.005	0.5	2
10	barium	mg/kg	0.0452	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0098	2	50
14	mercury	mg/kg	<0.0001	0.01	0.2
15	molybdenum	mg/kg	0.128	0.5	10
16	nickel	mg/kg	<0.004	0.4	10
17	lead	mg/kg	<0.002	0.5	10
18	antimony	mg/kg	<0.01	0.06	0.7
19	selenium	mg/kg	0.0369	0.1	0.5
20	zinc	mg/kg	<0.01	4	50
21	chloride	mg/kg	<20	800	15,000
22	fluoride	mg/kg	<5	10	150
23	sulphate	mg/kg	34	1,000	20,000
24	phenol index	mg/kg	<0.16	1	-
25	DOC (dissolved organic carbon)	mg/kg	56	500	800
26	TDS (total dissolved solids)	mg/kg	906	4,000	60,000

Key

🟨 User supplied data

Classification of sample: TP10-0.50

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

Sample details

Sample name:		LoW Code:	
TP10-0.50		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
17% (wet weight correction)			

Hazard properties

None identified

Determinands

Moisture content: 17% 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				☑							
3	antimony { antimony trioxide }				1.34	mg/kg	1.197	1.331	mg/kg	0.000133 %	✓	
	051-005-00-X	215-175-0	1309-64-4									
4	arsenic { arsenic pentoxide }				19.2	mg/kg	1.534	24.444	mg/kg	0.00244 %	✓	
	033-004-00-6	215-116-9	1303-28-2									
5	barium { ● barium sulphide }				105	mg/kg	1.233	107.499	mg/kg	0.0107 %	✓	
	016-002-00-X	244-214-4	21109-95-5									
6	cadmium { cadmium sulfate }				3.14	mg/kg	1.855	4.833	mg/kg	0.000483 %	✓	
	048-009-00-9	233-331-6	10124-36-4									
7	copper { dicopper oxide; copper (I) oxide }				50.6	mg/kg	1.126	47.285	mg/kg	0.00473 %	✓	
	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	22.7	mg/kg		18.841	mg/kg	0.00188 %	✓	
	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 }				4.93	mg/kg	1.5	6.139	mg/kg	0.000614 %	✓	
	042-001-00-9	215-204-7	1313-27-5									
11	nickel { nickel sulfate }				67.4	mg/kg	2.637	147.501	mg/kg	0.0148 %	✓	
	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 }				2.93	mg/kg	1.405	3.417	mg/kg	0.000342 %	✓	
	034-002-00-8											
13	zinc { zinc sulphate }				122	mg/kg	2.469	250.041	mg/kg	0.025 %	✓	
	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) }				8.03	mg/kg	1.462	9.741	mg/kg	0.000974 %	✓	
		215-160-9	1308-38-9									

#		Determinand	EU CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
15		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.6	mg/kg	1.923	<1.154	mg/kg	<0.000115 %		<LOD
16		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
17	●	acenaphthylene		205-917-1	208-96-8		<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
18	●	acenaphthene		201-469-6	83-32-9		<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
19	●	fluorene		201-695-5	86-73-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
20	●	phenanthrene		201-581-5	85-01-8		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
21	●	anthracene		204-371-1	120-12-7		<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
22	●	fluoranthene		205-912-4	206-44-0		<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		<LOD
23	●	pyrene		204-927-3	129-00-0		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
24		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
25		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
26		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
27		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
28		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
29	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
30		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
31	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
32	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
34		benzene	601-020-00-8	200-753-7	71-43-2		<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
35		toluene	601-021-00-3	203-625-9	108-88-3		<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
36	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
37	●	coronene		205-881-7	191-07-1		<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
38	●	pH			PH		7.93	pH		7.93	pH	7.93 pH		
39		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
											Total:	0.0633 %		

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 Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

WAC results for sample: TP10-0.50

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)	%	0.601	3	5
2	LOI (loss on ignition)	%	4.62	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	<0.04	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	7.93	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	<0.005	0.5	2
10	barium	mg/kg	0.0383	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0051	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	0.0045	0.4	10
17	lead	mg/kg	<0.002	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	0.225	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	80.3	500	800
26	TDS (total dissolved solids)	mg/kg	949	4,000	60,000

Key

🟨 User supplied data

Classification of sample: TP13-0.50

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

Sample details

Sample name:		LoW Code:	
TP13-0.50		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
16% (wet weight correction)			

Hazard properties

None identified

Determinands

Moisture content: 16% 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			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		**<LOD**
2	●	confirm TPH has NOT arisen from diesel or petrol					☑							
3		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		0.667	mg/kg	1.197	0.671	mg/kg	0.0000671 %	✓	
4		arsenic { arsenic pentoxide }	033-004-00-6	215-116-9	1303-28-2		11.8	mg/kg	1.534	15.204	mg/kg	0.00152 %	✓	
5		barium { ● barium sulphide }	016-002-00-X	244-214-4	21109-95-5		197	mg/kg	1.233	204.119	mg/kg	0.0204 %	✓	
6		cadmium { cadmium sulfate }	048-009-00-9	233-331-6	10124-36-4		2.04	mg/kg	1.855	3.178	mg/kg	0.000318 %	✓	
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		12.2	mg/kg	1.126	11.538	mg/kg	0.00115 %	✓	
8		lead { ● lead compounds with the exception of those specified elsewhere in this Annex (worst case) }	082-001-00-6			1	13.7	mg/kg		11.508	mg/kg	0.00115 %	✓	
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		**<LOD**
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		4.76	mg/kg	1.5	5.998	mg/kg	0.0006 %	✓	
11		nickel { nickel sulfate }	028-009-00-5	232-104-9	7786-81-4		32.1	mg/kg	2.637	71.096	mg/kg	0.00711 %	✓	
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				3.24	mg/kg	1.405	3.824	mg/kg	0.000382 %	✓	
13		zinc { zinc sulphate }	030-006-00-9	231-793-3 [1] 231-793-3 [2]	7446-19-7 [1] 7733-02-0 [2]		87.6	mg/kg	2.469	181.701	mg/kg	0.0182 %	✓	
14		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		5.9	mg/kg	1.462	7.243	mg/kg	0.000724 %	✓	

#		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	<0.0000009 %		<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				<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
		603-181-00-X	216-653-1	1634-04-4									
34		benzene				<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
		601-020-00-8	200-753-7	71-43-2									
35		toluene				<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
		601-021-00-3	203-625-9	108-88-3									
36	●	ethylbenzene				<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<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				8.47	pH		8.47	pH	8.47 pH		
				PH									
39		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]				<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<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:	0.0528 %		

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 Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

WAC results for sample: TP13-0.50

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)	%	0.668	3	5
2	LOI (loss on ignition)	%	4.01	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	<0.04	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	8.47	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	<0.005	0.5	2
10	barium	mg/kg	0.0097	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0062	2	50
14	mercury	mg/kg	<0.0001	0.01	0.2
15	molybdenum	mg/kg	0.0575	0.5	10
16	nickel	mg/kg	<0.004	0.4	10
17	lead	mg/kg	<0.002	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	<0.01	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	79.2	500	800
26	TDS (total dissolved solids)	mg/kg	701	4,000	60,000

Key

🟨 User supplied data

Classification of sample: TP14-0.50

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

Sample details

Sample name:	**TP14-0.50**	LoW Code:	
Sample Depth:	**0.50 m**	Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Moisture content:	**17%** (wet weight correction)	Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 17% 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				☑					
3		antimony { antimony trioxide }				1.31 mg/kg	1.197	1.302 mg/kg	0.00013 %	✓	
		051-005-00-X	215-175-0	1309-64-4							
4		arsenic { arsenic pentoxide }				15.5 mg/kg	1.534	19.733 mg/kg	0.00197 %	✓	
		033-004-00-6	215-116-9	1303-28-2							
5		barium { barium sulphide }				159 mg/kg	1.233	162.784 mg/kg	0.0163 %	✓	
		016-002-00-X	244-214-4	21109-95-5							
6		cadmium { cadmium sulfate }				2.64 mg/kg	1.855	4.064 mg/kg	0.000406 %	✓	
		048-009-00-9	233-331-6	10124-36-4							
7		copper { dicopper oxide; copper (I) oxide }				38.7 mg/kg	1.126	36.165 mg/kg	0.00362 %	✓	
		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	19.7 mg/kg		16.351 mg/kg	0.00164 %	✓	
		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 }				3.63 mg/kg	1.5	4.52 mg/kg	0.000452 %	✓	
		042-001-00-9	215-204-7	1313-27-5							
11		nickel { nickel sulfate }				56.4 mg/kg	2.637	123.428 mg/kg	0.0123 %	✓	
		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 }				4.2 mg/kg	1.405	4.898 mg/kg	0.00049 %	✓	
		034-002-00-8									
13		zinc { zinc sulphate }				120 mg/kg	2.469	245.942 mg/kg	0.0246 %	✓	
		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) }				6.28 mg/kg	1.462	7.618 mg/kg	0.000762 %	✓	
			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 }	024-001-00-0	215-607-8	1333-82-0		<0.6	mg/kg	1.923	<1.154	mg/kg	<0.000115 %		<LOD
16		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
17	●	acenaphthylene		205-917-1	208-96-8		<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
18	●	acenaphthene		201-469-6	83-32-9		<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
19	●	fluorene		201-695-5	86-73-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
20	●	phenanthrene		201-581-5	85-01-8		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
21	●	anthracene		204-371-1	120-12-7		<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
22	●	fluoranthene		205-912-4	206-44-0		<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		<LOD
23	●	pyrene		204-927-3	129-00-0		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
24		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
25		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
26		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
27		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
28		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
29	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
30		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
31	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
32	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
34		benzene	601-020-00-8	200-753-7	71-43-2		<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
35		toluene	601-021-00-3	203-625-9	108-88-3		<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
36	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
37	●	coronene		205-881-7	191-07-1		<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
38	●	pH			PH		8.22	pH		8.22	pH	8.22 pH		
39		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
											Total:	0.0639 %		

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 Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

WAC results for sample: TP14-0.50

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)	%	6.22	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	<0.04	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	8.22	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	<0.005	0.5	2
10	barium	mg/kg	0.0295	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.011	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	0.0044	0.4	10
17	lead	mg/kg	<0.002	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	<0.01	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	37.3	500	800
26	TDS (total dissolved solids)	mg/kg	880	4,000	60,000

Key

🟨 User supplied data

Classification of sample: TP05-0.50

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

Sample details

Sample name:		LoW Code:	
TP05-0.50		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.50 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
17% (wet weight correction)			

Hazard properties

None identified

Determinands

Moisture content: 17% 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				☑							
3		antimony { antimony trioxide }				2.29	mg/kg	1.197	2.275	mg/kg	0.000228 %	✓	
		051-005-00-X	215-175-0	1309-64-4									
4		arsenic { arsenic pentoxide }				20.1	mg/kg	1.534	25.59	mg/kg	0.00256 %	✓	
		033-004-00-6	215-116-9	1303-28-2									
5		barium { ● barium sulphide }				72.4	mg/kg	1.233	74.123	mg/kg	0.00741 %	✓	
		016-002-00-X	244-214-4	21109-95-5									
6		cadmium { cadmium sulfate }				3.18	mg/kg	1.855	4.895	mg/kg	0.000489 %	✓	
		048-009-00-9	233-331-6	10124-36-4									
7		copper { dicopper oxide; copper (I) oxide }				45.9	mg/kg	1.126	42.893	mg/kg	0.00429 %	✓	
		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	24.4	mg/kg		20.252	mg/kg	0.00203 %	✓	
		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 }				4.94	mg/kg	1.5	6.151	mg/kg	0.000615 %	✓	
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel sulfate }				64.3	mg/kg	2.637	140.717	mg/kg	0.0141 %	✓	
		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 }				3.8	mg/kg	1.405	4.431	mg/kg	0.000443 %	✓	
		034-002-00-8											
13		zinc { zinc sulphate }				137	mg/kg	2.469	280.784	mg/kg	0.0281 %	✓	
		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) }				7.5	mg/kg	1.462	9.098	mg/kg	0.00091 %	✓	
			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 }	024-001-00-0	215-607-8	1333-82-0		<0.6	mg/kg	1.923	<1.154	mg/kg	<0.000115 %		<LOD
16		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
17	●	acenaphthylene		205-917-1	208-96-8		<0.012	mg/kg		<0.012	mg/kg	<0.0000012 %		<LOD
18	●	acenaphthene		201-469-6	83-32-9		<0.008	mg/kg		<0.008	mg/kg	<0.0000008 %		<LOD
19	●	fluorene		201-695-5	86-73-7		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
20	●	phenanthrene		201-581-5	85-01-8		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
21	●	anthracene		204-371-1	120-12-7		<0.016	mg/kg		<0.016	mg/kg	<0.0000016 %		<LOD
22	●	fluoranthene		205-912-4	206-44-0		<0.017	mg/kg		<0.017	mg/kg	<0.0000017 %		<LOD
23	●	pyrene		204-927-3	129-00-0		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
24		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
25		chrysene	601-048-00-0	205-923-4	218-01-9		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
26		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
27		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.014	mg/kg		<0.014	mg/kg	<0.0000014 %		<LOD
28		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.015	mg/kg		<0.015	mg/kg	<0.0000015 %		<LOD
29	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.018	mg/kg		<0.018	mg/kg	<0.0000018 %		<LOD
30		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.023	mg/kg		<0.023	mg/kg	<0.0000023 %		<LOD
31	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.024	mg/kg		<0.024	mg/kg	<0.0000024 %		<LOD
32	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.021	mg/kg		<0.021	mg/kg	<0.0000021 %		<LOD
33		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.01	mg/kg		<0.01	mg/kg	<0.000001 %		<LOD
34		benzene	601-020-00-8	200-753-7	71-43-2		<0.009	mg/kg		<0.009	mg/kg	<0.0000009 %		<LOD
35		toluene	601-021-00-3	203-625-9	108-88-3		<0.007	mg/kg		<0.007	mg/kg	<0.0000007 %		<LOD
36	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.004	mg/kg		<0.004	mg/kg	<0.0000004 %		<LOD
37	●	coronene		205-881-7	191-07-1		<0.2	mg/kg		<0.2	mg/kg	<0.00002 %		<LOD
38	●	pH			PH		8.27	pH		8.27	pH	8.27 pH		
39		o-xylene; [1] p-xylene; [2] m-xylene; [3] xylene [4]	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.02	mg/kg		<0.02	mg/kg	<0.000002 %		<LOD
											Total:	0.0623 %		

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 Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

WAC results for sample: TP05-0.50

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)	%	0.869	3	5
2	LOI (loss on ignition)	%	5.24	-	-
3	BTEX (benzene, toluene, ethylbenzene and xylenes)	mg/kg	<0.04	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	8.27	-	>6
8	ANC (acid neutralisation capacity)	mol/kg		-	-
Eluate Analysis 10:1					
9	arsenic	mg/kg	<0.005	0.5	2
10	barium	mg/kg	0.014	20	100
11	cadmium	mg/kg	<0.0008	0.04	1
12	chromium	mg/kg	<0.01	0.5	10
13	copper	mg/kg	0.0087	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	<0.004	0.4	10
17	lead	mg/kg	<0.002	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	<0.01	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	45.2	500	800
26	TDS (total dissolved solids)	mg/kg	810	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: 2022.168.5189.9766 (18 Jun 2022)
HazWasteOnline Database: 2022.168.5189.9766 (18 Jun 2022)

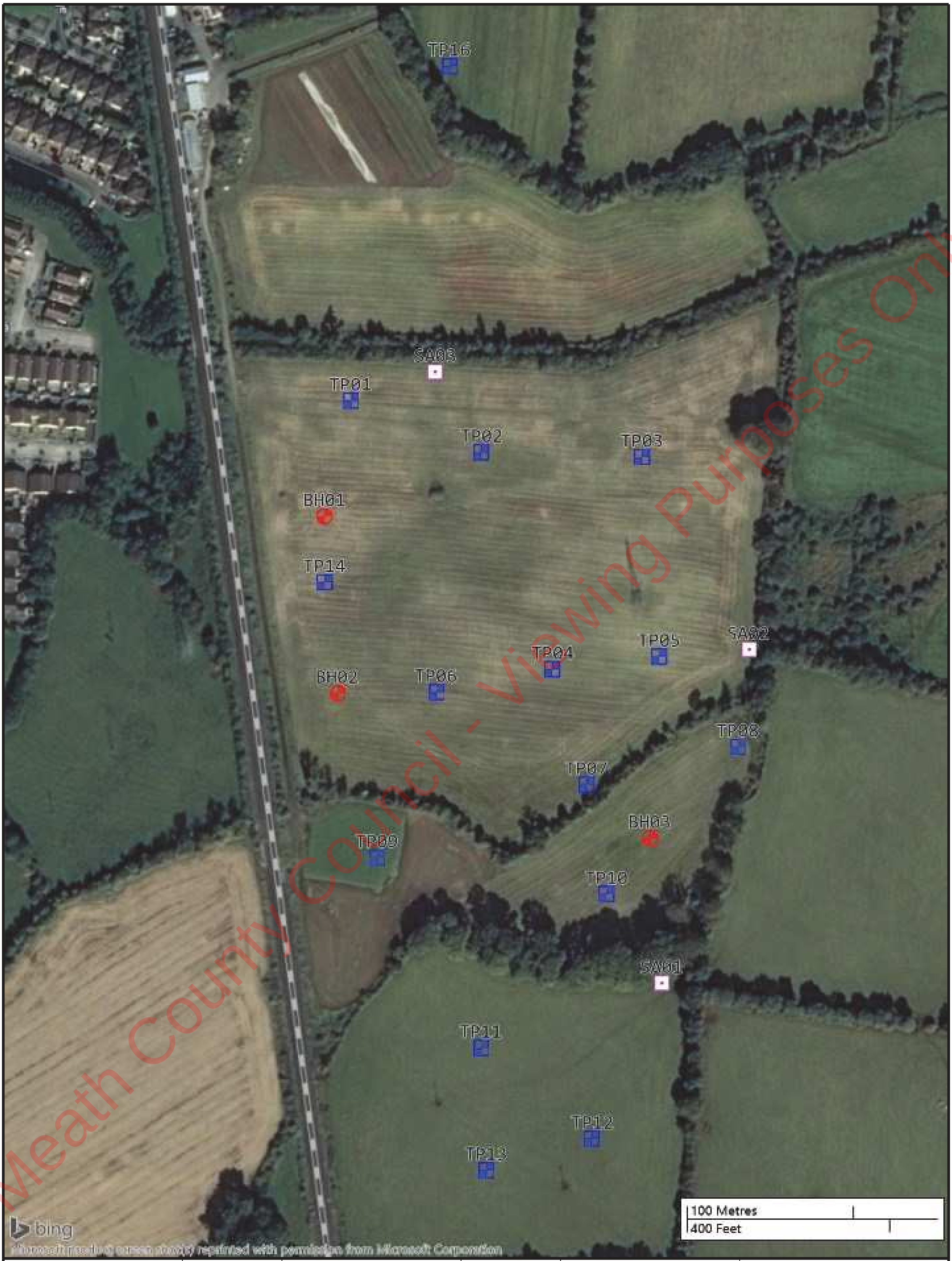
This classification utilises the following guidance and legislation:
WM3 v1.1.NI - Waste Classification - 1st Edition v1.1.NI - Jan 2021
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
17th ATP - Regulation (EU) 2021/849 of 11 March 2021

Appendix 7

Survey Data

Survey Data

Location	Irish Transverse Mercator		Elevation	Irish National Grid	
	Easting	Northing		Easting	Northing
Boreholes					
BH01	702198.250	741359.231	67.17	302269.641	241334.435
BH02	702208.122	741252.548	66.28	302279.516	241227.729
BH03	702398.924	741169.375	65.30	302470.360	241144.539
Trial Pits					
TP01	702212.360	741429.158	65.55	302283.753	241404.378
TP02	702292.326	741399.777	65.85	302363.737	241374.991
TP03	702389.351	741398.929	65.58	302460.783	241374.143
TP04	702338.174	741269.812	66.90	302409.596	241244.998
TP05	702402.393	741278.874	66.34	302473.828	241254.062
TP06	702267.725	741254.576	66.58	302339.132	241229.758
TP07	702360.125	741200.872	65.64	302431.552	241176.043
TP08	702450.882	741225.563	65.15	302522.328	241200.740
TP09	702234.254	741154.195	66.51	302305.654	241129.355
TP10	702373.569	741135.064	65.43	302444.999	241110.221
TP11	702299.539	741040.755	65.32	302370.954	241015.891
TP12	702368.220	740987.448	64.76	302439.651	240962.573
TP13	702304.376	740966.878	65.07	302375.793	240941.998
TP14	702199.068	741319.480	67.46	302270.459	241294.676
TP16	702267.627	741632.223	64.98	302339.030	241607.487
Soakaway Tests					
SA01	702407.940	741082.075	64.98	302479.378	241057.221
SA02	702455.876	741284.277	64.73	302527.323	241259.467
SA03	702263.239	741447.718	65.47	302334.643	241422.942



Contract No:	5998	Client:	Azra Property Company Ltd
Contract:	Station Road	Engineer:	Waterman Moylan
Location:	Dunboyne, Co. Meath	Scale:	1:3000
Title:	Site Plan	Drawn By:	SL

Legend Key

● Locations By Type - CP

▣ Locations By Type - IP

▨ Locations By Type - TP

APPENDIX 8.1

NRA CRITERIA FOR RATING THE MAGNITUDE AND SIGNIFICANCE OF IMPACTS AT EIA STAGE NATIONAL ROADS AUTHORITY (NRA, 2009)

Table 1 Criteria for Rating Site Attributes – Estimation of Importance of Hydrological Attributes (NRA)

Importance	Criteria	Typical Examples
Extremely High	Attribute has a high quality or value on an international scale	River, wetland or surface water body ecosystem protected by EU legislation e.g. 'European sites' designated under the Habitats Regulations or 'Salmonid waters' designated pursuant to the European Communities (Quality of Salmonid Waters) Regulations, 1988.
Very High	Attribute has a high quality or value on a regional or national scale	River, wetland or surface water body ecosystem protected by national legislation – NHA status. Regionally important potable water source supplying >2500 homes. Quality Class A (Biotic Index Q4, Q5). Flood plain protecting more than 50 residential or commercial properties from flooding. Nationally important amenity site for wide range of leisure activities.
High	Attribute has a high quality or value on a local scale	Salmon fishery. Locally important potable water source supplying >1000 homes. Quality Class B (Biotic Index Q3-4). Flood plain protecting between 5 and 50 residential or commercial properties from flooding. Locally important amenity site for wide range of leisure activities.
Medium	Attribute has a medium quality or value on a local scale	Coarse fishery. Local potable water source supplying >50 homes. Quality Class C (Biotic Index Q3, Q2- 3). Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	Attribute has a low quality or value on a local scale	Locally important amenity site for small range of leisure activities. Local potable water source supplying <50 homes Quality Class D (Biotic Index Q2, Q1). Flood plain protecting 1 residential or commercial property from flooding. Amenity site used by small numbers of local people.

Table 2 Criteria for Rating Impact Significance at EIS Stage – Estimation of Magnitude of Impact on Hydrological Attribute (NRA)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute	Loss or extensive change to a waterbody or water dependent habitat. Increase in predicted peak flood level >100mm. Extensive loss of fishery. Calculated risk of serious pollution incident >2% annually. Extensive reduction in amenity value.
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm. Partial loss of fishery. Calculated risk of serious pollution incident >1% annually. Partial reduction in amenity value.
Small Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm. Minor loss of fishery. Calculated risk of serious pollution incident >0.5% annually. Slight reduction in amenity value.
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level. Calculated risk of serious pollution incident <0.5% annually.
Minor Beneficial	Results in minor improvement of attribute quality	Reduction in predicted peak flood level >10mm. Calculated reduction in pollution risk of 50% or more where existing risk is <1% annually.
Moderate Beneficial	Results in moderate improvement of attribute quality	Reduction in predicted peak flood level >50mm. Calculated reduction in pollution risk of 50% or more where existing risk is >1% annually.
Major Beneficial	Results in major improvement of attribute quality	Reduction in predicted peak flood level >100mm

Table 3 Rating of Significant Environmental Impacts at EIS Stage (NRA)

Importance of Attribute	**Magnitude of Importance**			
	Negligible	**Small Adverse**	**Moderate Adverse**	**Large Adverse**
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant/moderate	Profound/Significant	Profound
High	Imperceptible	Moderate/Slight	Significant/moderate	Profound/Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight/Moderate

APPENDIX 8.2 HYDROLOGICAL & HYDROGEOLOGICAL QUALITATIVE RISK ASSESSMENT

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HYDROLOGICAL & HYDROGEOLOGICAL QUALITATIVE RISK ASSESSMENT

for

PROPOSED RESIDENTIAL DEVELOPMENT AT STATION ROAD, DUNBOYNE, CO. MEATH

Technical Report Prepared For

Azra Property Company Limited

Technical Report Prepared By

Marcelo Allende BSc, BEng,
Senior Environmental Consultant
(Hydrologist)

Our Reference

MA/217501.0929/WR01

Date of Issue

19 June 2023

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Signature		Teri Hayes
Name	Marcelo Allende	Teri Hayes
Title	Senior Environmental Consultant	Director
Date	19 June 2023	19 June 2023

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Figures

Tables

1.0 INTRODUCTION

1.1 Background

AWN have been requested to carry out a Hydrological and Hydrogeological Qualitative Risk Assessment for a Proposed Residential Development at Station Road, Dunboyne, Co. Meath. The subject site is located c. 290m south of the Station Road, between Clonee and Dunboyne. The village of Dunboyne is located c. 1.27km northwest of the site and Clonee is located c 1.1km to the east.

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.79Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 5 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraced buildings ; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m in length of distributor road including signalised junction at L2228, compensatory storage measures at Castle Stream and improvement works to two no. roundabouts on the R147 (Old Navan Road). Vehicular, cyclist and pedestrian access to serve the development will be provided from Station Road via existing access road permitted under Meath County Council Reg. Ref. RA180561.

The potential impacts on the receiving water environment considered withing this report are:

- The management of foul, surface water run-off and accidental oil leaks during construction phase.
- Connection to foul sewer and stormwater sewer during operation. Due to the residential development proposed it has been assumed that there will be no bulk oil storage during operation.

1.2 Hydrological Setting

The existing site is predominantly greenfield and is currently used for agricultural purposes. The subject site is bounded by a railway line to the west and by greenfield lands to the south and east. The subject land has a high point located on the western edge of the site from where it generally slopes to the north and to the south. There is an existing townland boundary which passes through the site and which has a ditch with some water flow during periods of wet weather.

There are 2 no. existing streams/watercourses along the boundary of the subject site. One is located along the northern boundary and the second (which is a local ditch) is located along the southern and east boundary.

The EPA (2022) on-line database identifies the watercourse along the northern boundary of the site as the Dunboyne Stream (refer to Figure 1.1 below). The Dunboyne Stream joins the River Tolka c. 900 m to the east of the proposed housing site. The River Tolka immediately adjoins a roundabout on the R147 that requires to be upgraded as part of the development.

The River Tolka runs south-eastwards and enters Dublin Bay just to the north of Dublin Port c 16 km southeast of the subject site.

Figure 1.1 *Location and Hydrological Environment*

The lands in which the proposed development is located have no formal designations. The closest area of ecological importance is the Royal Canal proposed Natural Heritage Area (pNHA) (Site Code 002103) which is approximately 4.0km to the south of the site. The Liffey Valley pNHA (Site Code 000128) is located approximately 4.4km to the south of the site. The site has no hydrological connectivity to any of these sites.

A review of the EPA (2023) on-line database indicates there are no NPWS protected areas in the immediate vicinity of the Proposed Development site. The nearest Natura 2000 Sites are the Rye Water Valley/Carton Special Area of Conservation (SAC)/ Special Protection Area (SPA)/ proposed Natural Heritage Area (pNHA) which are c. 4.7 Km to the south of the site. There would not be hydrological connection between the proposed development and these sites.

There is a hydrological connection to Dublin Bay waterbody from the Proposed Development site through the stormwater and foul water site drainage as described in Section 1.4 below. The South Dublin Bay hosts a range of Natura 2000 Sites (SPA/SAC/pNHA). These Natura 2000 Sites are located c. 16 Km to the southeast of the subject site.

1.3 Objective of Report

The scope of this desktop review is to assess the potential for any likely significant impacts on receiving waters and protected ecological areas during construction or post development, in the absence of taking account of any measures intended to avoid or reduce harmful effects of the proposed project (i.e. design or mitigation measures).

In particular, this review considers the likely impact of construction and operation impacts (construction run-off, and domestic sewage) from the proposed development on water quality and overall water body status within the South Dublin Bay (where the relevant European Sites are located). The assessment relies on information regarding construction and design provided by the applicant as follows:

- Engineering Assessment Report. Proposed Residential Development at Station Road, Dunboyne, Co. Meath. Waterman Moylan, June 2023.
- Flood Risk Assessment. Oakfield, Dunboyne, Co. Meath. JBA Consulting, March 2023.

This report was prepared by Marcelo Allende (BSc, BEng), and Teri Hayes (BSc MSc PGeol EurGeol). Marcelo is a Water Resources Engineer with over 15 years of experience in environmental consultancy and water resources studies. Marcelo is a Senior Environmental Consultant (Hydrologist) with AWN Consulting, a member of the International Association of Hydrogeologists (Irish Group) and a member of Engineers Ireland (MIEI). Teri is a hydrogeologist with over 25 years of experience in water resource management and impact assessment. She has a Masters in Hydrogeology and is a former President of the Irish Group of the Association of Hydrogeologists (IAH) and has provided advisory services on water related environmental and planning issues to both public and private sector bodies. She is qualified as a competent person as recognised by the EPA in relation to contaminated land assessment (IGI Register of competent persons www.igi.ie). Her specialist area of expertise is water resource management eco-hydrogeology, hydrological assessment and environmental impact assessment.

1.4 Description of Existing Site and Proposed Drainage

Existing and Proposed Surface Water Drainage

As mentioned above, there are 2 no. existing streams/watercourses along the boundary of the subject site. One is located along the northern boundary (Dunboyne Stream [also known as the Caste Stream]) and the second is located along the southern and east boundary. It is noted that both of these will be retained and will have a 10m riparian corridor.

There is an existing townland boundary which passes through the site and which has a ditch with some water flow during periods of wet weather. It is proposed to divert this ditch to flow to the southern watercourse.

Surface water will outfall to existing watercourse/ditches which bound the site (i.e., Dunboyne Stream). Surface water will outfall to existing watercourse/ditches which bound the site. Due to the topography of the site and the layout of the proposed development, surface water drainage is laid out in 6 No. Catchments.

It is proposed that surface water from the proposed development will drain via gravity through an underground pipe network. Various Sustainable Urban Drainage systems (SUDS) devices have been implemented to ensure runoff is treated to the standards outlined in the Greater Dublin Strategic Drainage Study (GDSDS).

The sitewide surface water system, which includes 4 No. detention basins, and 1 No attenuation tank, is in accordance with all the relevant design standards and Local Authority development plan. The surface water runoff generated from the proposed development will discharge from site through an existing flow control device (limiting the site runoff to a greenfield rate).

The design include Sustainable Urban Drainage Systems (SuDS) which will be incorporated to reduce run-off volumes and improve run-off water quality. The SuDs features comprise permeable pavement, attenuation tanks, roadside swales/filter drains, petrol interceptors (installed upstream of each attenuation tank), and detention basins. These features will be provided to cater for up to a 1-in-100 year rainfall event and 20% climate change. Refer to the Engineering Assessment Report (Waterman Moylan, 2023) for further details. It should be noted that these SUDS measures have not been taken into account in the subsequent analysis.

Flood Risk Assessment

According to the Site Specific Flood Risk Assessment carried out by JBA, the OPW Fluvial Flood Map the 1% AEP flood event (1 in 100 year) and the 0.1% AEP flood event (1 in 1000 year) do not inundate the site.

The detailed hydrological and hydraulic analysis indicates that the northern entrance road is partially located in Flood Zone B.

The development design has set floor levels to the 1% AEP climate change water level, plus a freeboard allowance of at least 500mm. Further, the finished floor level provides a minimum of 150mm above surrounding ground levels to provide protection against pluvial flooding. All residential buildings have also been located in Flood Zone C, further minimising the risk of inundation.

Existing and Proposed Foul Water Drainage

Strict separation of surface water and wastewater will be implemented within the development.

There is an existing 525mm diameter concrete combined sewer traversing the subject site along the northern boundary. As part of the proposed infrastructure works at the subject site, the combined sewer will be diverted to a location c. 20m parallel to the north. A pre-connection enquiry was submitted to Irish Water, Reg. Ref. CDS21006918. Irish Water confirmed that a connection is feasible.

The site has been divided into two foul drainage catchments. The Catchment 1, located to the north, will be served with a series of 150mm and 225mm diameter sewer networks. This network will ultimately outfall via gravity into the proposed diverted sewer along the northern boundary.

The Catchment 2, to the south will also be served with a series of 150mm and 225mm diameter sewer network and will outfall, via gravity, into a pumping station located to its the north-western side. The station will pump the foul by means of a rising main, which will then discharge into Catchment 1 and ultimately outfall into the proposed diverted sewer.

The foul water from the proposed development eventually discharges to the Ringsend Waste Water Treatment Plant (WWTP) which in turn discharges into Dublin Bay.

2.0 ASSESSMENT OF BASELINE WATER QUALITY, RIVER FLOW AND WATER BODY STATUS

A reliable Conceptual Site Model (CSM) requires an understanding of the existing hydrological and hydrogeological setting. This is described below for the proposed development site and surrounding hydrological and hydrogeological environs.

2.1 Hydrological Catchment Description

The proposed development site lies within the Liffey and Dublin Bay Catchment 09 WFD sub-catchment Tolka_SC_010 (Tolka_030 WFD River Sub Basin; EPA, 2022).

The Environmental Protection Agency (EPA, 2023) on-line mapping presents the available water quality status information for water bodies in Ireland.

The Dunboyne Stream belongs to the Dunboyne_Stream_010 WFD surface waterbody (WFD code IE_EA_09D040500) from its origin until Rooske Road, c. 600 m upstream of the proposed development site. From this point, it belongs to the Tolka_030 waterbody (WFD code IE_EA_09T010800). The Dunboyne_Stream_010 waterbody has a 'Poor' Status for the period 2016 2021 whilst the Tolka_030 also has a 'Poor' Status (EPA, 2023); both waterbodies have WFD risk score 'At risk of not achieving good status'. The 'Poor' status of both waterbodies is due to their biological (invertebrate) status or potential.

The most recent surface water quality data for the Dunboyne Stream (2022) indicate that it is '*Slightly Polluted*' (refer to www.catchments.ie).

The Coastal Waterbody Dublin Bay has a WFD status (2016-2021) of '*Good*' and a WFD risk score of '*Not at risk*'. The ecological status (which comprises biological and chemical status) of transitional and coastal water bodies during 2016-2021 for Dublin Bay is classed as '*Good*'. The most recent surface water quality data for the Dublin Bay on trophic status of estuarine and coastal waters indicate that they are '*Unpolluted*' (based on *Water Quality in 2021*, EPA, 2022)'. Under the 2015 'Trophic Status Assessment Scheme' classification of the EPA, '*Unpolluted*' means there have been no breaches of the EPA's threshold values for nutrient enrichment, accelerated plant growth, or disturbance of the level of dissolved oxygen normally present (refer to www.catchments.ie).

As the proposed development will have no additional stormwater run-off, when compared with the current situation, during a stormwater event, the development will, therefore, have no measurable impact on the water quality in any overflow situation at Ringsend WWTP apart from a minor contribution from foul sewage. As explained in Section 3.4 below, the maximum contribution of foul sewage (peak flow of 11.35 l/s) from the Proposed Development is 0.1% of the peak hydraulic capacity at Ringsend WWTP. The proposed stormwater and foul water networks within the proposed development will be entirely independent systems and rainfall will have no impact on foul flows to the WWTP.

It should be noted that the bathing status has no direct relevance to the water quality status of the Natura 2000 sites due to rapid mixing and dilution resulting in no measurable change in water quality within the overall water body.

2.2 Aquifer Description & Superficial Deposits

Mapping from the Geological Society of Ireland (GSI, 2022 http://www.gsi.ie, accessed on 19-06-2023) indicates the bedrock underlying the site is part of the Lucan Formation (code CDLUCN) and made up of dark limestone and shale (Calp). The lithological description comprises dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar. The beds are predominantly fine-grained distal turbidites in the north Dublin Basin. The formation is intermittently exposed on the coast between Rush and Drumanagh Head. The formation ranges from 300m to 800m in thickness. The GSI also classifies the principal aquifer types in Ireland as:

- Lk - Locally Important Aquifer - Karstified
- Ll - Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones
- Lm - Locally Important Aquifer - Bedrock which is Generally Moderately Productive
- Pl - Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones
- Pu - Poor Aquifer - Bedrock which is Generally Unproductive
- Rkd - Regionally Important Aquifer (karstified diffuse)

Presently, from the GSI (2023) National Bedrock Aquifer Map, the GSI classifies the bedrock aquifer beneath the subject site as a '*Locally Important Aquifer – Bedrock which is Moderately Productive only in Local Zones*'. The proposed development is within the '*Dublin*' groundwater body (Ground Waterbody Code: IE_EA_G_008) and is classified under the WFD Status 2016-2021 (EPA, 2023) as having '*Good status'*. The WFD Risk Score system for this GWB is under review.

Aquifer vulnerability is a term used to represent the intrinsic geological and hydrological characteristics that determine the ease with which groundwater may be contaminated generally by human activities. The GSI (2023) guidance presently classifies the bedrock aquifer in the region of the subject site as having '*Moderate*' to '*Extreme*' vulnerability which indicates a general overburden depth between 0-10 m, indicating that the aquifer is moderately protected by low permeability tills. The GSI aquifer vulnerability class in the region of the site is presented as Figure 2.1 below.

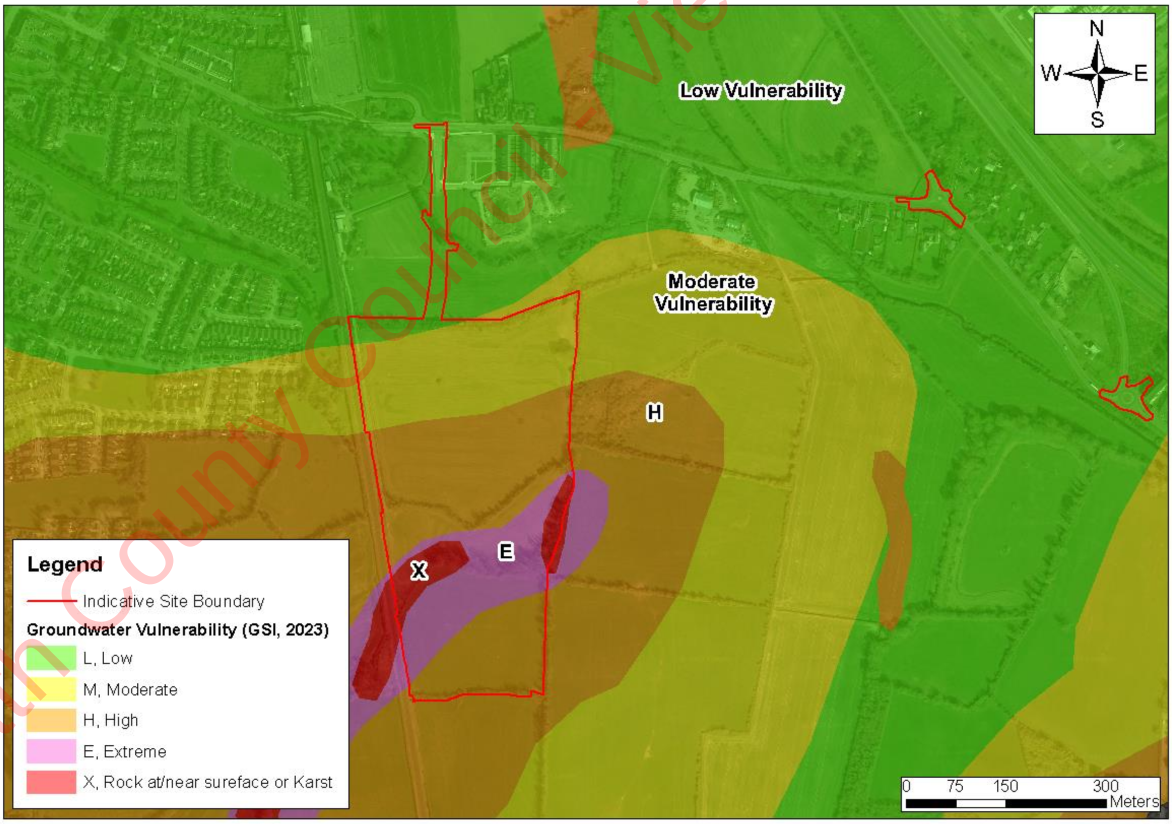

Figure 2.1 ***Aquifer Vulnerability (source: GSI, 2023)***

The GSI/ Teagasc (2023) mapping database of the quaternary sediments in the area of the subject site indicates the principal subsoil type in the residential area comprises till Carboniferous (TLs i.e. Till derived from limestones).

3.0 CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is developed based on a good understanding of the hydrological and hydrogeological environment, plausible sources of impact and knowledge of receptor requirements. This in turn allows possible Source Pathway Receptor (S-P-R) linkages to be identified. If no S-P-R linkages are identified, then there is no risk to identified receptors.

3.1 Assessment of Plausible Sources

Potential sources during both the construction and operational phases are considered. For the purposes of undertaking the potential of any hydrological/ hydrogeological S-P-R linkages, all potential sources of contamination are considered *without taking account of* any measures intended to avoid or reduce harmful effects of the proposed project (mitigation measures) i.e. a worst-case scenario. Construction sources (short-term) and operational sources (long-term) are considered below.

Construction Phase

The following potential sources are considered plausible risk scenarios for the proposed construction site:

(i) Hydrocarbons or any hazardous chemicals will be stored in specific bunded areas. Refuelling of plant and machinery will also be carried out in bunded areas to minimise risk of any potential being discharged from the site. As a worst-case scenario, a rupture of a 1,000-litre tank to ground is considered in this analysis which disregards the effect of bunding. This would be a single short-term event.

(ii) Leakage may occur from construction site equipment. As a worst-case scenario an unmitigated leak of 300 litres is considered. This would be a single short-term event.

(iii) Use of wet cement is a requirement during construction. Run-off water from recent cemented areas will result in highly alkaline water with high pH. As this would only occur during particular phases of work this is again considered as a single short-term event rather than an ongoing event.

(iv) Construction requires soil excavation and removal and also re-grading of the southern portion of the site, including lime stablisation, which results in the site (excluding riparian corridors) being raised by between approximately 0-1m. Unmitigated run-off could contain a high concentration of suspended solids and contaminants such as hydrocarbons during earthworks. These could be considered intermittent short-term events, i.e. on the basis that adequate mitigation measures which are already incorporated in the Construction Environmental Management Plan (CEMP) fail.

(v) During the excavations for foundations and basements, no significant dewatering is expected given the low permeability overburden underlying the site.

Operational Phase

The following sources are considered plausible post construction:

(i) The proposed development does not require any bulk chemical storage and therefore the potential for water quality impact is negligible.

(ii) Leakage of petrol/ diesel fuel may occur from individual cars in parking areas; run-off may contain a worst-case scenario of 70 litres for example.

(iii) The stormwater drainage system will follow SuDS measures and an attenuation system. This system has been designed in order to discharge following the characteristics of a greenfield run-off into the public sewer. As such the potential for silt laden runoff is low. It should be noted that the worst-case scenario (70 litres) under consideration here disregards the effect of SuDS and petrol interceptors.

(iv) The proposed development will be fully serviced with separate foul and stormwater sewers which will have adequate capacity for the facility and discharge limits as required by Irish Water licencing requirements. Discharge from the site to the public foul sewer will be sewage and grey water only due to the residential nature of the Proposed Development. The foul discharge from the site will join the public sewer and will be treated at the Irish Water Ringsend Wastewater Treatment Plant (WWTP) prior to subsequent discharge to Dublin Bay. This WWTP is required to operate under an EPA licence (D0034-01) and meet environmental legislative requirements as set out in such licence. It is noted that a planning permission for a new upgrade to this facility was received in 2019 and is currently in the process of construction/ implementation.

This plant operates under an EPA licence (D0034-01) and is currently in the process of being upgraded to a PE of 2.4million to meet the increased demand of the Dublin area. The most recent Annual Environmental Report (AER 2020) shows it is currently operating for a PE peak loading of 2.27million while originally designed for 1.64million. However, the current maximum hydraulic load (832,269 m^3/day) is less than the peak hydraulic capacity as constructed (959,040 m^3/day) i.e. prior to any upgrade works.

Irish Water is working to provide infrastructure to achieve compliance with the Urban Wastewater Treatment Directive for a population equivalent of 2.1million in the second half of 2023. When all the proposed works are complete in 2025, the Ringsend Wastewater Treatment Plant will be able to treat wastewater for up to 2.4 million population equivalent.

These upgrade works (described in section 3.4 below) have commenced and comprise a number of phases and are ongoing and expected to be fully completed by 2025.

3.2 Assessment of Pathways

The following pathways have been considered within this assessment with impact assessment presented in Section 3.4:

The potential for offsite migration due to any construction discharges is low as there is no significant pathway in the aquifer or through land ditches or streams.

(i) Vertical migration to the underlying Limestone is minimised due to the recorded '*Moderate*' to '*Extreme*' vulnerability present at the site resulting in a moderate aquifer protection from any localised diesel/ fuel oil spills during either construction or operational phases. The site is underlain by [generally low permeable] Limestone which the GSI classifies as a *Locally Important Aquifer* (This aquifer is characterised by discrete local fracturing with little connectivity rather than large connected fractures which are more indicative of Regional Aquifers. As such, flow paths are generally local.

(ii) There is a hydrological connection trough drainage (in construction) and as storm water discharges into an existing public sewer (during operation which ultimately discharges to the Dunboyne Stream and ultimately into the South Dublin Bay c. 16 km from the development site.

(iii) There is no direct pathway for foul sewage to any receiving water body. There is however an 'indirect pathway' through the public foul sewer which ultimately discharges to the Ringsend WWTP prior to final discharge to Dublin Bay post treatment.

3.3 Assessment of Receptors

The receptors considered in this assessment include the following:

(i) Underlying limestone bedrock aquifer;
(ii) South Dublin Bay and River Tolka Estuary SPA (site code: 4024), and the South Dublin Bay SAC (site code: 0210).

Other Natura 2000 Sites within Dublin Bay that may be hydrologically connected to the proposed development site, but are located further away (North Dublin Bay SAC (site code: 0206), the North Bull Island SPA (site code: 4006), Rockabill to Dalkey Island SAC (site code: 3000) and Lambay Islands SAC (site code: 0204) and SPA (site code: 4069)) were excluded from the assessment due to their distance from the subject site, the potential loading of contaminant from the site (risk scenarios presented in Section 3.1) and significant dilution through its pathway.

3.4 Assessment of Source Pathway Receptor Linkages

Table 3.1 below summarises the plausible pollutant linkages (S-P-R) considered as part of the assessment and a review of the assessed risk is also summarised below.

The potential for impact on the aquifer is low based on the absence of any bulk chemical storage on site. The overburden thickness, low permeability nature of till and a lack of fracture connectivity within the limestone will minimise the rate of off-site migration for any indirect discharges to ground at the site. As such there is no potential for a change in the groundwater body status or significant source pathway linkage through the aquifer to any Natura 2000 site.

During construction phase, there is no direct open-water pathway between the site and Natura 2000 sites within South Dublin Bay. However, there is an indirect pathway through the public surface sewer which discharges into the Dunboyne Stream. Should any silt-laden stormwater from construction or hydrocarbon-contaminated water from a construction vehicle leak/tank leak manage to enter into the surface water sewer, the suspended solids will naturally settle within the sewer; however, in the event of a worst case hydrocarbon leak of 1,000 litres this would be diluted to background levels (water quality objectives as outlined in S.I. No. 272 of 2009, S.I. No. 386 of 2015 and S.I. No. 77 of 2019) by the time the stormwater reaches the nearest Natura 2000 Sites (South Dublin Bay SAC/SPA, c. 16 km downgradient).

During operation, the potential for a release is low as there is no bulk fuel/chemical storage and no silt laden run-off. Stormwater will be collected by a drainage system which includes SuDS measures, an attenuation system and oil/ petrol interceptors prior to discharge off-site (albeit these measures have been disregarded for this analysis). In addition, the potential for hydrocarbon discharge is quite minimal based on an individual vehicle (70 litres) leak being the only source for hydrocarbon release. However, even if the operation of the proposed SuDS and interceptor systems are excluded from consideration, there is no likely impact above water quality objectives as outlined in S.I. No. 272 of 2009, S.I. No. 386 of 2015 and S.I. No. 77 of 2019) in the worst case scenarios described above at section 3.2 and there will be no significant effect on any European site. The volume of contaminant release is low and combined with the significant attenuation within the stormwater drainage network, hydrocarbons will dilute to background levels with no likely impact above water quality objectives as outlined in S.I. No. 272 of 2009, S.I. No. 386 of 2015 and S.I. No. 77 of 2019 at any Natura 2000 sites.

It can be concluded that the in-combination effects of surface water arising from the proposed development taken together with that of other permitted developments will not be significant based on the in-combination low potential chemical and sediment expected loading. Therefore, based on the loading of any hazardous material considered in the worst case scenarios mentioned in Section 3.1 above during construction and operation phases, there is subsequently no potential for impact on downgradient Natura 2000 habitats (those in South Dublin Bay, located c. 16 km from the site).

The peak wastewater discharge is calculated at 11.35 l/s. The sewage discharge will be licensed by Irish Water, collected in public sewers and ultimately treated at Irish Water's WWTP at Ringsend prior to discharge to Dublin Bay. As outlined in section 3.1 (iv), upgrade works commenced in 2018 and are expected to be fully completed by 2025. The upgrade works will result in treatment of sewage to a higher quality than current, thereby ensuring effluent discharge to Dublin Bay will comply with the Urban Wastewater Treatment Directive for a population equivalent of 2.1 million by Q4 2023.

The project is being progressed in stages to ensure that the plant continues to treat wastewater to the current treatment levels throughout the delivery of the upgrade. The project comprises three key elements and underpinning these is a substantial programme of ancillary works:

- Provision of additional secondary treatment capacity with nutrient reduction (400,000 population equivalent);
- Upgrade of the 24 existing secondary treatment tanks to provide additional capacity and nutrient reduction, which is essential to protect the nutrient-sensitive Dublin Bay area; and
- Provision of a new phosphorous recovery process.

In February 2018, the work commenced on the first element, the construction of a new 400,000 population equivalent extension at the Ringsend Wastewater Treatment Plant. After commissioning stages, the Capacity Upgrade facility began accepting flows for treatment in November 2021). This facility will enable current treatment levels to be maintained during the remainder of the upgrade of the existing secondary treatment tanks.

The 2019 planning permission facilitated upgrading works to meet nitrogen and phosphorus standards set out in the licence, which are temporarily exceeded currently. Works on the first of four contracts to retrofit the existing treatment tanks with aerobic granular sludge technology commenced in November 2020 and was completed in December 2021. In September 2021, the second contract was awarded and its construction works commenced in November 2021 and is expected to take approximately 2 years to complete. In November 2021, the third contract was awarded and its Construction works were anticipated to commence in late 2022. The fourth contract is scheduled to commence in mid-2023.

The application for the upgrade of the WWTP in 2012 and the revised upgrade in 2018 was supported by a detailed EIAR. As outlined in the EIAR, modelling of water quality in Dublin Bay has shown that the upgrades (which are now currently underway) will result in improved water quality within Dublin Bay. The 2018 EIAR predicts that the improvement in effluent quality achieved by the upgrade will compensate for the increase in flow through the plant. The ABP inspector's report summarises the positive findings of the modelling for the post WWTP upgrade scenario on Dublin Bay water quality in sections 12.3.5 and 12.3.12 of his report and the overall positive impact for human health and the environment in his conclusions in section 12.9.1.

In addition, the EIAR report acknowledges that under the do-nothing scenario "*the areas in the Tolka Estuary and North Bull Island channel will continue to be affected by the cumulative nutrient loads from the river Liffey and Tolka and the effluent from the Ringsend WWTP*", which could result in a deterioration of the biological status of Dublin Bay (Irish Water, 2018). Nevertheless, these negative impacts of nutrient over-enrichment are considered "unlikely" (Irish Water, 2018). This is because historical data suggests that pollution in Dublin Bay has had little or no effect on the composition and richness of the benthic macroinvertebrate fauna. Therefore, the do-nothing scenario predicts that nutrient and suspended solid loads from the WWTP will "continue at the same levels and the impact of these loadings should maintain the same level of effects on marine biodiversity". Therefore, it can be concluded that significant effects on the current status of the European sites within Dublin Bay from the current operation of Ringsend WWTP are unlikely. This conclusion is not dependent upon any future works to be undertaken at Ringsend.

Even without treatment at the Ringsend WWTP, the peak effluent discharge, calculated for the proposed development as 11.35 l/s (which would equate to 0.1% of the licensed discharge at Ringsend WWTP [peak hydraulic capacity]), would not have a measurable impact on the overall water quality within Dublin Bay and therefore would not have an impact on the current Water Body Status (as defined within the Water Framework Directive). This assessment is supported by hydrodynamic and chemical modelling within Dublin Bay which has shown that there is significant dilution for contaminants of concern (DIN and MRP) available quite close to the outfall for the treatment plant (Ringsend WWTP 2012 EIS, Ringsend WWTP 2018 EIAR; refer to Section 12.4.22, ABP-301798-18 Inspector's report). The most recent water quality assessment of Dublin Bay WFD Waterbody undertaken by the EPA (Water Quality in 2020: An Indicator Report, 2021) also shows that Dublin Bay on the whole, currently has an 'Unpolluted' water quality status (refer to www.catchments.ie).

With regard to bathing waters in Dublin Bay, as mentioned above the Proposed Development will have no impact on the water quality in any overflow situation apart from a minor contribution (0.1% of the peak hydraulic capacity at Ringsend WWTP) from foul sewage.

It should be noted that the Ringsend WWTP upgrade has experienced capacity issues during rainfall events and therefore overflows can occur following periods of heavy rainfall. These overflows occur as a result of the impact on treatment capacity during heavy rainfall events due to surges primarily caused by the historical combined drainage system in Dublin. As the Proposed Development will not contribute any additional stormwater drainage to the WWTP over the natural greenfield rate, the development will therefore have no measurable impact on the water quality in any overflow situation.

The assessment has also considered the effect of cumulative events, such as release of sediment laden water combined with a hydrocarbon leak on site (1,000 litres as a worst case scenario during the construction phase). As there is adequate assimilation and dilution between the site and the Natura 2000 sites (South Dublin Bay, which is

c. 16 km from the site), it is concluded that no perceptible impact on water quality would occur at the Natura 2000 sites as a result of the construction or operation of this Proposed Development. It can also be concluded that the cumulative or in-combination effects of effluent arising from the Proposed Development with that of other permitted proposed developments, or with development planned pursuant to statutory plans in the greater Dublin, Meath and Kildare areas, which will be discharged into Ringsend WWTP will not be significant having regard to the size of the calculated discharge from the Proposed Development and having regard to the following:

- Recent water quality assessment for Dublin Bay shows that they currently continue to meet the criteria for 'Unpolluted' water quality status (EPA, data until July 2021).
- The Ringsend WWTP upgrade which is currently being constructed will result in improved water quality by Q4 2023 (for a population of 2.1 million) and 2025 (for a population of 2.4 million) to ensure compliance with Water Framework Directive requirements.
- All new developments are required to comply with SuDS which ensures management of run-off rate within the catchment of Ringsend WWTP.
- The natural characteristics of Dublin Bay result in enriched water rapidly mixing and degrading such that the plume has no appreciable effect on water quality at Natura 2000 sites.

As the Proposed Development will have no additional stormwater run-off during a stormwater event over and above the current level, surface water run-off from the development in the operational phase will therefore have no impact on the current water quality in any overflow situation at Dublin Bay.

It should also be noted that the bathing status has no direct relevance to the water quality status of the Natura sites due to rapid mixing and dilution resulting in no measurable change in water quality within the overall water body.

In addition, there is no long term discharge planned which could have an impact on the status of the water body. In the scenario of an accidental release (unmitigated leaks mentioned above) there is potential for a temporary impact only which would not be of a sufficient magnitude to effect a change in the current water body status.

Finally, in a worst-case scenario of an unmitigated leak and not considering the operation of the SuDS measures already included in the design, no perceptible risk to any Natura 2000 Sites is anticipated given the distance from source to South Dublin Bay protected areas (c. 16km). Potential contaminant loading will be attenuated, diluted and dispersed near source area.

Table 3.1 below presents a summary of the risk assessment undertaken.

Source	**Pathways**	**Receptors considered**	**Risk of Impact**
Construction Impacts (Summary)			
Unmitigated leak from an oil tank to ground/ unmitigated leak from construction vehicle (1,000 litres worst case scenario).	Bedrock protected by 0-10m low permeability overburden. Migration within weathered/ less competent limestone is low (limestone has discrete local fracturing rather than large connected fractures).	Limestone bedrock aquifer (Locally Important Aquifer)	Low risk of migration through poorly connected fracturing within the limestone rock mass (Locally Important Aquifer). No likely impact on the status of the aquifer/off site migration due to low potential loading, natural attenuation within overburden and discrete nature of fracturing reducing off site migration.
Discharge to ground of runoff water with High pH from cement process/ hydrocarbons from construction vehicles/run-off containing a high concentration of suspended solids	Indirect pathway through stormwater drainage and river network to Dublin Bay waterbody (distance source-receptor: >16km)	South Dublin Bay SAC/SPA/pNHA	Potential for local temporary exceedances of statutory water quality standards at outfall. However, no perceptible risk to water requirements for the Natura 2000 sites in Dublin Bay based on loading and high level of dilution in the surface water sewer and on the distance of c. 16 km between the source and the estuary.
Operational Impacts (Summary)			
Foul effluent discharge to sewer	Indirect pathway to South Dublin Bay through public sewer	South Dublin Bay SAC/SPA/pNHA	No perceptible risk – Even without treatment at Ringsend WWTP, the peak effluent discharge (11.35 l/sec which would equate to 0.1% of the licensed discharge at Ringsend WWTP); would not impact on the overall water quality within Dublin Bay and therefore would not have an impact on the current Water Body Status (as defined within the Water Framework Directive).
Discharge to ground of hydrocarbons from carpark leak (70 litres worst case scenario)	Indirect pathway through stormwater drainage and river network to Dublin Bay waterbody (distance source-receptor: >16km)	South Dublin Bay SAC/SPA/pNHA	No perceptible risk – taking into account the extent of loading of contaminant, distance between the source and Dublin Bay is c. 16 km and significant dilution in the surface water sewer, Dunboyne Stream and River Tolka will ensure any released hydrocarbons are at background levels (i.e., with no likely impact above water quality objectives as outlined in S.I. No. 272 of 2009, S.I. No. 386 of 2015 and S.I. No. 77 of 2019).

Table 3.1 Pollutant Linkage Assessment (without mitigation)

4.0 CONCLUSIONS

A conceptual site model (CSM) has been prepared following a desk top review of the site and surrounding environs. Based on this CSM, plausible Source-Pathway-Receptor linkages have been assessed assuming an absence of any measures intended to avoid or reduce harmful effects of the proposed project (i.e. mitigation measures) in place at the proposed development site.

During construction and operation phases there is no direct source pathway linkage between the proposed development and open waters. There is no direct source pathway linkage between the proposed development site and any Natura 2000 sites (i.e. South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA). There are indirect source pathway linkage from the proposed development through the public stormwater sewer which discharges into the Dunboyne Stream and the foul sewer which will eventually discharge to the Ringsend WWTP and ultimately discharges to South Dublin Bay. The future development has a peak foul discharge that would equate to 0.1% of the licensed discharge at Ringsend WWTP (peak hydraulic capacity).

Even disregarding the operation of design measures including SuDS and an attenuation system and petrol interceptors on site, it is concluded that there will be imperceptible impacts from the proposed development to the water bodies due to emissions from the site stormwater drainage infrastructure to the wider drainage network. It should be noted the proposal also includes permeable paving, an attenuation system and petrol interceptors as part of best practice project design, and these features will provide additional filtration from the site to the drainage network.

It is concluded that there are no pollutant linkages as a result of the construction or operation of the Proposed Development which could result in a water quality impact which could alter the habitat requirements of the Natura 2000 sites within South Dublin Bay.

Finally, and in line with good practice, appropriate and effective mitigation measures will be included in the construction design, management of construction programme and during the operational phase of the proposed development. With regard the construction phase, adequate mitigation measures will be incorporated in the Construction Environmental Management Plan (CEMP). These specific measures will provide further protection to the receiving soil and water environments. However, the protection of downstream European sites is in no way reliant on these measures and they have not been taken into account in this assessment.

5.0 REFERENCES

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APPENDIX 10.1 DUST MANAGEMENT PLAN

APPENDIX 10.1: DUST MANAGEMENT PLAN

The objective of dust control at the site is to ensure that no significant nuisance occurs at nearby sensitive receptors. In order to develop a workable and transparent dust control strategy, the following management plan has been formulated by drawing on best practice guidance from Ireland, the UK (IAQM (2014), BRE (2003), The Scottish Office (1996), UK ODPM (2002)) and the USA (USEPA, 1997).

10.1.1 Site Management

The aim is to ensure good site management by avoiding dust becoming airborne at source. This will be done through good design and effective control strategies.

At the construction planning stage, the siting of activities and storage piles will take note of the location of sensitive receptors and prevailing wind directions in order to minimise the potential for significant dust nuisance (see Figure 11.1 for the windrose for Dublin Airport). As the prevailing wind is predominantly westerly to south-westerly, locating construction compounds and storage piles downwind of sensitive receptors will minimise the potential for dust nuisance to occur at sensitive receptors.

Good site management will include the ability to respond to adverse weather conditions by either restricting operations on-site or quickly implementing effective control measures before the potential for nuisance occurs. When rainfall is greater than 0.2mm/day, dust generation is generally suppressed (IAQM, 2014; UK ODPM, 2002). The potential for significant dust generation is also reliant on threshold wind speeds of greater than 10 m/s (19.4 knots) (at 7m above ground) to release loose material from storage piles and other exposed materials (USEPA, 1986). Particular care should be taken during periods of high winds (gales) as these are periods where the potential for significant dust emissions are highest. The prevailing meteorological conditions in the vicinity of the site are favourable in general for the suppression of dust for a significant period of the year. Nevertheless, there will be infrequent periods were care will be needed to ensure that dust nuisance does not occur. The following measures shall be taken in order to avoid dust nuisance occurring under unfavourable meteorological conditions:

- The Principal Contractor or equivalent must monitor the contractors' performance to ensure that the proposed mitigation measures are implemented and that dust impacts and nuisance are minimised;
- During working hours, dust control methods will be monitored as appropriate, depending on the prevailing meteorological conditions;
- The name and contact details of a person to contact regarding air quality and dust issues shall be displayed on the site boundary, this notice board should also include head/regional office contact details;
- It is recommended that community engagement be undertaken before works commence on site explaining the nature and duration of the works to local residents and businesses;
- A complaints register will be kept on site detailing all telephone calls and letters of complaint received in connection with dust nuisance or air quality concerns, together with details of any remedial actions carried out;
- It is the responsibility of the contractor at all times to demonstrate full compliance with the dust control conditions herein;
- At all times, the procedures put in place will be strictly monitored and assessed.

The dust minimisation measures shall be reviewed at regular intervals during the works to ensure the effectiveness of the procedures in place and to maintain the goal of minimisation of dust through the use of best practice and procedures. In the event of dust nuisance occurring outside the site boundary, site activities will be reviewed and satisfactory procedures implemented to rectify the problem. Specific dust control measures to be employed are described below.

10.1.2 Site Roads / Haulage Routes

Movement of construction trucks along site roads (particularly unpaved roads) can be a significant source of fugitive dust if control measures are not in place. The most effective means of suppressing dust emissions from unpaved roads is to apply speed restrictions. Studies show that these measures can have a control efficiency ranging from 25 to 80% (UK ODPM, 2002).

- A speed restriction of 20 km/hr will be applied as an effective control measure for dust for on-site vehicles using unpaved site roads;
- Access gates to the site shall be located at least 10m from sensitive receptors where possible;
- Bowsers or suitable watering equipment will be available during periods of dry weather throughout the construction period. Research has found that watering can reduce dust emissions by 50% (USEPA, 1997). Watering shall be conducted during sustained dry periods to ensure that unpaved areas are kept moist. The required application frequency will vary according to soil type, weather conditions and vehicular use;
- Any hard surface roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only.

10.1.3 Land Clearing / Earth Moving

Land clearing / earth-moving works during periods of high winds and dry weather conditions can be a significant source of dust.

- During dry and windy periods, and when there is a likelihood of dust nuisance, watering shall be conducted to ensure moisture content of materials being moved is high enough to increase the stability of the soil and thus suppress dust;
- During periods of very high winds (gales), activities likely to generate significant dust emissions should be postponed until the gale has subsided.

10.1.4 Storage Piles

The location and moisture content of storage piles are important factors which determine their potential for dust emissions.

- Overburden material will be protected from exposure to wind by storing the material in sheltered regions of the site. Where possible storage piles should be located downwind of sensitive receptors;
- Regular watering will take place to ensure the moisture content is high enough to increase the stability of the soil and thus suppress dust. The regular watering of stockpiles has been found to have an 80% control efficiency (UK ODPM, 2002).
- Where feasible, hoarding will be erected around site boundaries to reduce visual impact. This will also have an added benefit of preventing larger particles from impacting on nearby sensitive receptors.

10.1.5 Site Traffic on Public Roads

Spillage and blow-off of debris, aggregates and fine material onto public roads should be reduced to a minimum by employing the following measures:

- Vehicles delivering or collecting material with potential for dust emissions shall be enclosed or covered with tarpaulin at all times to restrict the escape of dust;
- At the main site traffic exits, a wheel wash facility shall be installed if feasible. All trucks leaving the site must pass through the wheel wash. In addition, public roads outside the site shall be regularly inspected for cleanliness, as a minimum on a daily basis, and cleaned as necessary.

10.1.6 Summary of Dust Mitigation Measures

The pro-active control of fugitive dust will ensure that the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released, will contribute towards the satisfactory performance of the contractor. The key features with respect to control of dust will be:

- The specification of a site policy on dust and the identification of the site management responsibilities for dust issues;
- The development of a documented system for managing site practices with regard to dust control;
- The development of a means by which the performance of the dust minimisation plan can be regularly monitored and assessed; and
- The specification of effective measures to deal with any complaints received.

APPENDIX 15 A BS5837 TREE SURVEY REPORT

APRIL 6, 2022

BS5837 TREE SURVEY REPORT

Dunboyne,Dublin

ANDREW BOE BSC (HONS) MARBORA
INDEPENDENT ARBORICULTURAL CONSULTANT
Tel: 07834895556 / Email: ajboe@hotmail.co.uk

Site at Dunboyne, Dublin

Introduction to Tree Survey

Comer Group Ireland has requested a BS5837 ‘Trees in relation to construction’ tree survey concerning the trees population of the above site. This provides the initial data to inform the design team in any future development.

Survey details

An initial BS 5837 2012 tree survey report was undertaken in September 2021 with additional areas added to the survey in April 2022.

All information proved to the author of this report is assumed to be accurate.

The scope of this report is to complete a BS5837 2012- Trees in relation to construction-specification tree survey of the trees and make recommendations for any tree management required.

The survey was carried out using Visual Tree Assessment (VTA) methodologies from ground level only. No below ground, invasive or destructive tests where undertaken. No soil / root samples were taken for analysis.

Weather conditions on the day where dry with a light wind.

Due to the changing nature of trees and other site circumstances this report and any recommendations made are limited to a 2-year period. Any alteration to the subject site, trees or any development could change the current circumstances and may invalidate this report and any recommendations made.

The report is valid only for normal weather conditions. Healthy trees or parts of healthy trees may fail in normal weather situations although the risk is significantly increased in storm conditions and as the consequences of such weather phenomena are unforeseeable the tree surveyor cannot be held liable for any such failures.

Any alteration or deletion from this report shall invalidate it as a whole.

Tree details

This site is based around a green field site with multiple fields and tree boundaries. The tree population has arisen through a combination of deliberate planting and self-seeding. The amenity value of the majority of the trees should be considered low to medium due to being mostly self-seeded and unmaintained.

The remaining contribution of the majority of the trees is very limited with the exception of the Oak woodland to the South of the site.

This survey has been completed on the basis that the locational information provided is correct.

The surveyed area has a population of approximimalty 395 trees surveyed as individuals and groups. The species breakdown can be explored in Figure 1.

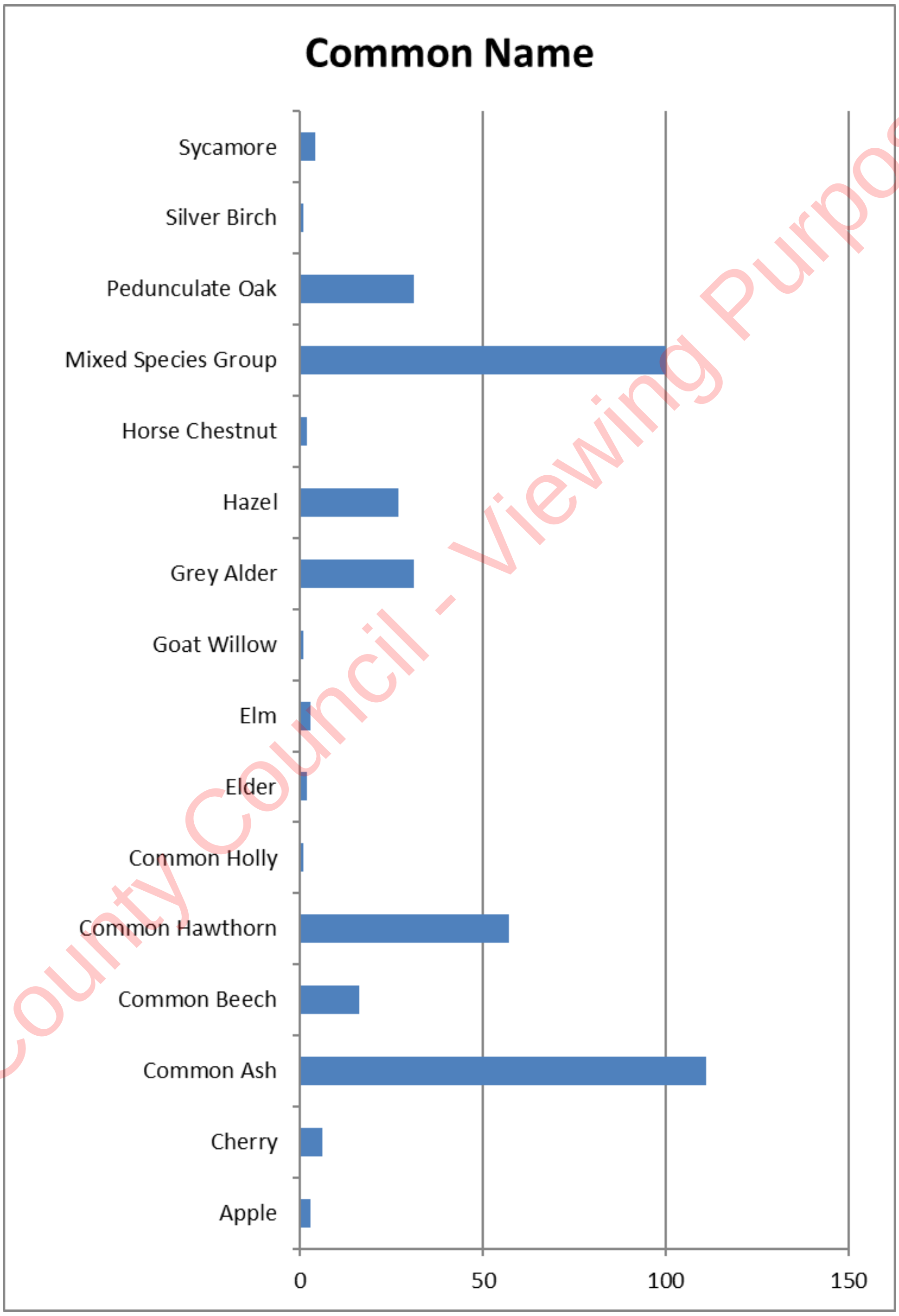


Figure 1. Species make up.

The tree population has a diversity of ages with the majority being mature. (Figure 2.)
Remaining contribution is illustrated in figure 3.

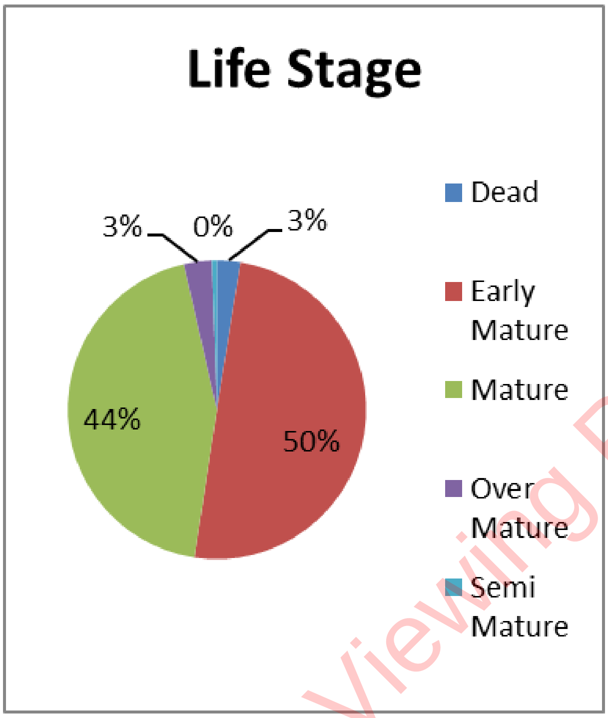


Figure 2. Life stage

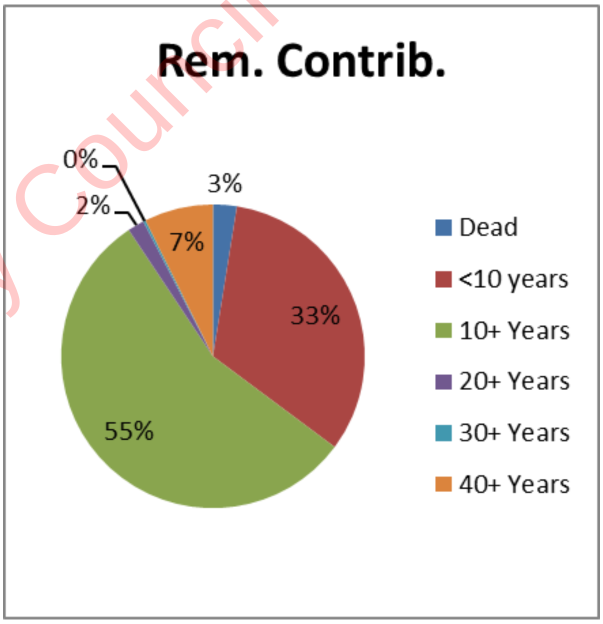


Figure 3. Remaining contribution.

BS5837 Categorisation.

Each tree or group of trees has been assigned a category from the British standard. (Figure 4)

86% of the trees have been categorised as C. Trees in this category include unremarkable trees of limited merit, small-growing, young species which have a relatively low potential amenity value, and low landscape benefits.

4% of the trees have been categorised as U. Trees assigned to this category are in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years and/or are unsuitable for retention in the proximity of new dwellings or areas of public open space.

The remainder (10%) are classed as B. Trees assigned to this category include healthy attractive trees with remediable defects that are in a condition as to be able to make a significant contribution for a minimum of 20 years.

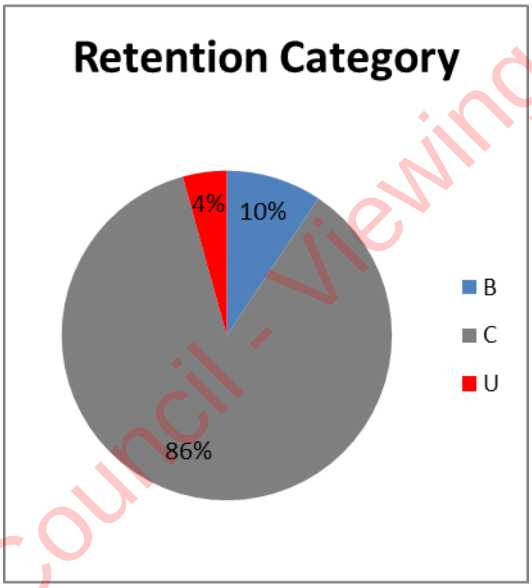


Figure 4. Retention category summary.

For a complete list of observations and recommendations on a tree by tree basis please consult the attached tree survey schedule.

Trees Suitable for Retention

Where possible, it is generally considered desirable for Category 'A' and Category 'B' trees to be retained and incorporated into new developments and layouts. Category 'U' trees are not considered to be appropriate for retention.

In assessing the Arboricultural Impact on the trees of the proposed development and which trees might be suitable for retention in the context of the proposed layout the following factors should be considered.

- Shading-
- Future Pressure for Tree Removal and Pruning
- Seasonal Nuisance
- Infrastructure
- Direct Damage
- Root Protection Areas
- Future Management
- Demolition/Ground Works
- Construction Activity

Recommendations

Full details of the Preliminary management Recommendations are provided in the attached tree survey Schedule.

Tree Protection Guidelines

Root protection areas –(RPAS)

The erection of protective fencing as per the Tree Protection Plan (TPP) prior to the commencement of any works on site will protect the RPA of retained trees.

Existing ground levels should be retained within the RPAs. Intrusions into the soil within the RPAs is generally not acceptable and topsoil within it should remain in situ.

The erection of protective fencing, in this instance, is considered likely to place constraints on elements of the construction and its associated activities and/or possibly limit the working space available, with the subsequent result that incursions into the RPAs of some of the retained trees. Consequently, additional ground protection measures will be required.

Guidance is provided below, which upon adoption, will help to minimise the potential for any detrimental effect that associated ground works and construction might have in respect of retained trees.

Suitable existing hard surfacing that is not proposed for re-use as part of the finished design should be retained to act as temporary ground protection during the construction and, development rather than being removed. The suitability of such surfacing for this purpose should be evaluated by the project arboriculturist and an engineer as appropriate (BS 5837:2012).

The British Standards 5837:2012 advises that new temporary ground protection should be capable of supporting any traffic entering or using the site without being distorted or causing compaction to underlying soil and further provides the following note:

NOTE The ground protection might comprise one of the following:

a) for pedestrian movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression resistant layer (e.g. 100 mm depth of woodchip), laid onto a geotextile membrane;

b) for pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (e.g. 150 mm depth of woodchip), laid onto a geotextile membrane;

c) for wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.

Root Protection Fencing.

Protective fencing is essential to preserve root protection areas during the duration of the works.

The location will be agreed with the retained Arboricultural consultant prior to work commencing and will aim to preserve and protect the root systems of retained trees for the duration of the works.

Due to the nature of this site root protection fencing may have to allow for pedestrian movement.

Protective barriers are to be erected prior to the commencement of site works including demolition, soil stripping or movement, bringing onto site of materials, supplies or machinery. Tree works can be undertaken prior to the erection of the barriers.

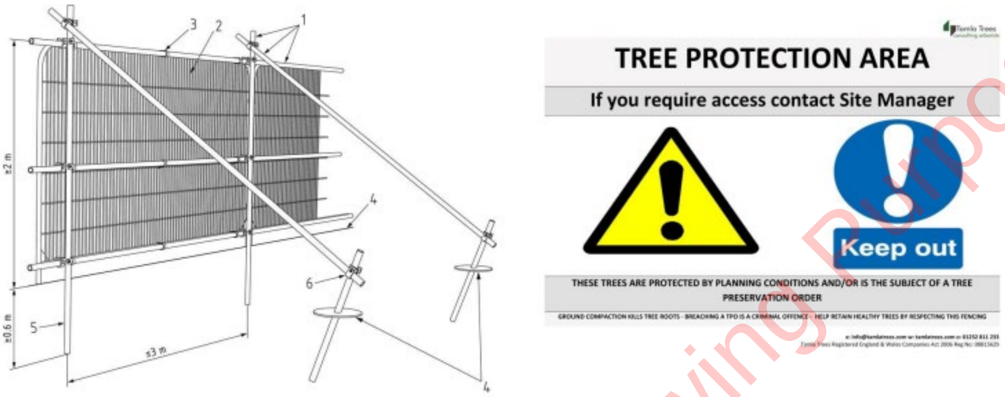
The barriers should be considered essential and should not be removed or altered without prior recommendation by an Arboriculturalist and approval of the local planning authority.

The barrier should consist of a vertical and horizontal framework of scaffold tubing which is adequately braced to resist impacts. The vertical scaffold tubes need to be placed at a distance not exceeding 3m apart and driven securely into the ground for a minimum depth of 0.6m. Care should
be taken when locating the vertical poles to avoid underground services and, in the case of the bracing poles, also to avoid any structural roots. The weldmesh or Heras panels need to be a minimum 2.0m tall and are securely attached to the scaffold framework with wire or scaffold clamps.

The wire or scaffold clamps should be secured on the inside of the barrier to avoid easy dismantling. Panels on rubber or concrete feet are not resistant to impact and should not be used.

No fixing shall be made to any tree and all possible care must be taken to prevent damage to tree roots when locating the posts. (Figure 5)

All barriers must be firmly fixed to prevent movement by site personnel or vehicles and include all weather signs with the wording “Construction exclusion zone- keep out”.



To be effective fencing must be robust and clearly signed

Figure 5- Root Protection fencing.

Excavation/Ground Works

The erection of protective fencing and/or use of ground protection, prior to the commencement of any works on site, will allow excavations and ground works to take place without any adverse effect and/or impact on the retained trees.

All plant and vehicles engaged in ground works should either operate outside the RPAs, or run on ground protection in the proximity of retained trees.

Where trees stand adjacent to hard surfaces and/or buildings to be removed, excavation should be undertaken inwards, from within the footprint of the existing hard surfacing or outside of the RPAs.

Hard Surfacing Within the Root Protection Area

General guidance is provided below in the event that a subsequent need transpires.

Arboricultural Practice Note No. 12 describes in detail the requirements of no-dig type installation whilst BS 5837:2012 suggests ‘Appropriate sub-base options for new hard surfacing include three-dimensional cellular confinement systems’.

An assessment should be made to establish whether or not the existing site topography lends itself to the installation of a three-dimensional cellular no-dig product upon anticipation of the required and final level changes.

Final on-site measurements should be taken to ascertain the extent of any incursions into the RPA and provide subsequent guidance on the extent of any ‘no-dig’ installation.

Cross sectional drawings of a suitable product can be seen below (figure 6)

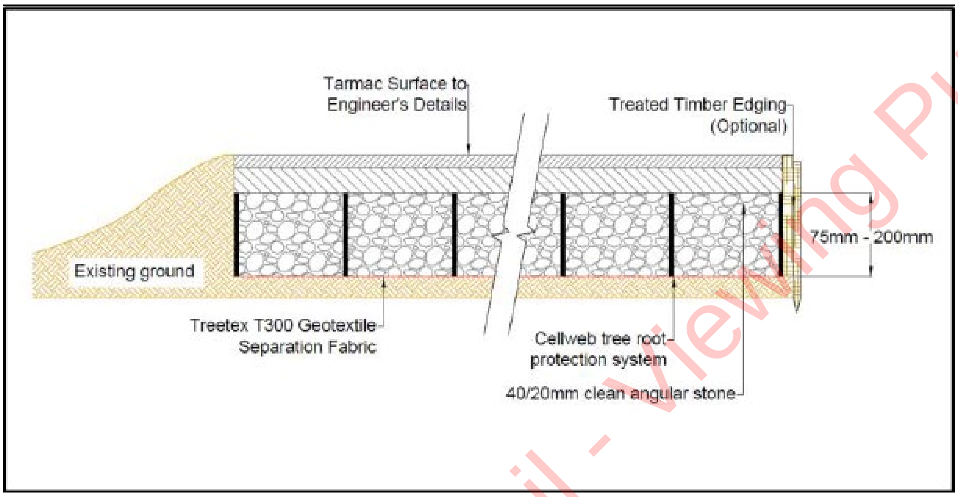


Figure 6. Cross section illustrating a possible permeable tarmac surface finish

General considerations.

To prevent damage to the retained trees, including their roots, within the fenced area (RPA) the following should be avoided.

- Alteration of ground levels, including soil stripping.
- Storage of any materials or equipment, even on a temporary basis.
- Storage of oil, bitumen, cement or other harmful materials, mixed or discharged within 12- m of the trunk of any retained tree and making further allowances for any slope of the ground so prevent running contamination. Phytotoxic materials would include any mineral oil, fuels, cement mortar washings concrete washings, mortar.
- Fires must not be lit beneath or within 12-m of any tree canopies.
- Site operations such as deliveries, site machines, crane jibs etc should be organised to avoid damaging the trunk or crown of trees. Where this conflict is unavoidable then facilitation pruning should be carried out in advance, rather than after damage has occurred. This may also be required to allow demolition operations.

- Mechanical cultivation of the soil as part of landscaping operations.

Direct Damage

Any proposed layout should consider the likelihood of direct damage occurring from incremental root and stem growth and the possibility of the fabric of any new structure being damaged by the whipping of branches against it.

Andrew Boe *BSc (Hons) MArborA*

Photographic record.

Photograph 1. Oak Woodland (Photo A.Boe September 2021)

Photo 2. Open fields with hedging.

Photo 3. Low value Hazel and Ash. The Ash throughout the site has some level of Ash dieback.

Tree survey Schedule

BS5837 Report

Comer Group Ireland
dunboyne survey

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-BS5837 Tree Surveys, Tree Constraints Plans-
-Arboricultural Impact Assessments
-Arboricultural Method Statements Tree Protection Plans-
-Arboricultural Supervision and Site Monitoring-
-Mortgage Tree Report-
Arboricultural Association Professional Member

Retention Category	No. trees
B	37
C	341
U	17
Total	395

Life Stage	No. trees
Dead	10
Early Mature	197
Mature	174
Over Mature	12
Semi Mature	2

Rem. Contrib.	No. trees
Dead	10
<10 years	129
10+ Years	219
20+ Years	7
30+ Years	1
40+ Years	29

Ref.	Species	Full Structure	Measurements	Spread	General Observations	Retention Category	RPA	Measurements2	Recommendations
T001	Apple *(Malus sp.)*	Tree	Height (m): 5 Stem Diam (mm): 200 Spread (m): 4N, 3E, 4S, 4W Life Stage: Mature Rem. Contrib.: 10+ Years	N:4 E:3 S:4 W:4	Hedgerow tree. A Single stemmed tree. Healthy but partially suppressed crown. Heavily overgrown with Ivy.	C1	Radius: 2.4m. Area: 18 sq m.	Physiological Cond: Fair Structural Cond: Physical Defect	No action required.
T002	Common Ash *(Fraxinus excelsior)*	Tree	Height (m): 4 Stem Diam (mm): 150 Spread (m): 3N, 3E, 3S, 3W Life Stage: Dead	N:3 E:3 S:3 W:3	This tree is dead but still standing.	U	None - due to Retention Category of U.	Physiological Cond: Dead Structural Cond: Decaying	Fell tree.
T003	Elm x2 *(Ulmus sp.)* Silver Birch *(Betula pendula)* Common Ash *(Fraxinus excelsior)* Horse Chestnut x2 *(Aesculus hippocastanum)* Common Hawthorn x7 *(Crataegus monogyna)*	Group 12 trees	Height (m): 5 12 stems, avg.(mm): 150 Spread (m): 3N, 3E, 3S, 3W Life Stage: Early Mature Rem. Contrib.: 10+ Years	N:3 E:3 S:3 W:3	Hedgerow with various trees. Ivy throughout. Grows by ditch. Mature hedge.	C1	Area: 427 sq m, plus a 1m buffer.	Physiological Cond: Fair Structural Cond: Fair	No action required.
T004	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 18 Stem Diam (mm): 910 Spread (m): 5N, 3E, 6S, 5W Life Stage: Over Mature Rem. Contrib.: 20+ Years	N:5 E:3 S:6 W:5	A Single stemmed tree. Healthy but partially suppressed crown. Deadwood in the crown. Heavily overgrown with Ivy. Minor decay pockets in the crown. Minor decay pockets around the base.	B1	Radius: 10.9m. Area: 373 sq m.	Physiological Cond: Fair Structural Cond: Fair	Sever ivy at base.

Ref.	Species	Full Structure	Measurements	Spread	General Observations	Retention Category	RPA	Measurements2	Recommendations
T005	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 18 Stem Diam (mm): 800 Spread (m): 5N, 3E, 6S, 3W Life Stage: Over Mature Rem. Contrib.: 20+ Years	N:5 E:3 S:6 W:3	A Single stemmed tree. Healthy but partially suppressed crown. Deadwood in the crown. Heavily overgrown with Ivy. Minor decay pockets in the crown. Minor decay pockets around the base.	B1	Radius: 9.6m. Area: 290 sq m.	Physiological Cond: Fair Structural Cond: Fair	Sever ivy at base.
T006	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 18 Stem Diam (mm): 1200 Spread (m): 7N, 6E, 3S, 3W Life Stage: Over Mature Rem. Contrib.: 20+ Years	N:7 E:6 S:3 W:3	A Single stemmed tree. Healthy but partially suppressed crown. Deadwood in the crown. Heavily overgrown with Ivy. Minor decay pockets in the crown. Minor decay pockets around the base.	B1	Radius: 14.4m. Area: 651 sq m.	Physiological Cond: Fair Structural Cond: Fair	Sever ivy at base.
T007	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 18 Stem Diam (mm): 910 Spread (m): 5N, 6E, 7S, 3W Life Stage: Over Mature Rem. Contrib.: 20+ Years	N:5 E:6 S:7 W:3	A Single stemmed tree. Healthy but partially suppressed crown. Deadwood in the crown. Heavily overgrown with Ivy. Minor decay pockets in the crown. Minor decay pockets around the base.	B1	Radius: 10.9m. Area: 373 sq m.	Physiological Cond: Fair Structural Cond: Fair	Sever ivy at base.
T008	Elder *(Sambucus nigra)*	Tree	Height (m): 6 Stem Diam (mm): 200 Spread (m): 3N, 3E, 3S, 3W Life Stage: Mature Rem. Contrib.: 10+ Years	N:3 E:3 S:3 W:3	Twin-stemmed tree. Healthy spreading crown. Heavily overgrown with Ivy.	C1	Radius: 2.4m. Area: 18 sq m.	Physiological Cond: Fair Structural Cond: Fair	No action required.
T009	Elder *(Sambucus nigra)* Sycamore x2 *(Acer pseudoplatanus)* Apple x2 *(Malus sp.)* Common Ash x13 *(Fraxinus excelsior)* Common Hawthorn x15 *(Crataegus monogyna)*	Group 33 trees	Height (m): 15 33 stems, avg.(mm): 300 Spread (m): 4N, 4E, 4S, 4W Life Stage: Mature Rem. Contrib.: 10+ Years	N:4 E:4 S:4 W:4	Ash Dieback on Ash. Old mature hedgerow line on ditch. Single and multi-stemmed trees.	C1	Area: 1099 sq m, plus a 1m buffer.	Physiological Cond: Poor Structural Cond: Poor	Remove Ash.
T010	Common Ash *(Fraxinus excelsior)*	Tree	Height (m): 12 Stem Diam (mm): 200 Spread (m): 3N, 3E, 3S, 3W Life Stage: Dead	N:3 E:3 S:3 W:3	This tree is dead but still standing.	U	None - due to Retention Category of U.	Physiological Cond: Dead Structural Cond: Decaying	Fell tree.

Ref.	Species	Full Structure	Measurements	Spread	General Observations	Retention Category	RPA	Measurements2	Recommendations
T011	Common Ash x2 *(Fraxinus excelsior)* Common Hawthorn x9 *(Crataegus monogyna)*	Group 11 trees	Height (m): 9 11 stems, avg.(mm): 200 Spread (m): 2N, 2E, 2S, 2W Life Stage: Early Mature Rem. Contrib.: <10 years	N:2 E:2 S:2 W:2	Mature Hedge line. Ash Dieback throughout Ash.	C1	Area: 250 sq m, plus a 1m buffer.	Physiological Cond: Poor Structural Cond: Physical Defect	Remove Ash.
T012	Common Ash *(Fraxinus excelsior)*	Tree	Height (m): 6 Stem Diam (mm): 180 Spread (m): 3N, 3E, 3S, 3W Life Stage: Semi Mature Rem. Contrib.: <10 years	N:3 E:3 S:3 W:3	A multi-stemmed tree. Healthy spreading crown.	C1	Radius: 2.2m. Area: 15 sq m.	Physiological Cond: Fair Structural Cond: Fair	No action required.
T013	Common Ash *(Fraxinus excelsior)*	Tree	Height (m): 7 Stem Diam (mm): 150 Spread (m): 2N, 2E, 2S, 2W Life Stage: Dead	N:2 E:2 S:2 W:2	Tree has been felled.	U	None - due to Retention Category of U.	Physiological Cond: Dead Structural Cond: Decaying	Fell tree.
T014	Common Ash *(Fraxinus excelsior)*	Tree	Height (m): 7 Stem Diam (mm): 150 Spread (m): 2N, 2E, 2S, 2W Life Stage: Dead	N:2 E:2 S:2 W:2	Tree has been felled.	U	None - due to Retention Category of U.	Physiological Cond: Dead Structural Cond: Decaying	Fell tree.
T015	Common Ash *(Fraxinus excelsior)*	Tree	Height (m): 7 Stem Diam (mm): 160 Spread (m): 2N, 2E, 2S, 2W Life Stage: Dead	N:2 E:2 S:2 W:2	Tree has been felled.	U	None - due to Retention Category of U.	Physiological Cond: Dead Structural Cond: Decaying	Fell tree.
T016	Common Hawthorn *(Crataegus monogyna)*	Tree	Height (m): 4 Stem Diam (mm): 150 Spread (m): 2N, 1E, 2S, 2W Life Stage: Mature Rem. Contrib.: 10+ Years	N:2 E:1 S:2 W:2	A multi-stemmed tree. Healthy spreading crown.	C1	Radius: 1.8m. Area: 10 sq m.	Physiological Cond: Fair Structural Cond: Fair	No action required.
T017	Common Ash x4 *(Fraxinus excelsior)*	Group 4 trees	Height (m): 8 4 stems, avg.(mm): 300 Spread (m): 3N, 3E, 3S, 3W Life Stage: Mature Rem. Contrib.: <10 years	N:3 E:3 S:3 W:3	Ash Dieback throughout. 20 to 40%	C1	Area: 105 sq m, plus a 1m buffer.	Physiological Cond: Poor Structural Cond: Poor	Fell trees,
T018	Common Ash *(Fraxinus excelsior)*	Tree	Height (m): 12 Stem Diam (mm): 500 Spread (m): 4N, 4E, 4S, 4W Life Stage: Mature Rem. Contrib.: <10 years	N:4 E:4 S:4 W:4	A Single stemmed tree. Poor crown with loss of vigour. Ash Dieback 30% Heavily overgrown with Ivy.	C1	Radius: 6.0m. Area: 113 sq m.	Physiological Cond: Poor Structural Cond: Poor	Fell tree.
T019	Pedunculate Oak *(Quercus robur)*	Tree	Height (m): 11 Stem Diam (mm): 550 Spread (m): 3N, 3E, 6S, 5W Life Stage: Mature Rem. Contrib.: 30+ Years	N:3 E:3 S:6 W:5	Twin-stemmed tree. Healthy but partially suppressed crown. Major deadwood in the crown. Fractured limbs - storm damage Hung up limbs. Heavily overgrown with Ivy.	B1	Radius: 6.6m. Area: 137 sq m.	Physiological Cond: Fair Structural Cond: Physical Defect	Complete prune, which is a combination of crown reduction, crown lifting, crown thinning and the removal of epicormic shoots. Where the tree overhangs the street, the Contractor must ensure that they leave the tree with a 5.8 metre height clearance over the road. Sever ivy at base.
T020	Goat Willow *(Salix caprea)*	Tree	Height (m): 6 Stem Diam (mm): 500 Spread (m): 3N, 5E, 3S, 3W Life Stage: Over Mature Rem. Contrib.: 10+ Years	N:3 E:5 S:3 W:3	A multi-stemmed tree. Healthy spreading crown.	C1	Radius: 6.0m. Area: 113 sq m.	Physiological Cond: Fair Structural Cond: Fair	No action required.

Ref.	Species	Full Structure	Measurements	Spread	General Observations	Retention Category	RPA	Measurements2	Recommendations
T021	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 18 Stem Diam (mm): 900 Spread (m): 5N, 5E, 1S, 3W Life Stage: Over Mature Rem. Contrib.: <10 years	N:5 E:5 S:1 W:3	A Single stemmed tree. Poor crown with loss of vigour. Internal decay. Giant Polypore at the base.	U	None - due to Retention Category of U.	Physiological Cond: Poor Structural Cond: Poor	Fell tree.
T022	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 12 Stem Diam (mm): 900 Spread (m): 3N, 3E, 3S, 3W Life Stage: Mature Rem. Contrib.: <10 years	N:3 E:3 S:3 W:3	A Single stemmed tree. Poor crown with loss of vigour. Dieback - poor foliage Fractured limbs - storm damage Internal decay.	U	None - due to Retention Category of U.	Physiological Cond: Poor Structural Cond: Poor	Fell tree.
T023	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 5 Stem Diam (mm): 300 Spread (m): 2N, 2E, 2S, 2W Life Stage: Dead	N:2 E:2 S:2 W:2	This tree is dead but still standing.	U	None - due to Retention Category of U.	Physiological Cond: Dead Structural Cond: Decaying	Fell tree.
T024	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 18 Stem Diam (mm): 800 Spread (m): 5N, 7E, 6S, 3W Life Stage: Over Mature Rem. Contrib.: <10 years	N:5 E:7 S:6 W:3	A Single stemmed tree. Poor crown with loss of vigour. Major deadwood in the crown. Heavily overgrown with Ivy. Wounds on the main stem. Large decaying cavity on the main stem. Large decaying cavity in the crown. Internal decay suspected.	U	None - due to Retention Category of U.	Physiological Cond: Poor Structural Cond: Poor	Fell tree.
T025	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 10 Stem Diam (mm): 500 Spread (m): 1N, 6E, 6S, 5W Life Stage: Over Mature Rem. Contrib.: <10 years	N:1 E:6 S:6 W:5	A Single stemmed tree. Poor crown with loss of vigour. Major deadwood in the crown. Heavily overgrown with Ivy. Wounds on the main stem. Large decaying cavity on the main stem. Large decaying cavity in the crown. Internal decay suspected.	U	None - due to Retention Category of U.	Physiological Cond: Poor Structural Cond: Poor	Fell tree.
T026	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 16 Stem Diam (mm): 900 Spread (m): 1N, 1E, 1S, 1W Life Stage: Dead	N:1 E:1 S:1 W:1	Tree has been felled.	U	None - due to Retention Category of U.	Physiological Cond: Dead Structural Cond: Poor	Fell tree.
T027	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 0 Stem Diam (mm): 10 Spread (m): 1N, 1E, 1S, 1W Life Stage: Dead	N:1 E:1 S:1 W:1	Tree has been felled.	U	None - due to Retention Category of U.	Physiological Cond: Dead Structural Cond: Poor	Fell tree.

Ref.	Species	Full Structure	Measurements	Spread	General Observations	Retention Category	RPA	Measurements2	Recommendations
T028	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 18 Stem Diam (mm): 800 Spread (m): 3N, 5E, 6S, 6W Life Stage: Over Mature Rem. Contrib.: <10 years	N:3 E:5 S:6 W:6	A Single stemmed tree. Poor crown with loss of vigour. Major deadwood in the crown. Heavily overgrown with Ivy. Wounds on the main stem. Large decaying cavity on the main stem. Large decaying cavity in the crown. Internal decay suspected.	U	None - due to Retention Category of U.	Physiological Cond: Poor Structural Cond: Poor	Fell tree.
T029	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 18 Stem Diam (mm): 750 Spread (m): 6N, 7E, 5S, 5W Life Stage: Mature Rem. Contrib.: 20+ Years	N:6 E:7 S:5 W:5	A Single stemmed tree. Healthy but partially suppressed crown. Deadwood in the crown. Heavily overgrown with Ivy.	B1	Radius: 9.0m. Area: 254 sq m.	Physiological Cond: Fair Structural Cond: Fair	Sever ivy at base.
T030	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 18 Stem Diam (mm): 700 Spread (m): 5N, 5E, 6S, 4W Life Stage: Over Mature Rem. Contrib.: <10 years	N:5 E:5 S:6 W:4	A Single stemmed tree. Poor crown with loss of vigour. Major deadwood in the crown. Heavily overgrown with Ivy. Wounds on the main stem. Large decaying cavity on the main stem. Large decaying cavity in the crown. Internal decay suspected.	U	None - due to Retention Category of U.	Physiological Cond: Poor Structural Cond: Poor	Fell tree.
T031	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 18 Stem Diam (mm): 800 Spread (m): 3N, 7E, 5S, 4W Life Stage: Over Mature Rem. Contrib.: 10+ Years	N:3 E:7 S:5 W:4	A Single stemmed tree. Poor crown with loss of vigour. Major deadwood in the crown. Heavily overgrown with Ivy. Wounds on the main stem. Large decaying cavity on the main stem. Large decaying cavity in the crown. Internal decay suspected. Beech Bark Disease.	U	None - due to Retention Category of U.	Physiological Cond: Poor Structural Cond: Poor	Fell
T032	Common Beech *(Fagus sylvatica)*	Tree	Height (m): 18 Stem Diam (mm): 600 Spread (m): 3N, 6E, 7S, 2W Life Stage: Mature Rem. Contrib.: 20+ Years	N:3 E:6 S:7 W:2	A Single stemmed tree. Healthy but partially suppressed crown. Deadwood in the crown. Heavily overgrown with Ivy. On bank.	B1	Radius: 7.2m. Area: 163 sq m.	Physiological Cond: Fair Structural Cond: Fair	Sever ivy at base.

Ref.	Species	Full Structure	Measurements	Spread	General Observations	Retention Category	RPA	Measurements2	Recommendations
T033	Pedunculate Oak x28 *(Quercus robur)*	Group 28 trees	Height (m): 18 28 stems, avg.(mm): 800 Spread (m): 6N, 6E, 6S, 6W Life Stage: Mature Rem. Contrib.: 40+ Years	N:6 E:6 S:6 W:6	A linear, mature Oak woodland strip growing at the field boundary. Single stemmed trees with healthy spreading crowns. Normal Levels of deadwood. Ivy throughout. Minor decay pockets. This group should be treated as a whole and avoided.	B1	Area: 1817 sq m, plus a 1m buffer.	Physiological Cond: Fair Structural Cond: Fair	Sever ivy at base.
T034	Pedunculate Oak *(Quercus robur)*	Tree	Height (m): 16 Stem Diam (mm): 500 Spread (m): 5N, 5E, 5S, 5W Life Stage: Dead	N:5 E:5 S:5 W:5	This tree is dead but still standing.	U	None - due to Retention Category of U.	Physiological Cond: Dead Structural Cond: Poor	Fell tree.
T035	Common Ash x6 *(Fraxinus excelsior)*	Group 6 trees	Height (m): 13 6 stems, avg.(mm): 500 Spread (m): 3N, 3E, 3S, 3W Life Stage: Mature Rem. Contrib.: <10 years	N:3 E:3 S:3 W:3	Ash Dieback 20-40%	C1	Area: 138 sq m, plus a 1m buffer.	Physiological Cond: Poor Structural Cond: Poor	Fell trees.
T036	Cherry x6 *(Prunus sp. 'Cherry')* Common Ash x28 *(Fraxinus excelsior)* Common Hawthorn x25 *(Crataegus monogyna)*	Group 59 trees	Height (m): 15 59 stems, avg.(mm): 300 Spread (m): 3N, 3E, 3S, 3W Life Stage: Early Mature Rem. Contrib.: <10 years	N:3 E:3 S:3 W:3	Ash Dieback 20-30% Mature hedgerow with various species. Reduced to 2m in height.	C1	Area: 1969 sq m, plus a 1m buffer.	Physiological Cond: Poor Structural Cond: Poor	Remove all Ash
T037	Pedunculate Oak *(Quercus robur)*	Tree	Height (m): 12 Stem Diam (mm): 600 Spread (m): 5N, 5E, 5S, 5W Life Stage: Mature Rem. Contrib.: 40+ Years	N:5 E:5 S:5 W:5	Hedgerow tree. A Single stemmed tree. Healthy spreading crown. Deadwood in the crown. Heavily overgrown with Ivy.	B1	Radius: 7.2m. Area: 163 sq m.	Physiological Cond: Fair Structural Cond: Fair	Sever ivy at base.
T038	Mixed Species Group x100 *(Group, mixed species)*	Group 100 trees	Height (m): 12 100 stems, avg.(mm): 200 Spread (m): 3N, 2E, 3S, 3W Life Stage: Early Mature Rem. Contrib.: 10+ Years	N:3 E:2 S:3 W:3	A self-seed water loving group of Poplar, Willow and Alder with 5x Ash. All growing on banks of stream and creating a thicket.	C1	Area: 3250 sq m, plus a 1m buffer.	Physiological Cond: Fair Structural Cond: Fair	Remove Ash.
T039	Common Ash x9 *(Fraxinus excelsior)* Grey Alder x31 *(Alnus incana)*	Group 40 trees	Height (m): 15 40 stems, avg.(mm): 300 Spread (m): 4N, 3E, 3S, 4W Life Stage: Mature Rem. Contrib.: 10+ Years	N:4 E:3 S:3 W:4	A group of Alder and Ash. Self-seeded trees of limited value and approaching the end of life cycle. Single and multi-stemmed with multiple instances of dieback. Very dense. Ivy and deadwood throughout.	C1	Area: 1517 sq m, plus a 1m buffer.	Physiological Cond: Fair Structural Cond: Physical Defect	No action required.

Ref.	Species	Full Structure	Measurements	Spread	General Observations	Retention Category	RPA	Measurements2	Recommendations
T040	Common Ash *(Fraxinus excelsior)*	Tree	Height (m): 10 Stem Diam (mm): 300 Spread (m): 2N, 6E, 1S, 2W Life Stage: Early Mature Rem. Contrib.: <10 years	N:2 E:6 S:1 W:2	On bank. By river. A Single stemmed tree. Poor crown with loss of vigour. Ash Dieback 40%	C	Radius: 3.6m. Area: 41 sq m.	Physiological Cond: Poor Structural Cond: Poor	Fell tree.
T041	Common Ash *(Fraxinus excelsior)*	Tree	Height (m): 12 Stem Diam (mm): 650 Spread (m): 2N, 6E, 1S, 6W Life Stage: Over Mature Rem. Contrib.: <10 years	N:2 E:6 S:1 W:6	On bank. By river. A Single stemmed tree. Poor crown with loss of vigour. Ash Dieback 40% Wire main stem.	C	Radius: 7.8m. Area: 191 sq m.	Physiological Cond: Poor Structural Cond: Poor	Fell tree.
T042	Common Ash x13 *(Fraxinus excelsior)*	Group 13 trees	Height (m): 12 13 stems, avg.(mm): 500 Spread (m): 5N, 5E, 5S, 5W Life Stage: Mature Rem. Contrib.: <10 years	N:5 E:5 S:5 W:5	On bank. By river. Ash Dieback 20 to 40%	C	Area: 762 sq m, plus a 1m buffer.	Physiological Cond: Structural Cond:	Fell trees.
T043	Sycamore *(Acer pseudoplatanus)*	Tree	Height (m): 7 Stem Diam (mm): 200 Spread (m): 2N, 2E, 2S, 2W Life Stage: Early Mature Rem. Contrib.: 10+ Years	N:2 E:2 S:2 W:2	Not tagged due to access issues. On bank. By river. A Single stemmed tree. Healthy but partially suppressed crown.	C1	Radius: 2.4m. Area: 18 sq m.	Physiological Cond: Fair Structural Cond: Fair	No action required.
T044	Sycamore *(Acer pseudoplatanus)*	Tree	Height (m): 12 Stem Diam (mm): 500 Spread (m): 4N, 5E, 4S, 4W Life Stage: Mature Rem. Contrib.: 20+ Years	N:4 E:5 S:4 W:4	A multi-stemmed tree. Healthy spreading crown. On bank. By river.	B1	Radius: 6.0m. Area: 113 sq m.	Physiological Cond: Fair Structural Cond: Fair	No action required.
T045	Common Ash x12 *(Fraxinus excelsior)*	Group 12 trees	Height (m): 12 12 stems, avg.(mm): 350 Spread (m): 4N, 4E, 4S, 4W Life Stage: Early Mature Rem. Contrib.: <10 years	N:4 E:4 S:4 W:4	On bank. By river. Overhangs adjacent Powerlines.	C	Area: 328 sq m, plus a 1m buffer.	Physiological Cond: Poor Structural Cond: Poor	Fell trees.
T046	Common Ash x12 *(Fraxinus excelsior)*	Group 12 trees	Height (m): 12 12 stems, avg.(mm): 300 Spread (m): 3N, 3E, 3S, 3W Life Stage: Mature Rem. Contrib.: <10 years	N:3 E:3 S:3 W:3	Hedgerow trees. Ash dieback 30%+ throughout. Deadwood. Ivy.	C1	Area: 349 sq m, plus a 1m buffer.	Physiological Cond: Poor Structural Cond: Poor	Fell trees.
T047	Hazel x2 *(Corylus avellana)*	Group 2 trees	Height (m): 5 2 stems, avg.(mm): 200 Spread (m): 2N, 2E, 2S, 2W Life Stage: Mature Rem. Contrib.: 10+ Years	N:2 E:2 S:2 W:2	Hedgerow trees. Multi-stemmed with cow damage. Deadwood. Ivy.	C1	Area: 54 sq m, plus a 1m buffer.	Physiological Cond: Fair Structural Cond: Fair	No action required.
T048	Common Holly *(Ilex aquifolium)*	Tree	Height (m): 5 Stem Diam (mm): 120 Spread (m): 1N, 1E, 1S, 1W Life Stage: Early Mature Rem. Contrib.: 10+ Years	N:1 E:1 S:1 W:1	Hedgerow tree. On bank. By river. A Single stemmed tree. Healthy spreading crown. Not tagged due to access issues.	C1	Radius: 1.4m. Area: 6 sq m.	Physiological Cond: Structural Cond:	No action required.

Ref.	Species	Full Structure	Measurements	Spread	General Observations	Retention Category	RPA	Measurements2	Recommendations
T049	Common Ash *(Fraxinus excelsior)*	Tree	Height (m): 15 Stem Diam (mm): 300 Spread (m): 3N, 3E, 3S, 3W Life Stage: Mature Rem. Contrib.: <10 years	N:3 E:3 S:3 W:3	Hedgerow tree. On bank. By river. A multi-stemmed tree. Poor crown with loss of vigour. Ash Dieback 20% Heavily overgrown with Ivy. Not tagged due to access issues.	C1	Radius: 3.6m. Area: 41 sq m.	Physiological Cond: Structural Cond:	Fell tree.
T050	Hazel x25 *(Corylus avellana)*	Group 25 trees	Height (m): 5 25 stems, avg.(mm): 200 Spread (m): 2N, 2E, 2S, 2W Life Stage: Mature Rem. Contrib.: 10+ Years	N:2 E:2 S:2 W:2	Hedgerow trees. Multi-stemmed with cow damage. Deadwood. Ivy.	C1	Area: 298 sq m, plus a 1m buffer.	Physiological Cond: Fair Structural Cond: Fair	No action required.
T051	Common Ash *(Fraxinus excelsior)*	Tree	Height (m): 6 Stem Diam (mm): 140 Spread (m): 2N, 2E, 2S, 2W Life Stage: Semi Mature Rem. Contrib.: <10 years	N:2 E:2 S:2 W:2	By river. A Single stemmed tree. Poor crown with loss of vigour. Ash Dieback 10-20 %	C	Radius: 1.7m. Area: 9 sq m.	Physiological Cond: Poor Structural Cond: Poor	Tree removal.
T052	Elm *(Ulmus sp.)*	Tree 2 stems	Height (m): 13 2 stems, avg.(mm): 300 Spread (m): 2N, 2E, 2S, 2W Life Stage: Dead	N:2 E:2 S:2 W:2	Two dead trees. One on each side of stream bank.	U	None - due to Retention Category of U.	Physiological Cond: Dead Structural Cond: Poor	Tree removal.

Appendix 1.

BS5837:2012 Table 1 – Cascade chart for tree quality assessment

Category and definition	**Criteria (including subcategories where appropriate)**			**Identification on plan**
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) • Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline • Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality *NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see [BS5837:2012]* ***4.5.7.***			🔴
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
Category A **Trees of high quality** with an estimated remaining life expectancy of at least 40 years	Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	🟢
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable defects, including unsympathetic past management and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years; or trees lacking the special quality necessary to merit the category A designation	Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality	Trees with material conservation or other cultural value	🔵
Category C **Trees of low quality** with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/transient landscape benefits	Trees with no material conservation or other cultural value	⚫

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APPENDIX 15 B LANDSCAPE AND VISUAL IMPACT ASSESSMENT PHOTOMONTAGES

APPENDIX 15B

LANDSCAPE AND VISUAL IMPACT ASSESSMENT

PHOTOMONTAGES

RESIDENTIAL DEVELOPMENT OAKFIELD, DUNBOYNE, CO.MEATH
PREPARED ON BEHALF OF AZRA PROPERTY COMPANY LTD

MAY 2023 / PROJECT NO. 7342

parkhood.com

Legend

● Viewpoint Locations

🟥 Application Boundary

- Viewpoint Nos. 1 to 5 – Beechdale;
- Viewpoint No. 6 – Chestnut Grove;
- Viewpoint No. 7 – Larchfield;
- Viewpoint No. 8 – Castle Farm;
- Viewpoint No. 9 – L2228 Station Road, Dunboyne Railway Bridge;
- Viewpoint No.10 – Dunboyne Train Station;
- Viewpoint No. 11 – L2228 Station Road, Castle Farm;
- Viewpoint No. 12 – L228 Station Road near Clonee Sawmills; and
- Viewpoint No. 13 - R147 Road, Clonee

0 250 500 m

Figure 1.0 Viewpoint Location Map

Existing View

Proposed View - Photomontage

OS reference:	302039E 241372N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	70.13m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	E	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	335m			**Date and time:**	11/06/2023 17:12

Figure 2.0: Viewpoint 1 | Beechdale

Existing View

Proposed View - Photomontage

OS reference:	302017E 241451N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	70.27m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	E	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	172m			**Date and time:**	11/06/2022 17:22

Figure 3.0: Viewpoint 2 | Beechdale

Existing View

Proposed View - Photomontage

OS reference:	302124E 241446N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	68.57m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	E	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	77m			**Date and time:**	11/06/2022 17:20

Figure 4.0: Viewpoint 3 | Beechdale

Existing View

Propose View - Photomontage

OS reference:	301762E 241313N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	70.97m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	E	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	457m			**Date and time:**	11/06/2022 17:05

Figure 5.0: Viewpoint 4 | Beechdale

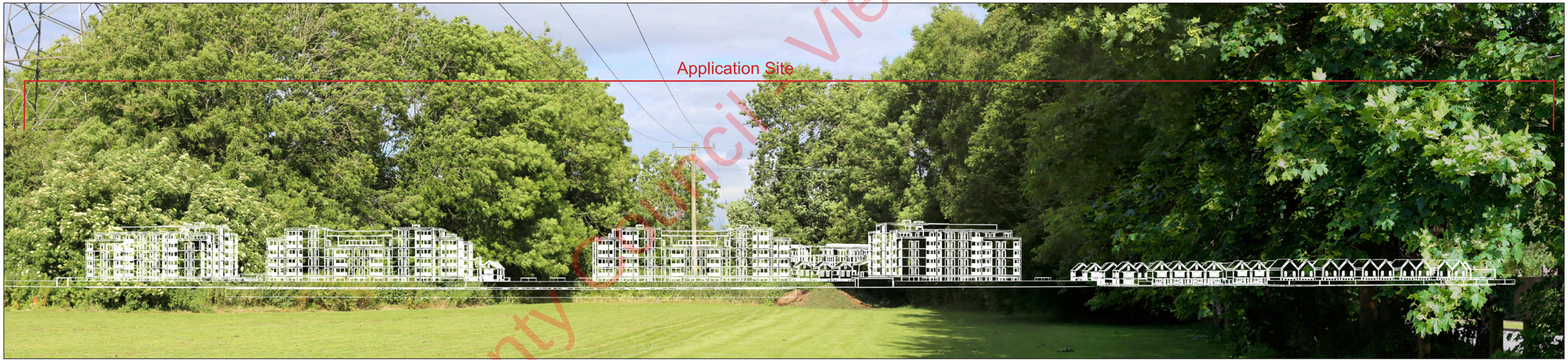
Existing View

Proposed View - Wireline depicts proposed development, but it is obscured by intervening residential properties

OS reference:	301834E 241358N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	70.35m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	E	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	378m			**Date and time:**	11/06/2022 17:08

Figure 6.0: Viewpoint 5 | Beechdale

Existing View



Proposed View - Wireline depicts proposed development, but it is obscured by intervening vegetation

OS reference:	301829E 241162N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	71.72m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	NE	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	416m			**Date and time:**	11/06/2022 17:27

Figure 7.0: Viewpoint 6 | Chestnut Grove

Existing View

Proposed View - Photomontage

OS reference:	302113E 241527N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	69.05m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	SE	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	120m			**Date and time:**	11/06/2022 16:57

Figure 8.0: Viewpoint 7 | Larchfield

Existing View

Proposed View - Wireline depicts proposed development, but it is obscured by intervening residential properties and vegetation

OS reference:	302420E 241649N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	66.60m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	S	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	205m			**Date and time:**	11/06/2022 16:24

Figure 9.0: Viewpoint 8 | Castle Farm

Existing View

Proposed View - Photomontage

OS reference:	302137E 241741N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	70.48m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	S	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	307m			**Date and time:**	11/06/2022 16:12

Figure 10.0: Viewpoint 9 | L2228 Station Road, Dunboyne Railway Bridge

Existing View

Proposed View - Photomontage

OS reference:	302121E 241835N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	68.34m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	S	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	402m			**Date and time:**	11/06/2022 16:00

Existing View

Proposed View - Photomontage

OS reference:	302346E 241737N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	67.04m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	S	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	281m			**Date and time:**	11/06/2022 16:21

Figure 12.0: Viewpoint 11 | L2228 Station Road, Castle Farm

Existing View

Proposed View - Wireline depicts proposed development, but it is obscured by intervening vegetation

OS reference:	302828E 241655N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	66.5m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	SW	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	377m			**Date and time:**	11/06/2022 16:36

Figure 13.0: Viewpoint 12 | L228 Station Road near Clonee Sawmills

Existing View

Proposed View - Wireline depicts proposed development, but it is obscured by intervening vegetation

OS reference:	303244E 241451N	**Horizontal field of view:**	60° (cylindrical projection)	**Camera:**	Canon EOS 6D
Eye level:	65.48m AOB	**Paper size:**	420 x 297 mm (A3)	**Lens:**	50mm (Canon RF 50mm f/1.8)
Direction of view:	W	**Correct printed image size:**	390 x 110 mm	**Camera height:**	1.5m AGL
Distance to Application Site:	741m			**Date and time:**	11/06/2022 16:43

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APPENDIX 17.1 RESOURCE AND WASTE MANAGEMENT PLAN

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RESOURCE & WASTE MANAGEMENT PLAN FOR A PROPOSED RESIDENTIAL DEVELOPMENT

"OAKFIELD, DUNBOYNE"

Report Prepared For

Azra Property Company Ltd

Report Prepared By

Chonaill Bradley, Principal Environmental Consultant

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1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Resource & Waste Management Plan (RWMP) on behalf of Azra Property Company Ltd. The proposed development will consist of residential units in a mix of houses, duplex and apartment buildings childcare facility located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works. Vehicular, cyclist and pedestrian access to serve the development will be provided from Station Road via existing access road permitted under Meath County Council Reg. Ref. RA180561.

This plan will provide information necessary to ensure that the management of C&D waste at the site is undertaken in accordance with the current legal and industry standards including the *Waste Management Act 1996* as amended and associated Regulations [1], *Environmental Protection Agency Act 1992* as amended [2], *Litter Pollution Act 1997* as amended [3] and the *Eastern Midlands Region Waste Management Plan 2015 – 2021* [4]. In particular, this plan aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also seeks to provide guidance on the appropriate collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

This RWMP includes information on the legal and policy framework for Construction & Demolition (C&D) waste management in Ireland, estimates of the type and quantity of waste to be generated by the proposed development and makes recommendations for management of different waste streams. The RWMP should be viewed as a live document and should be regularly revisited throughout a project's lifecycle so that opportunities to maximise waste reduction / efficiencies are exploited throughout, and that data is collected on an ongoing basis so that it is as accurate as possible

2.0 C&D RESOURCE AND WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September 1998, *Changing Our Ways*[5], which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least 50% of C&D waste within a five year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2018).

In response to the *Changing Our Ways* report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report entitled '*Recycling of Construction and Demolition Waste'* [6] concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

In September 2020, the Irish Government published a policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan, *'A Waste Action Plan for a Circular Economy'* [7] (WAPCE), replaces the previous national waste management plan, *"A Resource Opportunity"* (2012), and was prepared in response to the 'European

Green Deal' which sets a roadmap for a transition to an altered economical model, where climate and environmental challenges are turned into opportunities.

The WAPCE sets the direction for waste planning and management in Ireland up to 2025. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021) [8] to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021. It is anticipated that the Strategy will be updated in full every 18 months to 2 years.

The Circular Economy and Miscellaneous Provisions Act 2022 [9] was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will to significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions, tackling the delays which can be encountered by industry, and supporting the availability of recycled secondary raw materials in the Irish market, and tackles illegal fly-tipping and littering.

The Environmental Protection Agency (EPA) of Ireland issued '*Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' in November 2021* [10]*.* These guidelines replace the previous 2006 guidelines issued by The National Construction and Demolition Waste Council (NCDWC) and the Department of the Environment, Heritage and Local Government (DoEHLG) in 2006 [11]. The guidelines provide a practical approach which is informed by best practice in the prevention and management of C&D wastes and resources from design to construction of a project, including consideration of the deconstruction of a project. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted C&D wastes and procedures to prevent, minimise, recycle and reuse wastes;
- Design teams roles and approach;
- Relevant EU, national and local waste policy, legislation and guidelines;
- Waste disposal/recycling of C&D wastes at the site;
- Provision of training for Resource Waste Manager (RM) and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and

- Details of consultation with relevant bodies i.e. waste recycling companies, Local Authority, etc.

Section 3 of the Guidelines identifies thresholds above which there is a requirement for the preparation of a bespoke RWMP for developments. The new guidance classifies developments on a two-tiered system. Developments which do not exceed any of the following thresholds may be classed as Tier 1 development, which require a simplified RWMP:

- New residential development of less than 10 dwellings.
- Retrofit of 20 dwellings or less.
- New commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 1,250m^2.
- Retrofit of commercial, industrial, infrastructural, institutional, educational, health and other developments with an aggregate floor area less than 2,000m^2; and
- Demolition projects generating in total less than 100m^3 in volume of C&D waste.

A development which exceeds one or more of these thresholds is classed as Tier-2 projects.

This development requires a RWMP as a Tier 2 development as it is above the following criterion:

- New residential development of less than 10 dwellings.

Other guidelines followed in the preparation of this report include *'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers'* [12], published by FÁS and the Construction Industry Federation in 2002 and the previous guidelines, 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' (2006).

These guidance documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

2.2 Regional Level

The proposed development is located in the Local Authority area of Meath County Council (MCC).

The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan applicable to the MCC administrative area, which was published in May 2015. Currently the EMR and other regional waste management plans are under review and the Regional Waste Management Planning Offices expect to publish the plan in 2023.

The regional plan sets out the following strategic targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and

- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne of waste which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015.*

The *Meath County Development Plan 2021 – 2027* [13] sets out a number of policies and objectives for Meath in line with the objectives of the regional waste management plan.

Waste policies and objectives with a particular relevance to this development are:

Policies:

- *INF POL 61: To facilitate the implementation of National Waste legislation and National and Regional Waste Management Policy.*
- *INF POL 62: To encourage and support the provision of a separate collection of waste throughout the County in accordance with the requirements of the Waste Management (Household Food Waste) Regulations 2009, the Waste Framework Directive Regulations, 2011, the Waste Management (Commercial Food Waste) Regulations 2015 and other relevant legislation to meet the requirements of the Regional Waste Management Plan.*
- *INF POL 64: To encourage and support the expansion and improvement of a three bin system (mixed dry recyclables, organic waste and residual waste) in order to increase the quantity and quality of materials collected for recycling in conjunction with relevant stakeholders.*
- *INF POL 65: To adopt the provisions of the waste management hierarchy and implement policy in relation to the County's requirements under the current or any subsequent Waste Management Plan. All prospective developments in the County shall take account of the provisions of the regional waste management plan and adhere to the requirements of the Plan. Account shall also be taken of the proximity principle and the inter-regional movement of waste.*

Objectives:

- *INF OBJ 54: To facilitate the transition from a waste management economy to a green circular economy to enhance employment opportunities and increase the value recovery and recirculation of resources.*
- *INF OBJ 56: To support developments necessary to manage food waste in accordance with the requirements of the current Waste Management (Food Waste) Regulations and the regional Waste Management Plan.*
- *INF OBJ 68: To support the development of facilities to cater for commercial waste not provided for within the kerbside collection system such as the WEEE, C & D type waste and hazardous materials in accordance with the requirements of the Eastern Midlands Regional Waste Management Plan.*

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the development are:

- Waste Management Act 1996 as amended.

- Environmental Protection Agency Act 1992 as amended.
- Litter Pollution Act 1997 as amended.
- Planning and Development Act 2000 (as amended) [14]

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996* as amended and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of *"Polluter Pays"* whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the Developer ensures that the waste contractors engaged by construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments* or a Waste or Industrial Emissions Licence granted by the EPA. The COR / permit / licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

3.0 DESIGN APPROACH

The client and the design team have integrated the *'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects'* guidelines into the design workshops, to help review processes, identify and evaluate resource reduction measures and investigate the impact on cost, time, quality, buildability, second life and management post demolition and construction. Further details on these design principals can be found within the aforementioned guidance document.

The design team have undertaken the design process in line with the international best practice principles to firstly prevent wastes, reuse where possible and thereafter sustainably reduce and recover materials. The below sections have been the focal point of the design process and material selections and will continued to be analysed and investigated throughout the design process and when selecting material.

The approaches presented are based on international principles of optimising resources and reducing waste on construction projects through:

- Prevention;
- Reuse;

- Recycling;
- Green Procurement Principles;
- Off-Site Construction;
- Materials Optimisation; and
- Flexibility and Deconstruction.

3.1 Designing For Prevention, Reuse and Recycling

Undertaken at the outset and during project feasibility and evaluation the Client and Design Team considered:

- Establishing the potential for any reusable site assets (structures, equipment, materials, soils, etc.);
- Assessing any existing structures/hardstanding areas on the site that can be refurbished either in part or wholly to meet the Client requirements; and
- Enabling the optimum recovery of assets on site.

3.2 Designing for Green Procurement

Waste prevention and minimisation pre-procurement have been discussed and will be further discussed in this section. The Design Team will discuss proposed design solutions, encourage innovation in tenders and incentivise competitions to recognise sustainable approaches. They will also discuss options for packaging reduction with the main Contractor and subcontractors/suppliers using measures such as 'Just-in-Time' delivery and use ordering procedures that avoid excessive waste. The Green procurement extends from the planning stage into the detailed design and tender stage and will be an ongoing part of the long-term design and selection process for this development.

3.3 Designing for Off-Site Construction

Use of off-site manufacturing has been shown to reduce residual wastes by up to 90% (volumetric building versus traditional). The decision to use offsite construction is typically cost led but there are significant benefits for resource management. Some further considerations for procurement which are being investigated as part of the planning stage design process are listed as follows:

- Modular buildings as these can displace the use of concrete and the resource losses associated with concrete blocks such as broken blocks, mortars, etc.; Modular structures are typically pre-fitted with fixed plasterboard and installed insulation, eliminating these residual streams from site.
- Use of pre-cast structural concrete panels which can reduce the residual volumes of concrete blocks, mortars, plasters, etc.;
- The use of prefabricated composite panels for walls and roofing to reduce residual volumes of insulation and plasterboards;
- Using pre-cast concrete panels for batteries; and
- Designing for the preferential use of offsite modular units.

3.4 Designing for Materials Optimisation During Construction

To ensure manufacturers and construction companies adopt lean production models, including maximising the reuse of materials onsite. This helps to reduce the environmental impacts associated with transportation of materials and from waste management activities. This includes investigating the use of standardised sizes for certain materials to help reduce the amount of offcuts produced on site, focusing on promotion and development of off-site manufacture.

3.5 Designing for Flexibility and Deconstruction

Design flexibility has and will be investigated throughout the design process to ensure that where possible products (including bridges) only contain materials that can be recycled and are designed to be easily disassembled. Material efficiency is being considered for the duration and end of life of a building project to produce; flexible, adaptable spaces that enable a resource-efficient, low-waste future change of use; durability of materials and how they can be recovered effectively when maintenance and refurbishment are undertaken and during disassembly/deconstruction.

4.0 DESCRIPTION OF THE DEVELOPMENT

4.1 Location, Size and Scale of the Development

The proposed development on a site at lands in the Townlands of Castle Farm, Ruskin and Clonee, Dunboyne, County Meath on lands generally bound to the east and south by agriculturally zoned lands, to the west by the Iarnród Éireann rail line, including its Station and associated Park and Ride and to the north by residential development permitted under Meath County Council (MCC) Reg. Ref. RA180561.

AZRA Property Company Limited intend to apply for a 10-year permission for a Large Scale Residential Development at this site in the Townlands of Castle Farm, Ruskin and Clonee, Dunboyne, County Meath on lands generally bound to the east and south by agriculturally zoned lands, to the west by the Iarnród Éireann rail line, and to the north by the residential development permitted under Meath County Council (MCC) Reg. Ref. RA180561, agricultural lands and the L2228 (Station Road/Clonee Road). Improvement works to two no. roundabouts on the R147 (Old Navan Road) are located in at lands in the townlands of Loughsallagh and Clonee, Dunboyne, County Meath.

The proposed development on a site of approximately 16.69Ha consists of 716no. dwellings in a mixture of terraced, semi-detached and detached houses, duplexes and apartments as follows:

- 517no. apartment units are accommodated in 8no. buildings of 4-7 storeys in height as follows: -
    - Block A1 (4-6 storey, over basement) to consist of 2no. 1 bed apartment, 50no. 2 bed apartments and 6no. 3 bed apartments.
    - Block A2 (4-6 storey, over basement) to consist of 3no. 1 bed apartment, 51no. 2 bed apartments, 6no. 3 bed apartments.
    - Block A3 (4-6 storey, over basement) to consist of 2no. 1 bed apartment, 50no. 2 bed apartments and 6no. 3 bed apartments.
    - Block A4 (4-6 storey, over basement) to consist of 3no. 1 bed apartment, 51no. 2 bed apartments, 6no. 3 bed apartments.
    - Block B1 (6-7 storey) to consist of 25no. 1 bed apartment, 39no. 2 bed apartments and 6no. 3 bed apartments.

  - Block B2 (6-7 storey) to consist of 30no. 1 bed apartment, 41no. 2 bed apartments and 6no. 3 bed apartments.
  - Block C1 (4-5 storey) to consist of 18no. 1 bed apartment, 39no. 2 bed apartments, 10no. 3 bed apartments.
  - Block C2 (4-5 storey) to consist of 18no. 1 bed apartment, 39no. 2 bed apartments, 10no. 3 bed apartments.
- 44no. duplex units accommodated in 2no. 3 storey terraced buildings:
  - 22no. 1 bed dwellings
  - 18no. 2 bed dwellings
  - 4no. 3 bed dwellings
- 155no. 2-storey houses consisting of: -
  - 8no. 2-bedroom houses
  - 69no. 3-bedroom houses
  - 74no. 4-bedroom houses
  - 4no. 5-bedroom houses

The proposed development also includes: -

- 1no. childcare facility (c. 602sqm) located at ground floor level of Apartment Block B1 and an associated outdoor play space (c. 114.67 sqm)

All ancillary and associated site development and landscape works, including;

- site boundary treatments, boundary along western boundary with rail line ;
- Communal amenity open space (c. 6,830sqm)
- Public open space (c. 31,544sqm)
- Provision of 887no. car parking spaces (355no. in a basement), including 16no. creche car parking spaces.
- Provision of 1,362no. secure bicycle parking spaces, including 12no. creche bicycle parking spaces, including ancillary storage facilities.
- 3no. ESB substations
- Provision of foul sewage holding tank and lifting station.
- provision of c. 470m length of new distributor road.
- Alterations to existing junction at L2228 (Station Road/Clonee Road) and existing access road permitted under Meath County Council Reg. Ref. RA180561.
- Upgrades to 2no. existing roundabouts along R147 (Old Navan Road)
- Diversion of watercourse located centrally onsite.
- Bin storage.
- Provision of compensatory storage to Castle Stream

Vehicular, cyclist and pedestrian access to serve the development will be provided from L2228 (Station Road/Clonee Road) via existing access road permitted under Meath County Council Reg. Ref. RA180561.

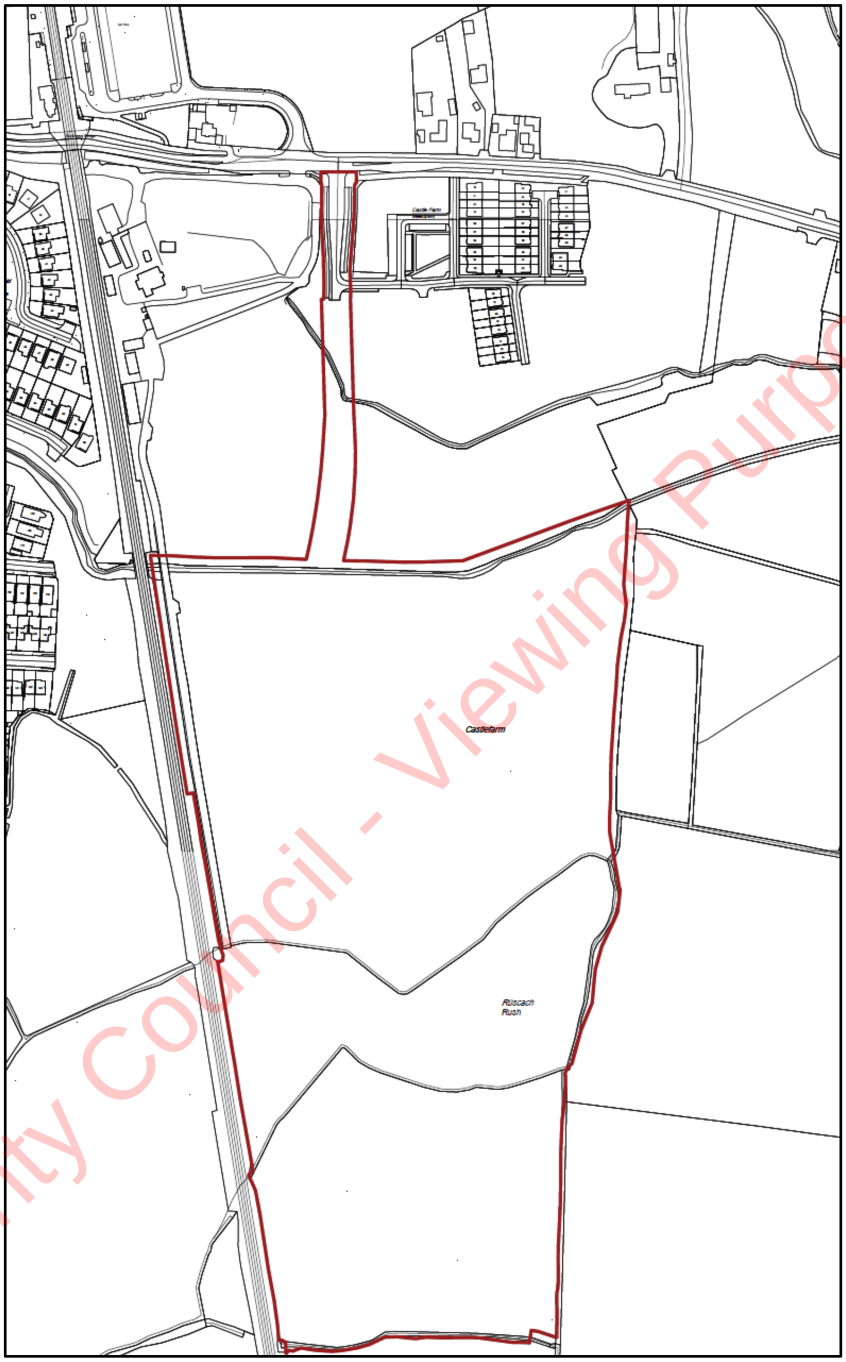

Figure 4.1: *Proposed site location (in red)*

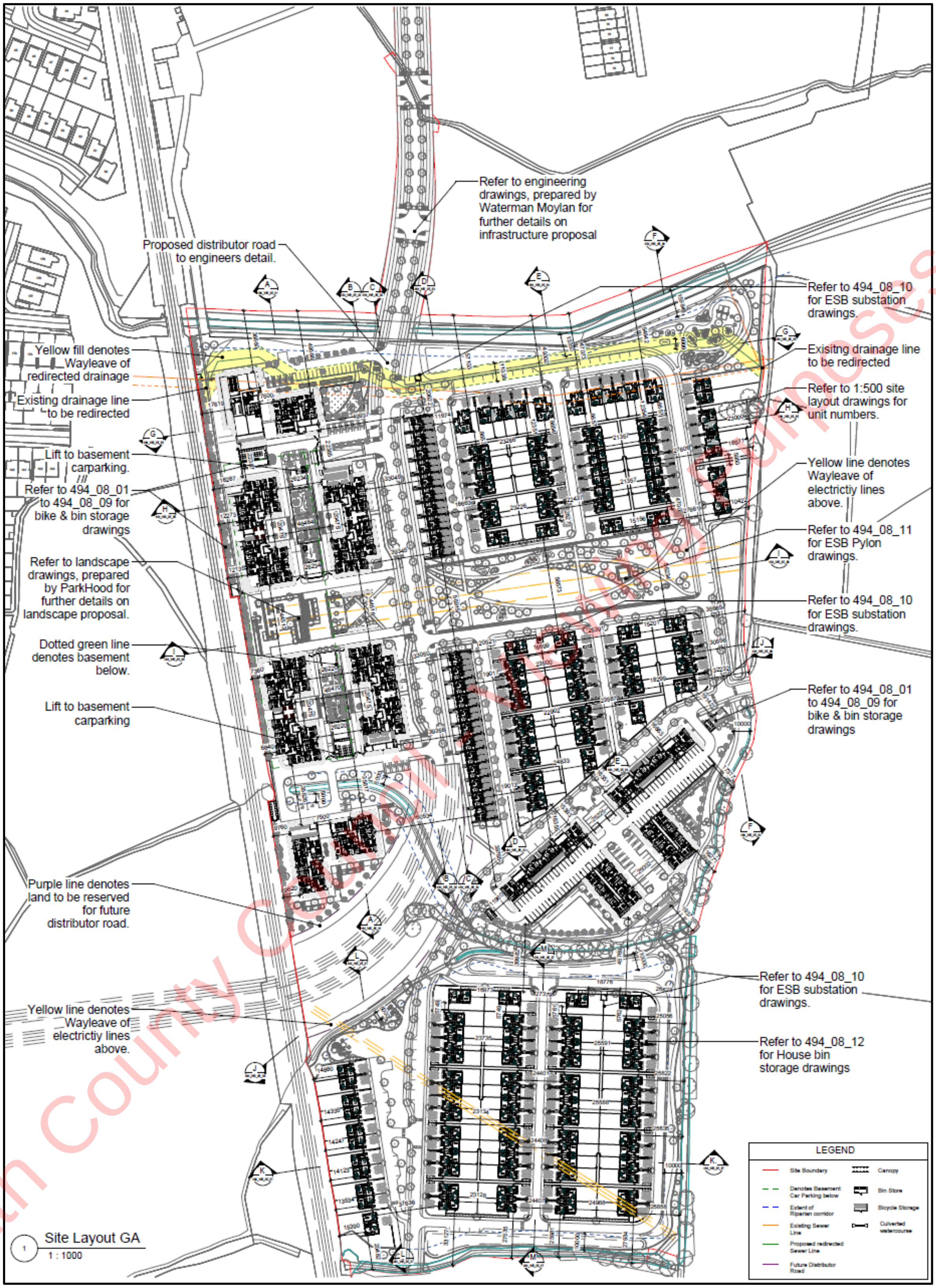

Figure 4.2: *Proposed Site Layout Plan*

4.2 Details of the Non-Hazardous Wastes to be Produced

There will be soil and stones excavated to facilitate construction of the development. The project engineers (Waterman Moylan) have estimated that 43,307 m^3 of material will be required to be excavated to facility site levelling, construction of foundations and installations of services. It is currently envisaged that 10,000 m^3 of suitable excavated material will be able to be retained and reused onsite for landscaping and structural fill. The remaining 33,307 m^3 of the excavated material will need to be removed offsite. This will be taken for appropriate offsite reuse, recovery, recycling and / or disposal.

During the construction phase there may be a surplus of building materials, such as timber off-cuts, broken concrete blocks, cladding, plastics, metals and concrete generated, however it is envisaged that these quantities will be relatively low due to the nature of development mainly being the installation as opposed to construction. It is envisaged that the majority of construction waste will be generated from packaging waste associated with the battery's that will be delivered to site for installation (Wood, plastic and cardboard waste). The contractor will be required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

Waste will also be generated from construction workers e.g. organic / food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided on site during the construction phase. Waste printer / toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

4.3 Potential Hazardous Wastes Arising

4.3.1 Contaminated Soil

Site investigations and environmental soil testing were undertaken by Site Investigations Limited in June 2022. Environmental testing (Rilta Suite) and a waste classification were carried out on five samples from the investigation.

The Waste Classification report created using HazWasteOnlineTM software shows that the material tested can be classified as non-hazardous material. Following this analysis of the solid test results, the leachate results generally remained within the Inert thresholds.

If any potentially contaminated material is encountered or any material is to be removed from site, it will need to be segregated from clean / inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [14] using the *HazWasteOnline* application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC* [15], which establishes the criteria for the acceptance of waste at landfills.

In the event that Asbestos Containing Materials (ACMs) are found within the excavated material, the removal will only be carried out by a suitably permitted waste contractor, in accordance with *S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.* All asbestos will be taken to a suitably licensed or permitted facility.

In the event that hazardous soil, or historically deposited waste is encountered during the construction phase, the contractor will notify MCC and provide a Hazardous /

Contaminated Soil Management Plan, to include estimated tonnages, description of location, any relevant mitigation, destination for disposal / treatment, in addition to information on the authorised waste collector(s).

4.3.2 Fuel/Oils

Fuels and oils are classed as hazardous materials; any on-site storage of fuel / oil, and all storage tanks and all draw-off points will be bunded and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and the site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel / oil waste generated at the site.

4.3.3 Invasive Plant Species

The project ecologists, Altemar, have confirmed that no Japanese Knotweed or any invasive species listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) were detected on site. If any are detected during the construction phase of the development, then an invasive species management plan will be produced and submitted to MCC.

4.3.4 Asbestos

It is not envisaged any Asbestos or Asbestos Containing Material will be encountered onsite as there is no requirement for demolition and the previous use for the site was for agricultural purposes.

Removal of asbestos or ACMs will be carried out by a suitably qualified contractor and ACMs will only be removed from site by a suitably permitted / licenced waste contractor, in accordance with *S.I. No. 589 of 2010 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010*. All material will be taken to a suitably licensed or permitted facility.

4.3.5 Other Known Hazardous Substances

Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, WEEE (containing hazardous components), printer toner / cartridges, batteries (Lead, Ni-Cd or Mercury) and / or fluorescent tubes and other mercury containing waste may be generated from during C&D activities or temporary site offices. These wastes, if generated, will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

5.0 ROLES AND RESPONSIBILITIES

The *Best Practice Guidelines on the Preparation of Resource Waste Management Plans for Construction and Demolition Projects* promotes that a RM should be appointed. The RM may be performed by number of different individuals over the life-cycle of the Project, however it is intended to be a reliable person chosen from within the Planning/Design/Contracting Team, who is technically competent and appropriately trained, who takes the responsibility to ensure that the objectives and measures within the Project RWMP are complied with. The RM is assigned the requisite authority to meet the objective and obligations of the RWMP. The role will include the important activities of conducting waste checks/audits and adopting construction and demolition methodology that is designed to facilitate maximum reuse and/or recycling of waste.

5.1 Role of the Client

The Client is the body establishing the aims and the performance targets for the project.

- The Client has commissioned the preparation and submission of a preliminary RWMP as part of the design and planning submission;
- The Client is to commission the preparation and submission of an updated RWMP as part of the construction tendering process;
- The Client will ensure that the RWMP is agreed on and submitted to the local authority prior to commencement of works on site;
- The Client is to request the end-of-project RWMP from the Contractor.

5.2 Role of the Client Advisory Team

The Client Advisory Team or Design Team is formed of architects, consultants, quantity surveyors and engineers and is responsible for:

- Drafting and maintaining the RWMP through the design, planning and procurement phases of the project;
- Appointing a RM to track and document the design process, inform the Design Team and prepare the RWMP.
- Including details and estimated quantities of all projected waste streams with the support of environmental consultants/scientists. This should also include data on waste types (e.g. waste characterisation data, contaminated land assessments, site investigation information) and prevention mechanisms (such as by-products) to illustrate the positive circular economy principles applied by the Design Team;
- Managing and valuing the demolition work with the support of quantity surveyors;
- Handing over of the RWMP to the selected Contractor upon commencement of construction of the development, in a similar fashion to how the safety file is handed over to the Contractor;
- Working with the Contractor as required to meet the performance targets for the project.

5.3 Future Role of the Contractor

The future construction Contractors have not yet been decided upon for this RWMP. However, once select they will have major roles to fulfil. They will be responsible for:

- Preparing, implementing and reviewing the RWMP throughout the construction phase (including the management of all suppliers and sub-contractors) as per the requirements of these guidelines;
- Identifying a designated and suitably qualified RM who will be responsible for implementing the RWMP;

- Identifying all hauliers to be engaged to transport each of the resources / wastes off-site;
- Implementing waste management policies whereby waste materials generated on site are to be segregated as far as practicable;
- Renting and operating a mobile-crusher to crush concrete for temporary reuse onsite during construction and reduce the amount of HGV loads required to remove material from site;
- Applying for the appropriate waste permit to crush concrete onsite;
- Identifying all destinations for resources taken off-site. As above, any resource that is legally classified as a 'waste' must only be transported to an authorised waste facility;
- End-of-waste and by-product notifications addressed with the EPA where required;
- Clarification of any other statutory waste management obligations, which could include on-site processing;
- Full records of all resources (both wastes and other resources) should be maintained for the duration of the project; and
- Preparing a RWMP Implementation Review Report at project handover.

6.0 KEY MATERIALS & QUANTITIES

6.1 Project Resource Targets

Project specific resource and waste management targets for the site have not yet been set and this information should be updated for these targets once these targets have been confirmed by the client. However, it is expected for projects of this nature that a minimum of 70% of waste is fully re-used, recycled or recovered. Target setting will inform the setting of project-specific benchmarks to track target progress. Typical Key Performance Indicators (KPIs) that may be used to set targets include (as per guidelines):

- Weight (tonnes) or Volume (m^3) of waste generated per construction value;
- Weight (tonnes) or Volume (m^3) of waste generated per construction floor area (m^2);
- Fraction of resource reused on site;
- Fraction of resource notified as by-product;
- Fraction of waste segregated at source before being sent off-site for recycling/recovery; and
- Fraction of waste recovered, fraction of waste recycled, or fraction of waste disposed.

6.2 Main Construction and Demolition Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction activities at a typical site are shown in Table 6.1. The List of Waste (LoW) code (2018) for each waste stream is also shown.

Table 6.1 *Typical waste types generated and LoW codes (individual waste types may contain hazardous substances)*

Waste Material	LoW Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

** Individual waste type may contain hazardous substances*

6.3 Demolition Waste Generation

There will be no demolition associated with this development as the site is a greenfield site.

6.4 Construction Waste Generation

Table 6.2 shows the breakdown of C&D waste types produced on a typical site based on data from the EPA *National Waste Reports* [16] *and the joint EPA & GMIT study* [17].

Table 6.2: *Waste materials generated on a typical Irish construction site*

Waste Types	%
Mixed C&D	38
Timber	38
Metals	8
Concrete	1
Other	15

Table 6.3, below, shows the estimated construction waste generation for the proposed Project based on the gross floor area of construction and other information available to date, along with indicative targets for management of the waste streams. The estimated amounts for the main waste types (with the exception of soils and stones) are based on waste generation rate per m^2, using the waste breakdown rates shown in Table 6.2. These have been calculated from the schedule of development areas provided by the architect.

***Table 6.3**: Predicted on and off-site reuse, recycle and disposal rates for construction waste*

Waste Type	Tonnes	Reuse/Recycle		Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	517.0	10	51.7	80	413.6	10	51.7
Timber	438.6	40	175.5	55	241.2	5	21.9
Plasterboard	156.7	30	47.0	60	94.0	10	15.7
Metals	125.3	5	6.3	90	112.8	5	6.3
Concrete	94.0	30	28.2	65	61.1	5	4.7
Other	235.0	20	47.0	60	141.0	20	47.0
Total	**1566.5**		**355.6**		**1063.7**		**147.3**

In addition to the waste streams in Table 6.3, there will be soil and stones excavated to facilitate construction of new foundations and underground services. It is currently envisaged that 10,000m^3 suitable excavated material will be reused on site. The material that has to be removed from site, it will be removed off-site for appropriate reuse, recovery and / or disposal.

It should be noted that until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

6.5 Proposed Resource and Waste Management Options

Waste materials generated will be segregated on-site, where it is practical. Where the on-site segregation of certain wastes types is not practical, off-site segregation will be carried out. There will be skips and receptacles provided to facilitate segregation at source, where feasible. All waste receptacles leaving the site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled. There are numerous waste contractors in the Meath region that provide this service.

All waste arisings will be handled by an approved waste contractor holding a current waste collection permit. All waste arisings requiring disposal off-site will be reused, recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required.

During construction, some of the sub-contractors on site will generate waste in relatively low quantities. The transportation of non-hazardous waste by persons who are not directly involved with the waste business, at weights less than or equal to 2 tonnes, and in vehicles not designed for the carriage of waste, are exempt from the requirement to have a waste collection permit (per Article 30 (1) (b) of the Waste Collection Permit Regulations 2007, as amended). Any sub-contractors engaged that do not generate more than 2 tonnes of waste at any one time can transport this waste off-site in their work vehicles (which are not designed for the carriage of waste). However, they are required to ensure that the receiving facility has the appropriate COR / permit / licence.

Written records will be maintained by the contractor(s), detailing the waste arising throughout the C&D phases, the classification of each waste type, waste collection permits for all waste contactors who collect waste from the site and COR / permit / licence for the receiving waste facility for all waste removed off-site for appropriate reuse, recycling, recovery and / or disposal

Dedicated bunded storage containers will be provided for hazardous wastes which may arise, such as batteries, paints, oils, chemicals, if required.

The anticipated management of the main waste streams is outlined as follows:

Soil and Stone

The waste hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling / recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The excavations are required to facilitate construction works so the preferred option (prevention and minimisation) cannot be accommodated for the excavation phase.

If material is removed off-site it could be reused as a by-product (and not as a waste). If this is done, it will be done in accordance with Regulation 27 (By-products), as amended, of S.I. No. 323/2020 - European Union (Waste Directive) Regulations 2011-2020, (Previously Article 27 of the European Communities (Waste Directive)), which requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material should not be removed from site until approval from the EPA has been received. The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material.

The next option (beneficial reuse) may be appropriate for the excavated material, pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication. Clean inert material may be used as fill material in other construction projects or engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end use.

Any nearby sites requiring clean fill/capping material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Regulation 27. Similarly, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Regulation 27. Regulation 27 will be investigated to see if the material can be imported onto this site for beneficial reuse instead of using virgin materials.

If the material is deemed to be a waste, then removal and reuse / recovery / disposal of the material will be carried out in accordance with the *Waste Management Act 1996* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

In the event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any non-hazardous material. It will require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

Bedrock

While it is not envisaged that bedrock will be encountered, if bedrock is encountered, it is anticipated that it will not be crushed on site. Any excavated rock is expected to be removed off-site for appropriate reuse, recovery and / or disposal. If bedrock is to be crushed on-site, the appropriate mobile waste facility permit will be obtained from MCC.

Silt & Sludge

During the construction phase, silt and petrochemical interception will be carried out on run-off and pumped water from site works, where required. Sludge and silt will then be collected by a suitably licensed contractor and removed off-site.

Concrete Blocks, Bricks, Tiles & Ceramics

The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction works are expected to be clean, inert material and should be recycled, where possible. If concrete is to be crushed on-site, the appropriate mobile waste facility permit will be obtained from MCC.

Hard Plastic

As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

Timber

Timber that is uncontaminated, i.e. free from paints, preservatives, glues, etc., will be disposed of in a separate skip and recycled off-site.

Metal

Metals will be segregated, where practical, and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Glass

Glass materials will be segregated for recycling, where possible.

Waste Electrical & Electronic Equipment (WEEE)

Any WEEE will be stored in dedicated covered cages / receptacles / pallets pending collection for recycling.

Other Recyclables

Where any other recyclable wastes, such as cardboard and soft plastic, are generated, these will be segregated at source into dedicated skips and removed off-site.

Non-Recyclable Waste

C&D waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboards, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip / receptacle will be examined by a member of the waste team (see Section 8.0) to determine if recyclable materials have been placed in there by mistake. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Asbestos Containing Materials

If any asbestos or ACM are found on-site they will be removed by a suitably competent contractor and disposed of as asbestos waste before the demolition works begin. All asbestos removal work or encapsulation work must be carried out in accordance with *S.I. No. 589 of 2010 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010.*

Other Hazardous Wastes

On-site storage of any hazardous wastes produced (i.e. contaminated soil if encountered and / or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

On-Site Crushing

It is currently not envisaged that the crushing of waste materials will occur on-site. However, if the crushing of material is to be undertaken, a mobile waste facility permit will first be obtained from MCC, and the destination of the accepting waste facility will be supplied to the MCC waste unit.

6.6 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the contractor, either by a weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the nominated project RM (see Section 8.0).

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Act 1996* as amended, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* and amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project RM (see Section 8.0) will maintain a copy of all waste collection permits on-site.

If the waste is being transported to another site, a copy of the Local Authority waste COR / permit or EPA Waste / Industrial Emissions Licence for that site will be provided to the nominated project Waste Manager (see Section 8.0). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from Dublin City Council (as the relevant authority on behalf of all Local Authorities in Ireland) and kept on-site along with details of the final destination (COR, permits, licences, etc.). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

All information will be entered in a waste management recording system to be maintained on-site.

7.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the costs associated with different aspects of waste management is outlined below. The total cost of C&D waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

7.1 Reuse

By reusing materials on site, there will be a reduction in the transport and recycle / recovery / disposal costs associated with the requirement for a waste contractor to take the material off-site. Clean and inert soils, gravel, stones, etc., which cannot be reused on-site may be used as access roads or capping material for landfill sites, etc. This material is often taken free of charge or at a reduced fee for such purposes, reducing final waste disposal costs.

7.2 Recycling

Salvageable metals will earn a rebate, which can be offset against the costs of collection and transportation of the skips.

Clean, uncontaminated cardboard and certain hard plastics can also be recycled. Waste contractors will charge considerably less to take segregated wastes, such as recyclable waste, from a site than mixed waste.

Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes, such as timber, from a site than mixed waste.

7.3 Disposal

Landfill charges are currently at around €130 - €150 per tonne which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015*. In addition to disposal costs, waste contractors will also charge a collection fee for skips.

Collection of segregated C&D waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc., is also used as fill / capping material, wherever possible.

8.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the RM to ensure commitment, operational efficiency and accountability in relation to waste management during the C&D phases of the development.

8.1 Resource Manager Training and Responsibilities

The nominated RM will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid them in the organisation, operation and recording of the waste management system implemented on site.

The RM will have overall responsibility to oversee, record and provide feedback to the client on everyday waste management at the site. Authority will be given to the Waste Manager to delegate responsibility to sub-contractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The RM will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The RM will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this RWMP.

8.2 Site Crew Training

Training of site crew in relation to waste is the responsibility of the RM and, as such, a waste training program will be organised. A basic awareness course will be held for all site crew to outline the RWMP and to detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the Waste Storage Areas (WSAs). A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

9.0 TRACKING AND TRACING / RECORD KEEPING

Records will be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arisings on Site.

A waste tracking log will be used to track each waste movement from the site. On exit from the site, the waste collection vehicle driver will stop at the site office and sign out as a visitor and provide the security personnel or RM with a waste docket (or Waste Transfer Form (WTF) for hazardous waste) for the waste load collected. At this time, the security personnel will complete and sign the Waste Tracking Register with the following information:

- Date
- Time
- Waste Contractor
- Company waste contractor appointed by, e.g. Contractor or subcontractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name

- Docket No.
- Waste Type
- Quantity
- LoW

The waste vehicle will be checked by security personal or the RM to ensure it has the waste collection permit no. displayed and a copy of the waste collection permit in the vehicle before they are allowed to remove the waste from the site.

The waste transfer dockets will be transferred to the RM on a weekly basis and can be placed in the Waste Tracking Log file. This information will be forwarded onto the MCC Waste Regulation Unit when requested.

Each subcontractor that has engaged their own waste contractor will be required to maintain a similar waste tracking log with the waste dockets / WTF maintained on file and available for inspection on site by the main contractor as required. These subcontractor logs will be merged with the main waste log.

Waste receipts from the receiving waste facility will also be obtained by the site contractor(s) and retained. A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licences will be maintained on site at all times and will be periodically reviewed by the RM. Subcontractors who have engaged their own waste contractors, will provide the main contractor with a copy of the waste collection permits and COR / permit / licence for the receiving waste facilities and maintain a copy on file, available for inspection on site as required.

10.0 OUTLINE WASTE AUDIT PROCEDURE

10.1 Responsibility for Waste Audit

The appointed RM will be responsible for conducting a waste audit at the site during the C&D phase of the proposed Project. Contact details for the nominated RM will be provided to the MCC Waste Regulation Unit after the main contractor is appointed and prior to any material being removed from site.

10.2 Review of Records and Identification of Corrective Actions

A review of all waste management costs and the records for the waste generated and transported off-site will be undertaken mid-way through the construction phase of the proposed Project.

If waste movements are not accounted for, the reasons for this will be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established recovery / reuse / recycling targets for the site. Each material type will be examined, in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved.

Upon completion of the C&D phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total recycling / reuse / recovery figures for the development.

11.0 CONSULTATION WITH RELEVANT BODIES

11.1 Local Authority

Once construction contractors have been appointed and have appointed waste contractors, and prior to removal of any C&D waste materials off-site, details of the proposed destination of each waste stream will be provided to the MCC Waste Regulation Unit.

MCC will also be consulted, as required, throughout the excavation and construction phases in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

11.2 Recycling / Salvage Companies

The appointed waste contractor for the main waste streams managed by the construction contractors will be audited in order to ensure that relevant and up-to-date waste collection permits and facility registrations / permits / licences are held. In addition, information will be obtained regarding the feasibility of recycling each material, the costs of recycling / reclamation, the means by which the wastes will be collected and transported off-site, and the recycling / reclamation process each material will undergo off-site.

APPENDIX 17.2 OPERATIONAL WASTE MANAGEMENT PLAN

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OPERATIONAL WASTE MANAGEMENT PLAN FOR A PROPOSED RESIDENTIAL DEVELOPMENT

“OAKFIELD, DUNBOYNE”

Report Prepared For

Azra Property Company Ltd

Report Prepared By

Chonaill Bradley, Principal Environmental Consultant

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CONTENTS

1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Operational Waste Management Plan (OWMP) on behalf of Azra Property Company Ltd. The proposed development will consist of residential units in a mix of houses, duplex and apartment buildings childcare facility located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works. Vehicular, cyclist and pedestrian access to serve the development will be provided from Station Road via existing access road permitted under Meath County Council Reg. Ref. RA180561.

This OWMP has been prepared to ensure that the management of waste during the operational phase of the proposed development is undertaken in accordance with the current legal and industry standards including, the *Waste Management Act 1996* as amended and associated Regulations [1], *Environmental Protection Agency Act 1992* as amended [2], *Litter Pollution Act 1997* as amended [3], the '*Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021*' [4] and *Meath County Council (MCC) Waste Management (Segregation, Storage & Presentation of Household and Commercial Waste) Bye-Laws (2018)* [5]. In particular, this OWMP aims to provide a robust strategy for the storage, handling, collection and transport of the wastes generated at site.

This OWMP aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. The OWMP also seeks to provide guidance on the appropriate collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil or water resources). The plan estimates the type and quantity of waste to be generated from the proposed development during the operational phase and provides a strategy for managing the different waste streams.

At present, there are no specific guidelines in Ireland for the preparation of OWMPs. Therefore, in preparing this document, consideration has been given to the requirements of national and regional waste policy, legislation and other guidelines.

2.0 OVERVIEW OF WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September 1998 titled as *'Changing Our Ways'* [6] which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. A heavy emphasis was placed on reducing reliance on landfill and finding alternative methods for managing waste. Amongst other things, Changing Our Ways stated a target of at least 35% recycling of municipal (i.e. household, commercial and non-process industrial) waste.

A further policy document *'Preventing and Recycling Waste – Delivering Change'* was published in 2002 [7]. This document proposed a number of programmes to increase recycling of waste and allow diversion from landfill. The need for waste minimisation at source was considered a priority.

This view was also supported by a review of sustainable development policy in Ireland and achievements to date, which was conducted in 2002, entitled *'Making Irelands Development Sustainable – Review, Assessment and Future Action'* [8]. This document also stressed the need to break the link between economic growth and waste generation, again through waste minimisation and reuse of discarded material.

In order to establish the progress of the Government policy document *Changing Our Ways*, a review document was published in April 2004 entitled *'Taking Stock and Moving Forward'* [9]. Covering the period 1998 – 2003, the aim of this document was to assess progress to date with regard to waste management in Ireland, to consider developments since the policy framework and the local authority waste management plans were put in place, and to identify measures that could be undertaken to further support progress towards the objectives outlined in *Changing Our Ways*.

In particular, *Taking Stock and Moving Forward* noted a significant increase in the amount of waste being brought to local authority landfills. The report noted that one of the significant challenges in the coming years was the extension of the dry recyclable collection services.

In September 2020, the Irish Government published a new policy document outlining a new action plan for Ireland to cover the period of 2020-2025. This plan *'A Waste Action Plan for a Circular Economy'* [10] (WAPCE), was prepared in response to the 'European Green Deal' which sets a roadmap for a transition to a new economy, where climate and environmental challenges are turned into opportunities, replacing the previous national waste management plan *"A Resource Opportunity"* (2012).

The WAPCE sets the direction for waste planning and management in Ireland up to 2025. This reorientates policy from a focus on managing waste to a much greater focus on creating circular patterns of production and consumption. Other policy statements of a number of public bodies already acknowledge the circular economy as a national policy priority.

The policy document contains over 200 measures across various waste areas including circular economy, municipal waste, consumer protection and citizen engagement, plastics and packaging, construction and demolition, textiles, green public procurement and waste enforcement.

One of the first actions to be taken was the development of the *Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021)* [11] to set a course for Ireland to transition across all sectors and at all levels of Government toward circularity and was issued in December 2021. It is anticipated that the Strategy will be updated in full every 18 months to 2 years.

The *Circular Economy and Miscellaneous Provisions Act 2022* [12] was signed into law in July 2022. The Act underpins Ireland's shift from a "take-make-waste" linear model to a more sustainable pattern of production and consumption, that retains the value of resources in our economy for as long as possible and that will to significantly reduce our greenhouse gas emissions. The Act defines Circular Economy for the first time in Irish law, incentivises the use of recycled and reusable alternatives to wasteful, single-use disposable packaging, introduces a mandatory segregation and incentivised charging regime for commercial waste, streamlines the national processes for End-of-Waste and By-Products decisions, tackling the delays which can be encountered by industry, and supporting the availability of recycled secondary raw materials in the Irish market, and tackles illegal fly-tipping and littering.

Since 1998, the Environmental Protection Agency (EPA) has produced periodic 'National Waste (Database) Reports' [13] detailing, among other things, estimates for household and commercial (municipal) waste generation in Ireland and the level of recycling, recovery and disposal of these materials. The 2020 National Waste Statistics, which is the most recent study published, along with the national waste statistics web resource (December 2022) reported the following key statistics for 2019:

- **Generated –** Ireland produced 3,210,220 t of municipal waste in 2020. This is a 4% increase since 2019. This means that the average person living in Ireland generated 645 kg of municipal waste in 2020.
- **Managed –** Waste collected and treated by the waste industry. In 2020, a total of 3,180,620 t of municipal waste was managed and treated.
- **Unmanaged –**Waste that is not collected or brought to a waste facility and is, therefore, likely to cause pollution in the environment because it is burned, buried or dumped. The EPA estimates that 29,600 t was unmanaged in 2020.
- **Recovered –** The amount of waste recycled, used as a fuel in incinerators, or used to cover landfilled waste. In 2020, around 84% of municipal waste was recovered – an increase from 83% in 2019.
- **Recycled –** The waste broken down and used to make new items. Recycling also includes the breakdown of food and garden waste to make compost. The recycling rate in 2020 was 41%, which is up from 37% in 2019.
- **Disposed –** 16% of municipal waste was landfilled in 2020. This is an increase from 15% in 2019.

2.2 Regional Level

The proposed development is located in the Local Authority area of Meath County Council (MCC).

The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan applicable to the MCC administrative area, which was published in May 2015. Currently the EMR and other regional waste management plans are under review and the Regional Waste Management Planning Offices expect to publish the plan in early 2023.

The regional plan sets out the following strategic targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne of waste which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015 (as amended).*

The *Meath County Development Plan 2021 – 2027* [14] sets out a number of policies and objectives for Meath in line with the objectives of the regional waste management plan.

Waste policies and objectives with a particular relevance to this development are:

Policies:

- *INF POL 61: To facilitate the implementation of National Waste legislation and National and Regional Waste Management Policy.*
- *INF POL 62: To encourage and support the provision of a separate collection of waste throughout the County in accordance with the requirements of the Waste Management (Household Food Waste) Regulations 2009, the Waste Framework Directive Regulations, 2011, the Waste Management (Commercial Food Waste) Regulations 2015 and other relevant legislation to meet the requirements of the Regional Waste Management Plan.*

- *INF POL 64: To encourage and support the expansion and improvement of a three bin system (mixed dry recyclables, organic waste and residual waste) in order to increase the quantity and quality of materials collected for recycling in conjunction with relevant stakeholders.*
- *INF POL 65: To adopt the provisions of the waste management hierarchy and implement policy in relation to the County's requirements under the current or any subsequent Waste Management Plan. All prospective developments in the County shall take account of the provisions of the regional waste management plan and adhere to the requirements of the Plan. Account shall also be taken of the proximity principle and the inter-regional movement of waste.*

Objectives:

- *INF OBJ 54: To facilitate the transition from a waste management economy to a green circular economy to enhance employment opportunities and increase the value recovery and recirculation of resources.*
- *INF OBJ 56: To support developments necessary to manage food waste in accordance with the requirements of the current Waste Management (Food Waste) Regulations and the regional Waste Management Plan.*
- *INF OBJ 68: To support the development of facilities to cater for commercial waste not provided for within the kerbside collection system such as the WEEE, C & D type waste and hazardous materials in accordance with the requirements of the Eastern Midlands Regional Waste Management Plan.*

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the proposed development are:

- Waste Management Act 1996 as amended.
- Environmental Protection Agency Act 1992 as amended;
- Litter Pollution Act 1997 as amended and
- Planning and Development Act 2000 as amended [15]

These Acts and subordinate Regulations transpose the relevant European Union Policy and Directives into Irish law.

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996* as amended and subsequent Irish legislation, is the principle of "Duty of Care". This implies that the waste producer is responsible for waste from the time it is generated through until its legal disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final disposal area, waste contractors will be employed to physically transport waste to the final waste disposal site.

It is, therefore, imperative that the residents, commercial tenants (including the childcare facility unit) and the proposed facilities management company undertake on-site management of waste in accordance with all legal requirements and that the facilities management company employ suitably permitted / licenced contractors to undertake off-site management of their waste in accordance with all legal requirements. This includes the requirement that a waste contactor handle, transport and reuse / recover / recycle / dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the Waste Management (Facility Permit & Registration) Regulations 2007, as amended, or a Waste or Industrial Emissions (IE) Licence granted by the EPA. The COR / permit / licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and / or disposed of at the specified site.

2.3.1 Meath County Council Waste Management Bye-Laws

The MCC *"Meath County Council Waste Management (Storage, Presentation and Segregation of Household and Commercial Waste) By-Laws (2018)"* came into effect on the 12thth of November 2018. These by-laws set a number of enforceable requirements on waste holders with regard to storage, separation and presentation of waste within the MCC functional area. Key requirements under these by-laws of relevance to the proposed development include the following:

- Kerbside waste presented for collection shall not be presented for collection earlier than 6.00pm on the day immediately preceding the designated waste collection day;
- All containers used for the presentation of kerbside waste and any uncollected waste shall be removed from any roadway, footway, footpath or any other public place no later than 8:00am on the day following the designated waste collection day;
- An authorised waste collector is engaged to service the receptacles referred to in this section of these bye-laws, with documentary evidence, such as receipts, statements or other proof of payment, demonstrating the existence of this engagement being retained for a period of no less than two years. Such evidence shall be presented to an authorised person within a time specified in a written request from either that person or from another authorised person employed by Meath County Council;
- Adequate access and egress onto and from the premises by waste collection vehicles is maintained; and
- Written information is provided to each tenant or other occupier about the arrangements for waste separation, segregation, storage and presentation prior to collection,

The full text of the waste by-laws is available from the MCC website.

2.4 Regional Waste Management Service Providers and Facilities

Various contractors offer waste collection services for the residential and commercial sectors in the MCC region. Details of waste collection permits (granted, pending and withdrawn) for the region are available from the NWCPO.

As outlined in the regional waste management plan, there is a decreasing number of landfills available in the region. Only three municipal solid waste landfills remain operational and are all operated by the private sector. There are a number of other licensed and permitted facilities in operation in the region including waste transfer stations, hazardous waste facilities and integrated waste management facilities. There are two existing thermal treatment facilities, one in Duleek, Co. Meath and a second facility in Poolbeg in Dublin.

The FCC Recycling Centre at Coolmine Industrial Estate located c. 5.5km southwest of the development site, can be utilised by the residents of the proposed development for other household waste streams. This centre can accept furniture, paint, wood, mattresses, plastic, waste tyres, mixed bulky waste, electrical items, clothes and shoes. The MCC Navan Recycling Centre is c. 30km to the northwest. There is also a bring bank located c. 1km southwest of the proposed development at St. Peter's GAA Dunboyne, where glass and aluminium cans can be deposited.

A copy of all CORs and waste permits issued by the Local Authorities are available from the NWCPO website and all Waste / Industrial Emissions Licenses issued are available from the EPA.

3.0 DESCRIPTION OF THE DEVELOPMENT

3.1 Location, Size and Scale of the Development

Permission is sought for a period of 10 Years for a proposed development on a site of approximately 16.69Ha consisting of 716no. residential units in a mix of houses, duplex and apartment buildings ranging in height from 2 to 7 storeys overall; comprising of 155no. 2 storey houses; 517no. apartments accommodated in 8no. buildings ranging in height from 5 to 7 storeys; 44no. duplex units accommodated in 2no. 3 storey terraced buildings ; 1no. childcare facility (c.602sqm) located at ground floor level of Block B1; public open space; communal and private open space; public lighting; car parking, including basement car parking under some of the apartments; secure bicycle parking; and all associated and ancillary site development and infrastructural works, hard and soft landscaping and boundary treatment works, provision of c. 470m in length of distributor road, compensatory storage measures at Castle Stream and improvement works to two no. roundabouts on the R147 (Old Navan Road). Vehicular, cyclist and pedestrian access to serve the development will be provided from Station Road via existing access road permitted under Meath County Council Reg. Ref. RA180561.

3.2 Typical Waste Categories

The typical non-hazardous and hazardous wastes that will be generated at the proposed development will include the following:

- Dry Mixed Recyclables (DMR) - includes waste paper (including newspapers, magazines, brochures, catalogues, leaflets), cardboard and plastic packaging, metal cans, plastic bottles, aluminium cans, tins and Tetra Pak cartons;
- Organic waste – food waste and green waste generated from internal plants / flowers;
- Glass; and
- Mixed Non-Recyclable (MNR)/General Waste.

In addition to the typical waste materials that will be generated at the development on a daily basis, there will be some additional waste types generated less frequently / in smaller quantities which will need to be managed separately including:

- Green / garden waste may be generated from internal plants / flowers and landscaping;
- Batteries (both hazardous and non-hazardous);
- Waste electrical and electronic equipment (WEEE) (both hazardous and non-hazardous);
- Printer cartridges / toners;
- Chemicals (paints, adhesives, resins, detergents, etc.);
- Light bulbs;
- Textiles;
- Waste cooking oil (if any generated by the residents or tenants);
- Furniture (and, from time to time, other bulky wastes); and
- Abandoned bicycles.

Wastes will be segregated into the above waste types to ensure compliance with waste legislation and guidance while maximising the re-use, recycling and recovery of waste with diversion from landfill wherever possible.

3.3 European Waste Codes

In 1994, the *European Waste Catalogue* [16] and *Hazardous Waste List* [17] were published by the European Commission. In 2002, the EPA published a document titled the *European Waste Catalogue and Hazardous Waste List* [18], which was a condensed version of the original two documents and their subsequent amendments. This document has recently been replaced by the EPA '*Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [19] 2018. This waste classification system applies across the EU and is the basis for all national and international waste reporting, such as those associated with waste collection permits, COR's, permits and licences and EPA National Waste Database.

Under the classification system, different types of wastes are fully defined by a code. The List of Waste (LoW) code (also referred to as European Waste Code (EWC)) for typical waste materials expected to be generated during the operation of the proposed development are provided in Table 3.1, below.

Table 3.1 Typical Waste Types Generated and LoW Codes

Waste Material	LoW/EWC Code
Paper and Cardboard	20 01 01
Plastics	20 01 39
Metals	20 01 40
Mixed Non-Recyclable Waste	20 03 01
Glass	20 01 02
Biodegradable Kitchen Waste	20 01 08
Oils and Fats	20 01 25
Textiles	20 01 11
Batteries and Accumulators*	20 01 33* - 34
Printer Toner/Cartridges*	20 01 27* - 28
Green Waste	20 02 01
WEEE*	20 01 35*-36
Chemicals (solvents, pesticides, paints & adhesives, detergents, etc.) *	20 01 13*/19*/27*/28/29*30
Fluorescent tubes and other mercury containing waste*	20 01 21*
Bulky Wastes	20 03 07
Healthcare wastes (wastes from natal care, diagnosis, treatment or prevention of disease in humans, includes non-hazardous and hazardous wastes) *	18 01 01 -18 01 09*

* *Individual waste type may contain hazardous materials*

4.0 ESTIMATED WASTE ARISINGS

A waste generation model (WGM) developed by AWN has been used to predict waste types, weights and volumes expected to arise from operations within the proposed development. The WGM incorporates building area and use and combines these with other data, including Irish and US EPA waste generation rates.

The estimated quantum / volume of waste that will be generated from the residential units and amenity areas has been determined based on the predicted occupancy of the units. While the estimated quantum / volume of waste that will be generated from the childcare facility unit is based upon floor area m^2 and its usage.

The estimated waste generation for the proposed development for the main waste types is presented in Table 4.1, 4.2, 4.3 and 4.4

Table 4.1 *Estimated Waste Generation for Residential Apartment Units*

Waste Type	**Waste Volume (m^3 / week)**			
	Residential Apartment Block A1 (Combined)	**Residential Apartment Block A2 (Combined)**	**Residential Apartment Block A3 (Combined)**	**Residential Apartment Block A4 (Combined)**
Organic Waste	0.95	0.98	0.95	0.98
Dry Mixed Recyclables	6.75	6.96	6.75	6.96
Glass	0.18	0.19	0.18	0.19
Mixed Non-Recyclables	3.55	3.66	3.55	3.66
Total	**11.44**	**11.79**	**11.44**	**11.79**

Table 4.2 *Estimated Waste Generation for Residential Apartment Units*

Waste Type	**Waste Volume (m^3 / week)**			
	Residential Apartment Block B1 (Combined)	**Residential Apartment Block B2 (Combined)**	**Residential Apartment Block C1 (Combined)**	**Residential Apartment Block C2 (Combined)**
Organic Waste	1.26	1.18	1.00	1.00
Dry Mixed Recyclables	8.92	8.39	7.11	7.11
Glass	0.24	0.23	0.19	0.19
Mixed Non-Recyclables	4.69	4.41	3.74	3.74
Total	**15.11**	**14.21**	**12.04**	**12.04**

Table 4.3 *Estimated Waste Generation for Residential Individual Houses/Duplex Units*

Waste type	**Waste Volume (m^3/week)**			
	Individual Duplex 1Bed (Individual)	**Individual House / Duplex 2 Bed (Individual)**	**Individual House / Duplex 3 Bed (Individual)**	**Individual House 4 Bed (Individual)**
Organics	0.01	0.02	0.02	0.02
DMR	0.08	0.11	0.13	0.18
Glass	<0.01	<0.01	<0.01	<0.01
MNR	0.04	0.07	0.08	0.09
Total	**0.14**	**0.20**	**0.23**	**0.29**

Table 4.4 *Estimated Waste Generation for Residential Individual Houses and Childcare Facility Units*

Waste type	**Waste Volume (m^3/week)**	
	Individual House 5 Bed (Individual)	**Childcare Facility (Individual) Commercial**
Organics	0.03	0.03
DMR	0.22	1.13

Glass	0.01	<0.01
MNR	0.10	0.50
Total	**0.36**	**1.66**

BS5906:2005 Waste Management in Buildings – Code of Practice [20] has been considered in the calculations of waste estimates. AWN's modelling methodology is based on recently published data and data from numerous other similar developments in Ireland and is based on AWN's experience, it provides a more representative estimate of the likely waste arisings from the proposed development.

5.0 WASTE STORAGE AND COLLECTION

This section provides information on how waste generated within the site will be stored and collected. This has been prepared with due consideration of the proposed site layout as well as best practice standards, local and national waste management requirements, including those of MCC. In particular, consideration has been given to the following documents:

- *BS 5906:2005 Waste Management in Buildings – Code of Practice,*
- *EMR Waste Management Plan 2015 – 2021;*
- *Meath County Council, Meath County Development Plan 2021-2027 (2021);*
- MCC *'Waste Management (Segregation, Storage and Presentation of Household & Commercial Waste) Bye-Laws' (2018);* and
- *DoHLGH, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities* (2022) [21]:

Waste Storage Areas

Locations of all Waste Storage Areas (WSAs) can be viewed on the drawings submitted with the planning application under separate cover and in the Appendix A of this report.

Residential Units Block A1, A2 & B1

One (1 no.) shared communal WSA has been allocated within the development design for this residential apartment block. This has been strategically located at ground floor level, in an external location between Block A2 and Block B1.

Residential Units Block A3 & A4

One (1 no.) shared communal WSA has been allocated within the development design for this residential apartment block. This has been strategically located at ground floor level, in an external location between Block A2 and Block A3.

Residential Units Block B2

One (1 no.) shared communal WSA has been allocated within the development design for this residential apartment block. This has been strategically located at ground floor level, in an external location to the northwest of Block B2.

Residential Units Block C1

Two (2 no.) shared communal WSAs have been allocated within the development design for this residential apartment block. These have been strategically located at ground floor level, in external locations on either side of the building.

Residential Units Block C2

Two (2 no.) shared communal WSAs have been allocated within the development design for this residential apartment block. These have been strategically located at ground floor level, in external locations on either side of the building.

Houses & Duplex Units

Duplexes and House will have their own individual WSAs allocated at the rear of their home where external access to the rear yard is possible. Where external access to the rear of the property is unavailable, bins will be stored at the front of the unit, in a screened area, shielded from view of the road.

Childcare Facility Block B1

One (1 no.) shared communal WSA has been allocated within the development design for the childcare facility in Block B1. This has been strategically located at ground floor level, in an external location to the northwest of Block B1.

Using the estimated waste generation volumes in Tables 4.1, above, the waste receptacle requirements for MNR, DMR, organic waste and glass have been established for the shared WSA. It is envisaged that all waste types will be collected on a weekly basis. The WSA has been appropriately sized to accommodate the weekly waste requirements for waste receptacles.

Residential Houses and Duplexes with their own individual waste stores will have sufficient space for a fortnightly waste receptacle collection.

Waste from the residential amenities has been included in the overall waste calculations and will be taken to the nearest residential WSA that has sufficient space.

Waste Storage Requirements

Estimated waste storage requirements for the operational phase of the proposed development are detailed in Table 5.1, below.

Table 5.1 *Waste storage requirements for the proposed development*

Area/Use	Bins Required			
	MNR[1]	DMR[2]	Organic	Glass
Houses / Duplex (Individual WSA)	1 x 240L	1 x 240L	1x 120L	-
Residential Units Block A1, A2 & B1 (Combined)	11 x 1100L	20 x 1100L	13 x 240L	3 x 240L
Residential Units Block A3 & A4 (Combined)	7 x 1100L	13 x 1100L	8 x 240L	2 x 240L
Residential Units Block B2 (Combined)	4 x 1100L	8 x 1100L	5 x 240L	1 x 240L
Residential Units Block C1 (Combined)	4 x 1100L	7 x 1100L	5 x 240L	1 x 240L
Residential Units Block C2 (Combined)	4 x 1100L	7 x 1100L	5 x 240L	1 x 240L
Childcare Facility Block B1 (Individual)	1 x 1100L	2 x 1100L	1 x 120L	1 x 120L

Note: 1 = Mixed Non-Recyclables
2 = Dry Mixed Recyclables

The waste receptacle requirements have been established from distribution of the total weekly waste generation estimate into the holding capacity of each receptacle type. Waste storage receptacles as per Table 5.1, above, (or similar appropriate approved containers) will be provided by the facilities management company in the residential WSA.

The types of bins used will vary in size, design and colour dependent on the appointed waste contractor. However, examples of typical receptacles to be provided in the WSAs are shown in Figure 5.1. All waste receptacles used will comply with the SIST EN 840-1:2020 and SIST EN 840-2:2020 standards for performance requirements of mobile waste containers, where appropriate.

Figure 5.1 *Typical waste receptacles of varying size (240 L and 1100 L)*

5.1 Waste Storage – Residential Units

Residents will be required to segregate waste into the following main waste streams:

- DMR;
- MNR;
- Glass; and
- Organic waste.

Residents in apartment blocks will be required to take their segregated waste materials to their designated shared WSA and deposit their segregated waste into the appropriate bins.

It is anticipated that residents in duplexes and houses with external access to the rear of the property and will store waste in bins at the back areas of the houses and duplexes. For houses and duplexes with no external access to the rear, a dedicated shielded area for storage of 2 no. 240l and 1 no. 120 l litre wheelie bins have been allocated at the front of the property.

Provision will be made in all residential units to accommodate 3 no. bin types to facilitate waste segregation at source. An example of a potential 3 bin storage system is provided in figure 5.2 below.

Figure 5.2 Example three bin storage system to be provided within the unit design

Each bin / container in the WSAs will be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage will be posted above or on the bins to show exactly which waste types can be placed in each bin.

Access to the shared residential WSAs will be restricted to authorised residents, facilities management and waste contractors by means of a key or electronic fob access.

Other waste materials such as textiles, batteries, lightbulbs, WEEE, cooking oil and printer toner / cartridges will be generated less frequently by the residents. Residents will be required to identify suitable temporary storage areas for these waste items within their own units and dispose of them appropriately. Further details on additional waste types can be found in Section 5.4.

5.2 Waste Storage –Childcare Facility (Commercial)

Staff will be required to segregate their waste into the following waste categories within their own unit:

- DMR;
- MNR;
- Glass; and
- Organic waste.

As required, the childcare facility staff will be required to take the segregated waste materials to the designated childcare facility WSA in their block and deposit the segregated waste into the appropriate bins.

Each bin/container in the WSAs will be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage will be posted above or on the bins to show exactly which waste types can be placed in each bin.

Access to the WSAs will be restricted to authorised childcare facility unit staff, childcare facility staff, facilities management and waste contractors by means of a key or electronic fob access.

Other waste materials such as textiles, batteries, lightbulbs, WEEE, cooking oil and printer toner / cartridges will be generated less frequently. The childcare facility tenant will be required to identify suitable temporary storage areas for these waste items within their own unit and dispose of them appropriately. Further details on additional waste types can be found in Section 5.4.

5.3 Waste Collection

There are numerous private contractors that provide waste collection services in the MCC area. All waste contractors servicing the proposed development must hold a valid waste collection permit for the specific waste types collected. All waste collected must be transported to registered / permitted / licensed facilities only.

Bins from the proposed development's shared WSAs will be brought to staging / collection points adjacent to the internal roads within the development. The waste receptacles will be moved by the waste contractor or facilities management immediately prior to collection. Bins will be returned to the WSA immediately following collection in line with the waste bye-laws.

Residents in duplexes and houses with individual WSAs will be responsible for transferring their owns bins to the curb for collection by the nominated waste contractor.

The staging areas are such that it will not obstruct traffic or pedestrians (allowing a footway path of at least 1.8m, the space needed for two wheelchairs to pass each other) as is recommended in the Design Manual for Urban Roads and Streets (2022)[22].

A trolley / tug or suitable vehicle may be required to convey the bins to and from the collection areas. The facilities management, residents or waste contractor will ensure that empty bins are promptly returned to the WSAs after collection / emptying in line with the MCC waste bye-laws.

Suitable access and egress has been provided to enable the bins to be moved easily from the WSAs to the waste collection vehicles on the appropriate days. Waste will be collected at agreed days and times by the nominated waste contractors.

All waste receptacles will be clearly identified as required by waste legislation and the requirements of the MCC *Waste Bye-Laws*. Waste will be presented for collection in a manner that will not endanger health, create a risk to traffic, harm the environment or create a nuisance through odours or litter.

It is recommended that bin collection times are staggered to reduce the number of bins required to be emptied at once and the time the waste vehicle is on-site. This will be determined during the process of appointment of a waste contractor.

5.4 Additional Waste Materials

In addition to the typical waste materials that are generated on a daily basis, there will be some additional waste types generated from time to time that will need to be managed separately. A non-exhaustive list is presented below.

Green Waste

Green waste may be generated from gardens, external landscaping and internal plants / flowers. Green waste generated from landscaping of external areas will be removed by external landscape contractors. Green waste generated from gardens internal plants / flowers can be placed in the organic waste bins.

Batteries

A take-back service for waste batteries and accumulators (e.g. rechargeable batteries) is in place in order to comply with the S.I. No. 283/2014 - European Union (Batteries and Accumulators) Regulations 2014, as amended. In accordance with these regulations, consumers are able to bring their waste batteries to their local civic amenity centre or can return them free of charge to retailers which supply the equivalent type of battery, regardless of whether or not the batteries were purchased at the retail outlet and regardless of whether or not the person depositing the waste battery purchases any product or products from the retail outlet.

The childcare facility tenant cannot use the civic amenity centre. They must segregate their waste batteries and either avail of the take-back service provided by retailers or arrange for recycling / recovery of their waste batteries by a suitably permited / licenced contractor. Facilties management may arrange collection, depending on the agreement.

Waste Electrical and Electronic Equipment (WEEE)

The WEEE Directive (Directive 2002/96/EC) and associated Waste Management (WEEE) Regulations have been enacted to ensure a high level of recycling of electronic and electrical equipment. In accordance with the regulations, consumers can bring their waste electrical and electronic equipment to their local recycling centre. In addition, consumers can bring back WEEE within 15 days to retailers when they purchase new equipment on a like for like basis. Retailers are also obliged to collect WEEE within 15 days of delivery of a new item, provided the item is disconnected from all mains, does not pose a health and safety risk and is readily available for collection.

As noted above, the childcare facility tenant cannot use the civic amenity centre. They must segregate their WEEE and either avail of the take-back / collection service provided by retailers or arrange for recycling / recovery of their WEEE by a suitably permited / licenced contractor. Facilties management may arrange collection, depending on the agreement.

Printer Cartridge / Toners

It is recommended that a printer cartridge / toner bin is provided in the childcare facility unit, where appropriate. The childcare facility tenant will be required to store this waste within their unit and arrange for return to retailers or collection by an authorised waste contractor, as required.

Waste printer cartridge / toners generated by residents can usually be returned to the supplier free of charge or can be brought to a civic amenity centre.

Chemicals

Chemicals (such as solvents, paints, adhesives, resins, detergents, etc) are largely generated from building maintenance works. Such works are usually completed by external contractors who are responsible for the off-site removal and appropriate recovery / recycling / disposal of any waste materials generated.

Any waste cleaning products or waste packaging from cleaning products generated in the childcare facility unit that is classed as hazardous (if they arise) will be appropriately stored within the tenants' own space. Facilties management may arrange collection, depending on the agreement.

Any waste cleaning products or waste packaging from cleaning products that are classed as hazardous (if they arise) generated by the residents should be brought to a civic amenity centre.

Light Bulbs

Waste light bulbs (fluorescent, incandescent and LED) may be generated by lighting at the childcare facility unit. It is anticipated that childcare facility tenant will be responsible for the off-site removal and appropriate recovery / disposal of these wastes. Facilties management may arrange collection, depending on the agreement.

Light bulbs generated by residents should be taken to the nearest civic amenity centre for appropriate storage and recovery / disposal.

Textiles

Where possible, waste textiles should be recycled or donated to a charity organisation for reuse. Childcare facility and residential tenants will be responsible for disposing of waste textiles appropriately.

Waste Cooking Oil

If the commerial tenants use cooking oil, waste cooking oil will need to be stored within the unit on a bunded area or spill pallet and regular collections by a dedicated waste contractor will need to be organised as required. Under sink grease traps will be installed in any cooking space.

If the residents generate waste cooking oil, this can be brought to a civic amenity centre.

Furniture & Other Bulky Waste Items

Furniture and other bulky waste items (such as carpet, etc.) may occasionally be generated by the childcare facility tenant. The collection of bulky waste will be arranged, as required by the tenant. If residents wish to dispose of furniture, this can be brought a civic amenity centre.

Abandoned Bicycles

Bicycle parking areas are planned for the development. As happens in other developments, residents sometimes abandon faulty or unused bicycles, and it can be difficult to determine their ownership. Abandoned bicycles should be donated to charity if they arise or Facilties management willmay arrange collection by a licensed waste contractor.

Covid-19 Waste

Any waste generated by residential and childcare facility tenants, along with any staff onsite that have tested positive for Covid-19 should be manged in accordance with the current Covid-19 HSE Guidelines at the time that that waste arises. At the time this report was prepared, the HSE Guidelines require the following procedure for any waste from a person that tests positive for Covid-19:

- Put all waste (gloves, tissues, wipes, masks) from that person in a bin bag and tie when almost full;
- Put this bin bag into a second bin bag and tie a knot;
- Store this bag safely for 3 days, then put the bag into the non-recyclable waste / general waste wheelie bin for collection / emptying.

Please note that this guidance is likely to be updated by the time the proposed Development is open and occupied and the relevant guidance at the time will need to be reviewed.

5.5 Waste Storage Area Design

The shared WSAs will be designed and fitted-out to meet the requirements of relevant design standards, including:

- Be fitted with a non-slip floor surface;
- Provide ventilation to reduce the potential for generation of odours with a recommended 6-10 air changes per hour for a mechanical system for internal WSAs;
- Provide suitable lighting – a minimum Lux rating of 220 is recommended;
- Appropriate sensor controlled lighting;
- Be easily accessible for people with limited mobility;
- Be restricted to access by nominated personnel only;
- Be supplied with hot or cold water for disinfection and washing of bins;
- Be fitted with suitable power supply for power washers;
- Have a sloped floor to a central foul drain for bins washing run-off;
- Have appropriate graphical and written signage placed above and on bins indicating correct use;
- Have access for potential control of vermin, if required;
- Robust design of doors to bin area incorporating steel sheet covering where appropriate; and
- Be fitted with CCTV for monitoring.

The facilities company will be required to maintain the waste storage areas in good condition as required by the MCC Waste Bye-Laws.

6.0 CONCLUSIONS

In summary, this OWMP presents a waste strategy that addresses all legal requirements, waste policies and best practice guidelines and demonstrates that the required storage areas have been incorporated into the design of the proposed development.

Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus contributing to the targets set out in the *EMR Waste Management Plan 2015 – 2021*.

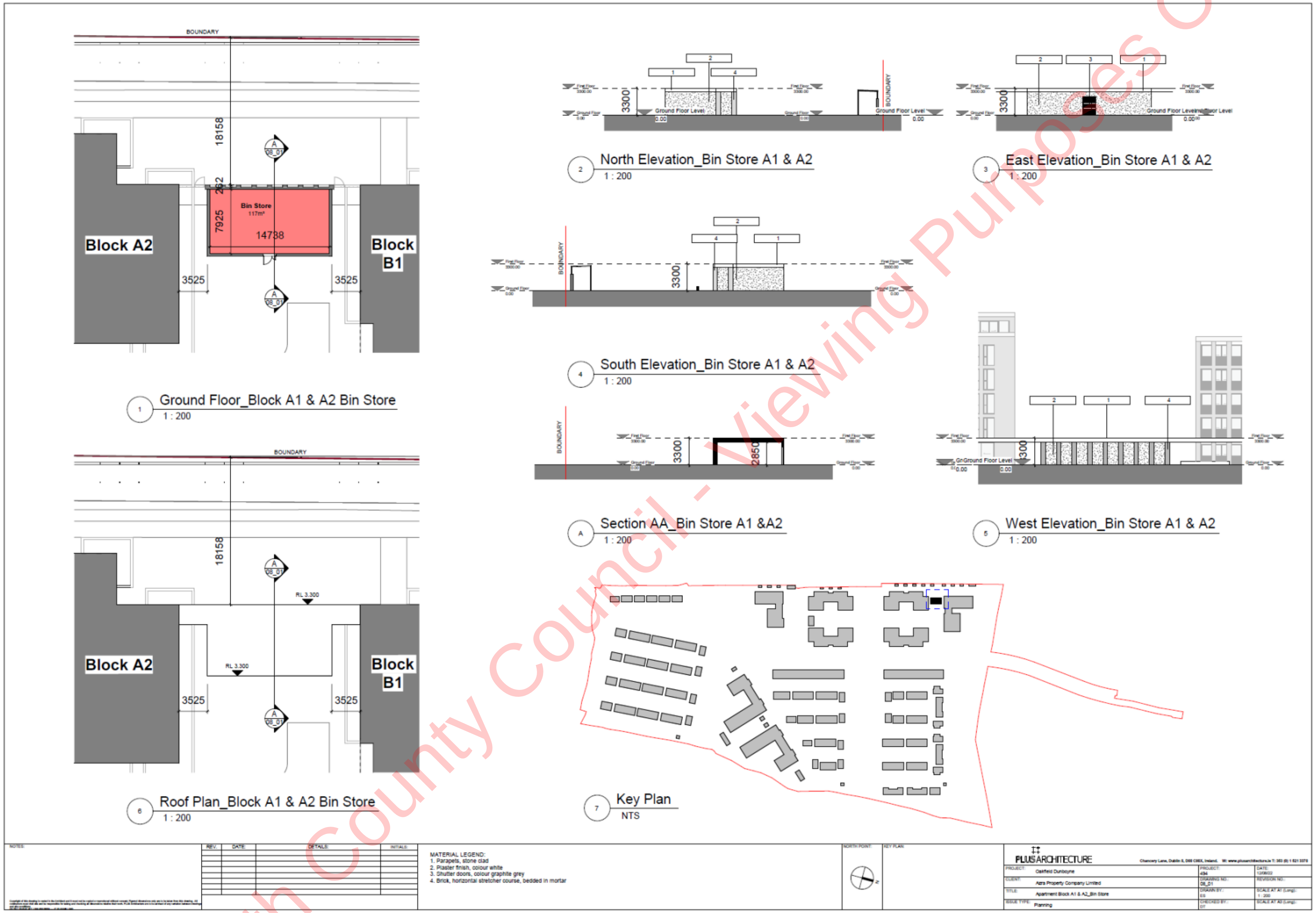
Adherence to this plan will also ensure that waste management at the development is carried out in accordance with the requirements of the *MCC Waste Bye-Laws.*

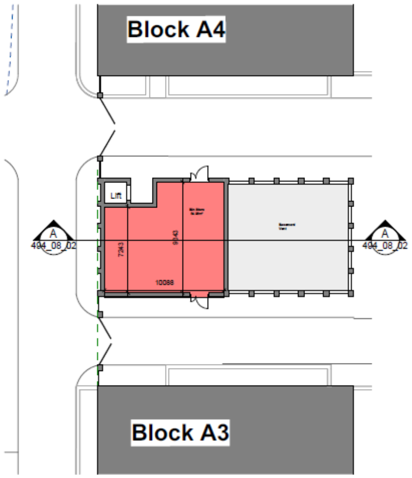
The waste strategy presented in this document will provide sufficient storage capacity for the estimated quantity of segregated waste. The designated areas for waste storage will provide sufficient room for the required receptacles in accordance with the details of this strategy.

7.0 REFERENCES

1. Waste Management Act 1996 as amended.
2. Environmental Protection Agency Act 1992 (Act No. 7 of 1992) as amended.
3. Litter Pollution Act 1997 (Act No. 12 of 1997) as amended.
4. Eastern-Midlands Waste Region, *Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021* (2015).
5. Meath County Council (MCC) *'Waste Management (Segregation, Storage and Presentation of Household & Commercial Waste Bye-Laws'* (2018).
6. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
7. Department of Environment, Heritage and Local Government (DoEHLG) *Preventing and Recycling Waste - Delivering Change* (2002).
8. DoELG, *Making Ireland's Development Sustainable – Review, Assessment and Future Action (World Summit on Sustainable Development)* (2002).
9. DoEHLG, *Taking Stock and Moving Forward* (2004).
10. Department of Communications, Climate Action and Environment (DCCAE), *Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025* (2020).
11. DCCAE, Whole of Government Circular Economy Strategy 2022-2023 'Living More, Using Less' (2021).
12. Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2012*.
13. Meath County Council*, Meath County Development Plan 2021 – 2027* (2021).
14. Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended
15. European Waste Catalogue - Council Decision 94/3/EC (as per Council Directive 75/442/EC).
16. Hazardous Waste List - Council Decision 94/904/EC (as per Council Directive 91/689/EEC).
17. EPA, *European Waste Catalogue and Hazardous Waste List* (2002)
18. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2015)
19. BS 5906:2005 Waste Management in Buildings – Code of Practice.
20. DoHLGH, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2020).
21. Department of Transport, Tourism and Sport and Department of Housing, Planning and Local Government, *Design Manual for Urban Roads and Streets* (2019).

APPENDIX A – WASTE STORAGE AREAS & ROAD SWEEP ANALYSIS


BOUNDARY
Block A2
Block B1
Bin Store
117m²
18158
262
7925
14738
3525
3525
1 Ground Floor_Block A1 & A2 Bin Store
1 : 200
RL 3.300
6 Roof Plan_Block A1 & A2 Bin Store
1 : 200
2 North Elevation_Bin Store A1 & A2
1 : 200
3 East Elevation_Bin Store A1 & A2
1 : 200
4 South Elevation_Bin Store A1 & A2
1 : 200
A Section AA_Bin Store A1 &A2
1 : 200
5 West Elevation_Bin Store A1 & A2
1 : 200
7 Key Plan
NTS
3300
2850
Ground Floor Level
0.00
First Floor
3300.00
NOTES:
REV. DATE: DETAILS: INITIALS:
MATERIAL LEGEND:
1. Parapets, stone clad
2. Plaster finish, colour white
3. Shutter doors, colour graphite grey
4. Brick, horizontal stretcher course, bedded in mortar
NORTH POINT:
KEY PLAN:
PLUS ARCHITECTURE
Chancery Lane, Dublin 8, D08 C9EX, Ireland. W: www.plusarchitecture.ie T: 353 (0) 1 821 3370
PROJECT: Oakfield Dunboyne
CLIENT: Azra Property Company Limited
TITLE: Apartment Block A1 & A2_Bin Store
ISSUE TYPE: Planning
PROJECT: 494
DRAWING NO.: 08_01
DRAWN BY.: ES
CHECKED BY.: DT
DATE: 12/08/22
REVISION NO.:
SCALE AT A1 (Long): 1 : 200
SCALE AT A3 (Long):



1 Ground Floor_Block A3 & A4 Bin Store
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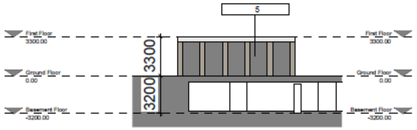

2 North Elevation_Bin Store Block A3 & A4
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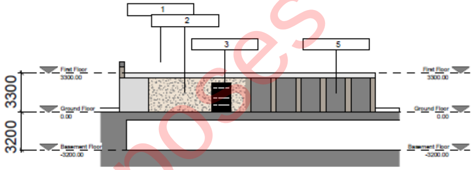

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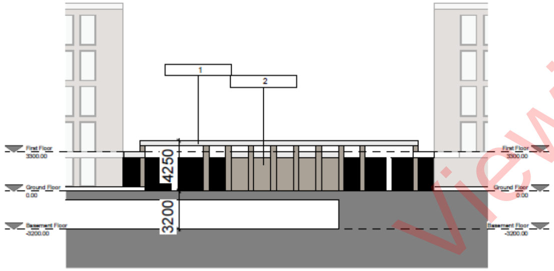

4 South Elevation_Bin Store Block A3 & A4
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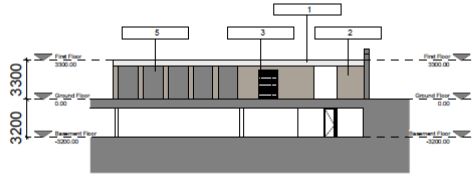
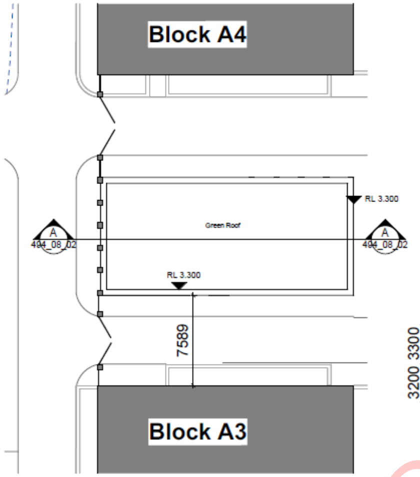
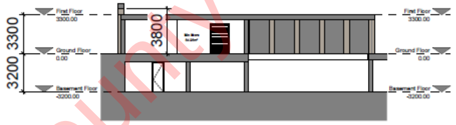


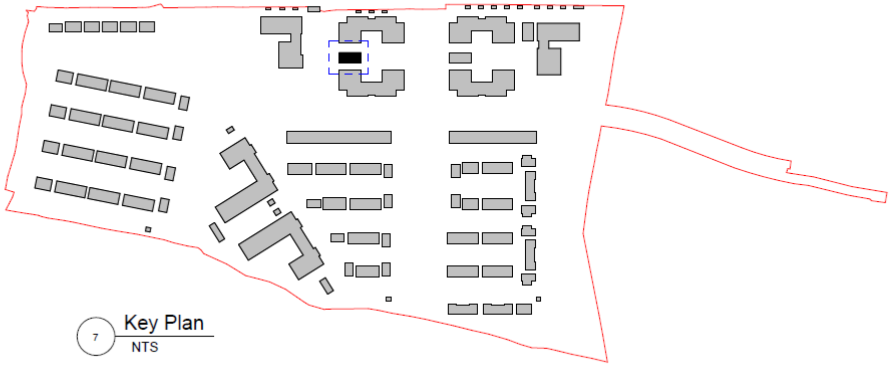
5 West Elevation_Bin Store Block A3 & A4
1 : 200



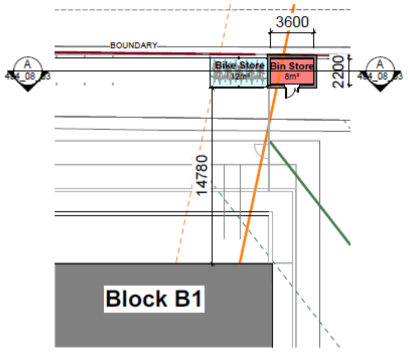
6 Roof Plan_Block A3 & A4 Bin Store
1 : 200



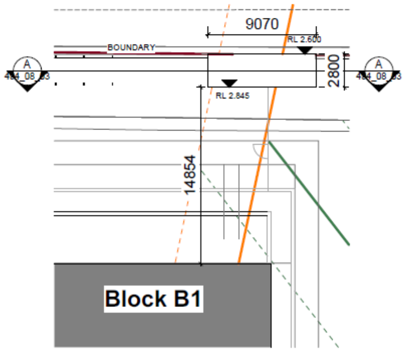
A Section AA_Bin Store A3 & A4
1 : 200



7 Key Plan
NTS



1 Ground Floor_Block B1 Creche Bin & Bike Store
1 : 200



6 Roof Plan_Block B1 Creche Bin & Bike Store
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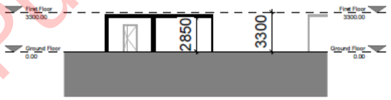
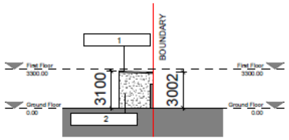
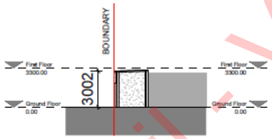


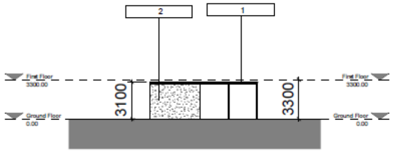
A Section AA_Creche Bin & Bike Store B1
1 : 200



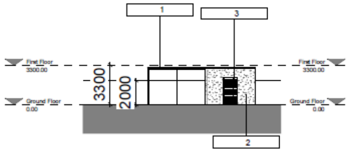
2 North Elevation_Creche Bin Store + Bikes
1 : 200



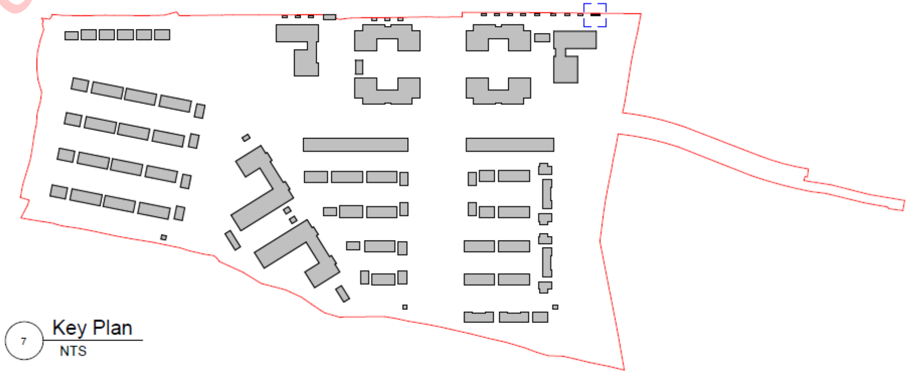
4 South Elevation_Creche Bin Store + Bikes
1 : 200



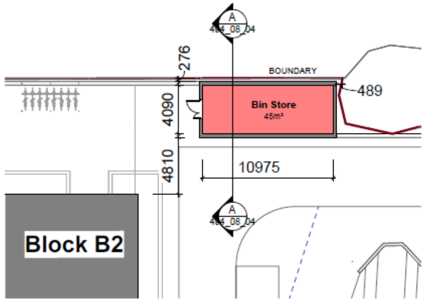
5 West Elevation_Creche Bin Store + Bikes
1 : 200



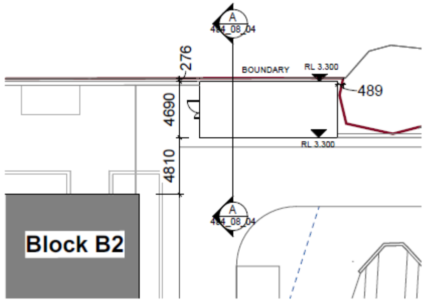
3 East Elevation_Creche Bin Store + Bikes
1 : 200



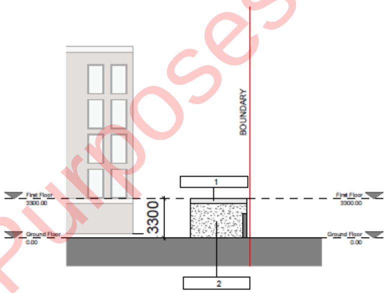
7 Key Plan
NTS



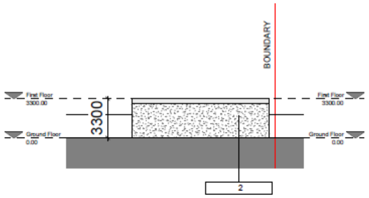
① Ground Floor_Block B2 Bin Store
1 : 200



② Roof Plan_Block B2 Bin Store
1 : 200



③ North Elevation_Bin Store Block B2
1 : 200



④ East Elevation_Bin Store Block B2
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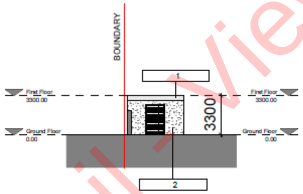

⑤ South Elevation_Bin Store Block B2
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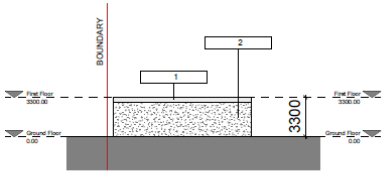
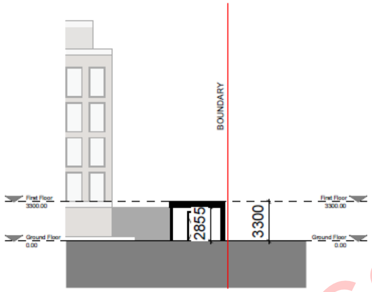


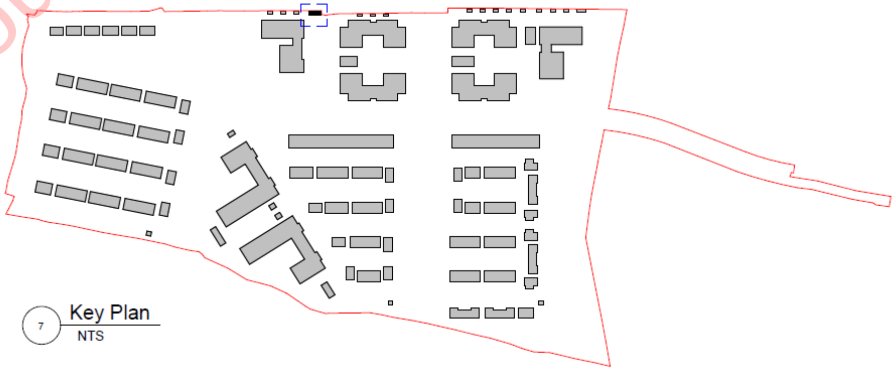
⑥ West Elevation_Bin Store Block B2
1 : 200



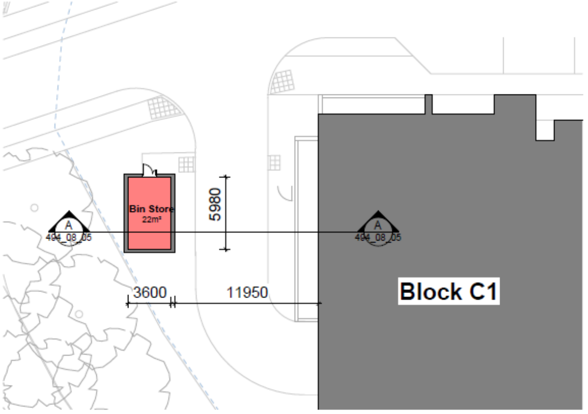
A Section AA_Bin Store Block B2
1 : 200

Room Legend

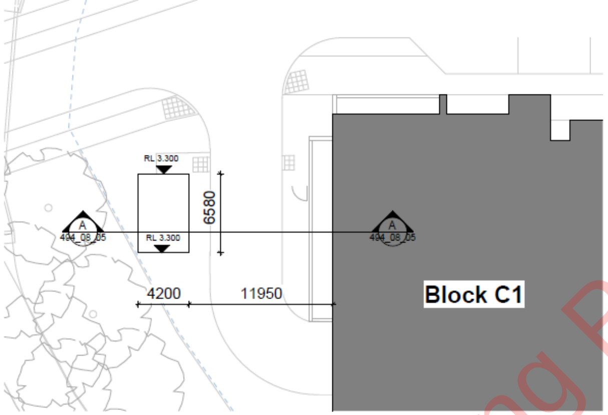
☐ No colors defined



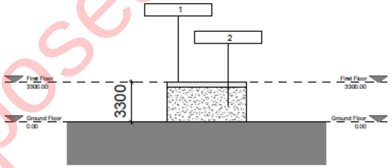
⑦ Key Plan
NTS



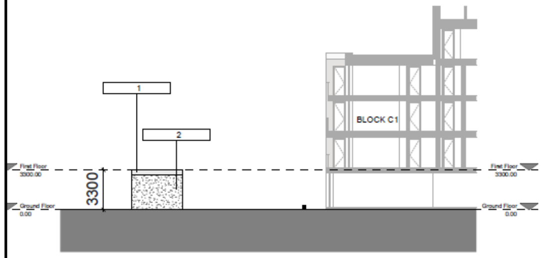
① Apartment Block C1_Bin Store
1 : 200



② Apartment Block C1_Bin Store Roof Plan
1 : 200



③ North Elevation_Bin Store Block C1
1 : 200



④ East Elevation_Bin Store Block C1
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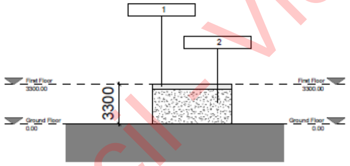

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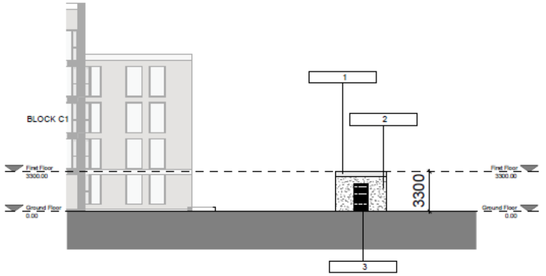

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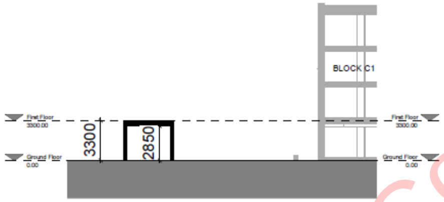
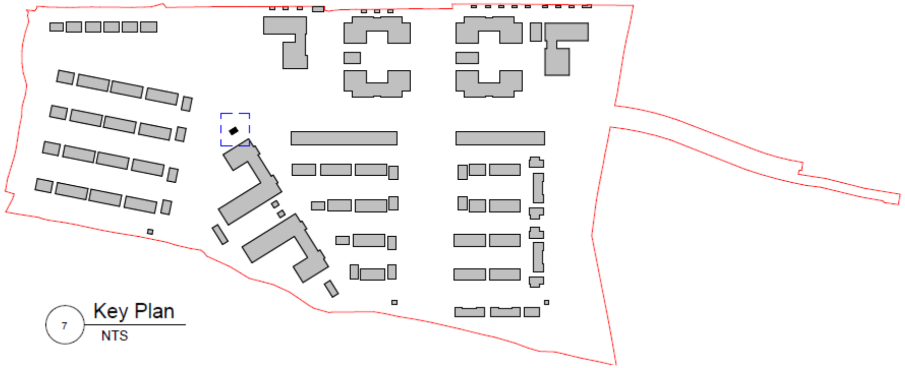
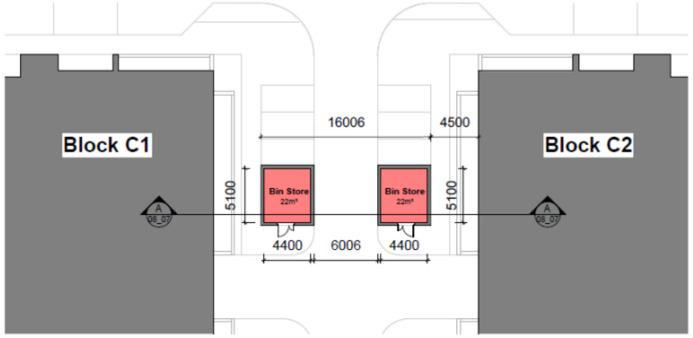


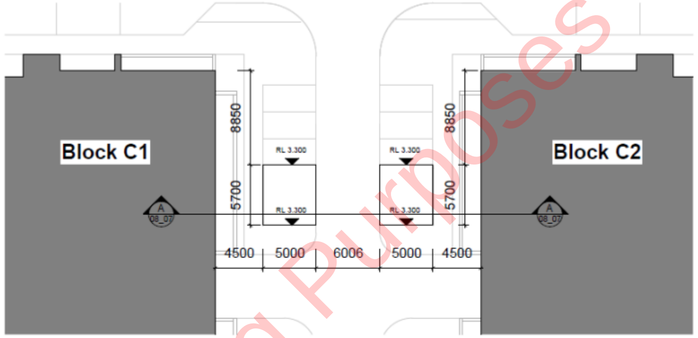
Ⓐ Section AA_Bin Store Block C1
1 : 200



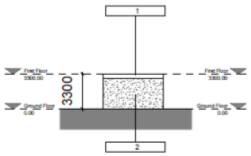
⑦ Key Plan
NTS



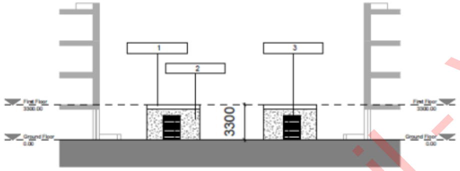
1 Apartment Block C1 & C2_Bin Stores
1 : 200



2 Apartment Block C1 & C2_Bin Stores Roof Plan
1 : 200



3 North Elevation_Bin Store Block C1 & C2
1 : 200



4 East Elevation_Bin Store Block C1 & C2
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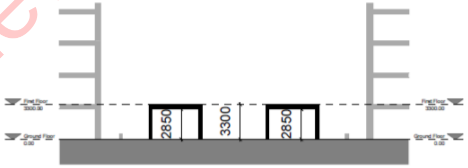

A Section AA_ Bin Store Block C1 & C2
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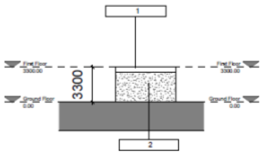
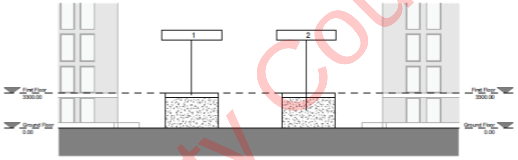
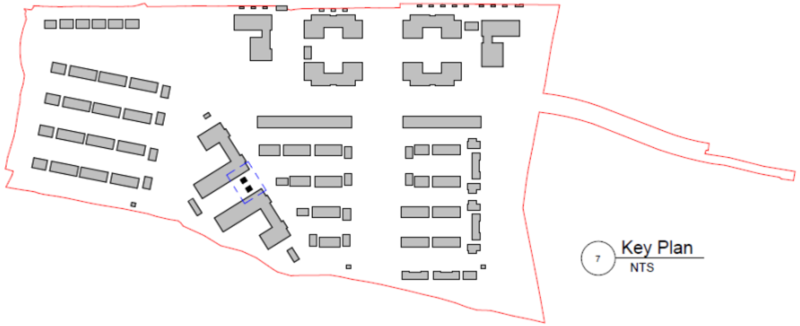


5 South Elevation_Bin Store Block C1 & C2
1 : 200



6 West Elevation_Bin Store Block C1 & C2
1 : 200



7 Key Plan
NTS

NOTES:

REV.	DATE:	DETAILS:	INITIALS:

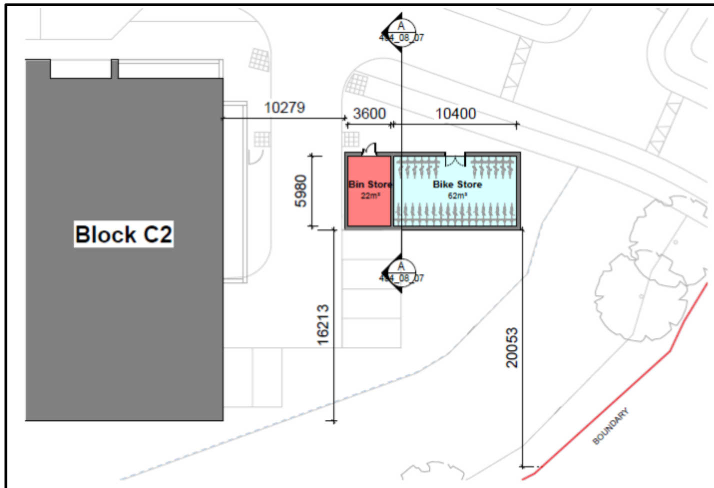
MATERIAL LEGEND:
1. Parapets, stone clad
2. Plaster finish, colour white
3. Shutter doors, colour graphite grey

NORTH POINT:

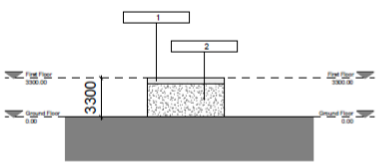
KEY PLAN:

PLUS ARCHITECTURE
Chancery Lane, Dublin 8, D08 C88X, Ireland. W: www.plusarchitecture.ie T: 353 (0) 1 821 3370

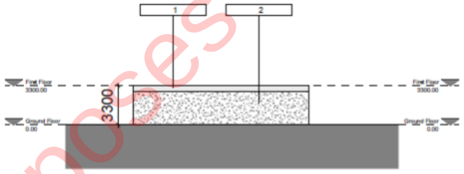
PROJECT: Oakfield Dunboyne	PROJECT: 494	DATE: 12/08/22
CLIENT: Azra Property Company Limited	DRAWING NO.: 08_07	REVISION NO.:
TITLE: Apartment Block C1 & C2_Bin Stores	DRAWN BY.: ES	SCALE AT A1 (Long).: 1 : 200
ISSUE TYPE: Planning	CHECKED BY.: DT	SCALE AT A3 (Long).:



① Apartment Block C2_Bin & Bike Store
1 : 200



③ North Elevation_Bin & Bike Store Block C2
1 : 200



④ East Elevation_Bin & Bike Store Block C2
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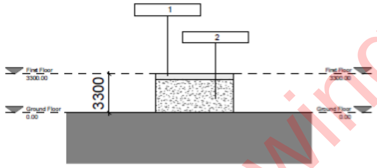

⑤ South Elevation_Bin & Bike Store Block C2
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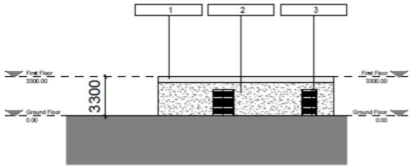

⑥ West Elevation_Bin & Bike Store Block C2
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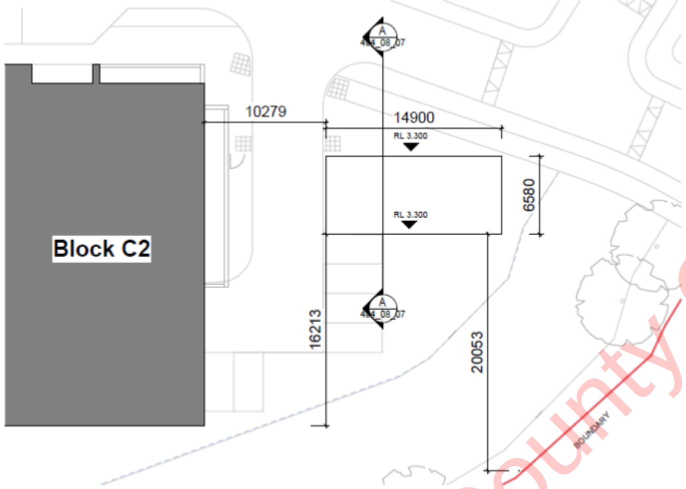
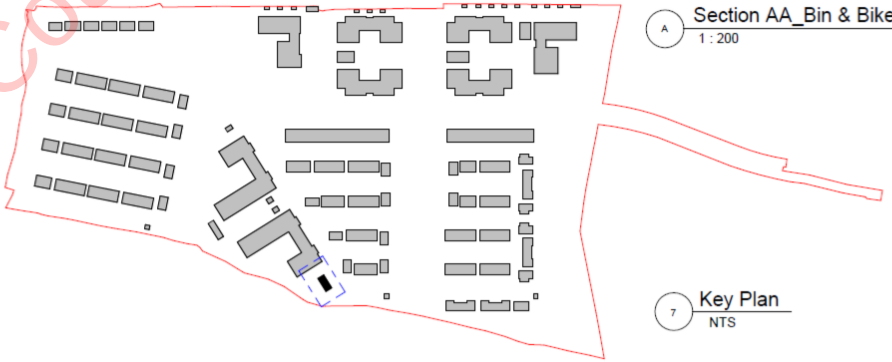
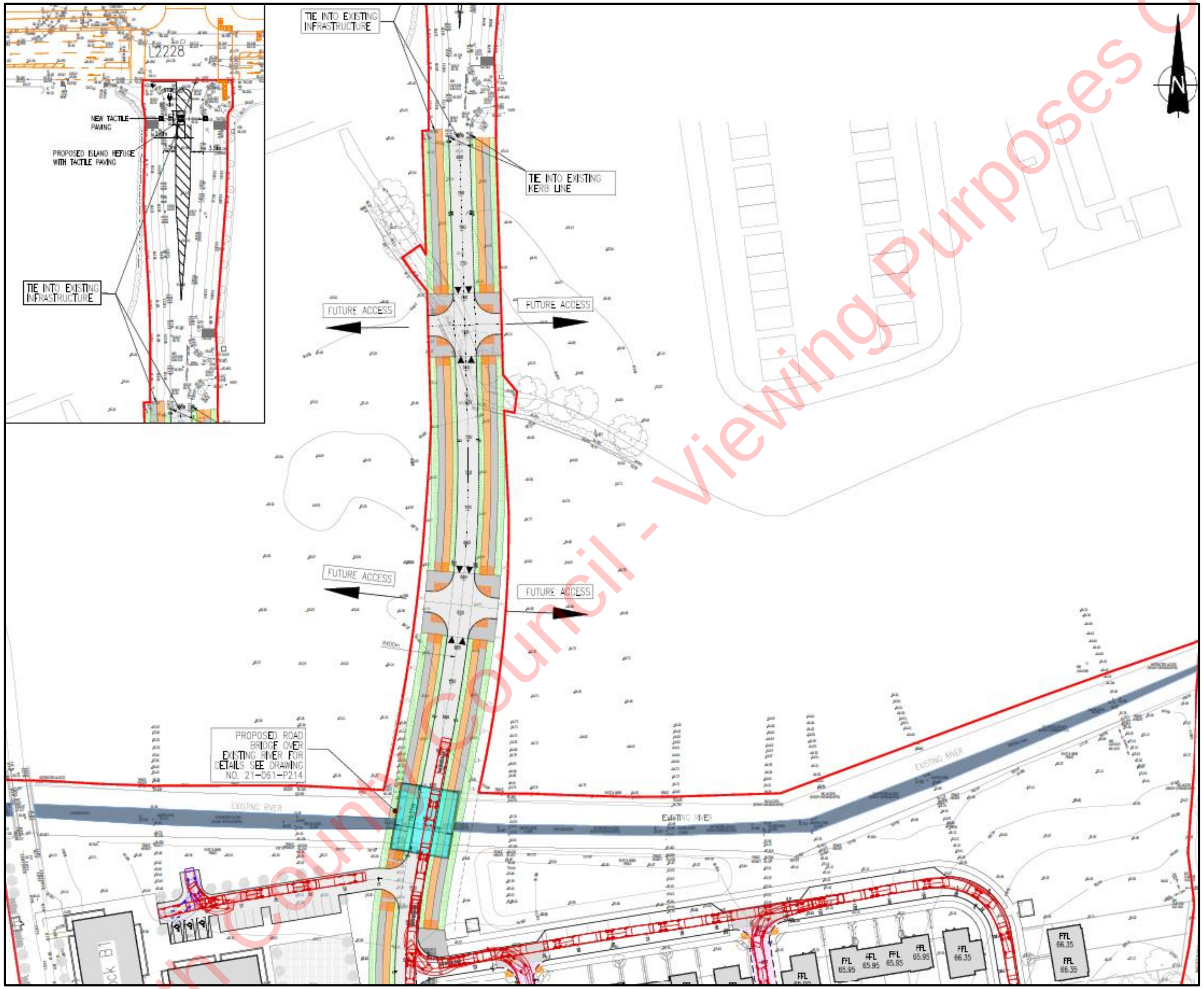


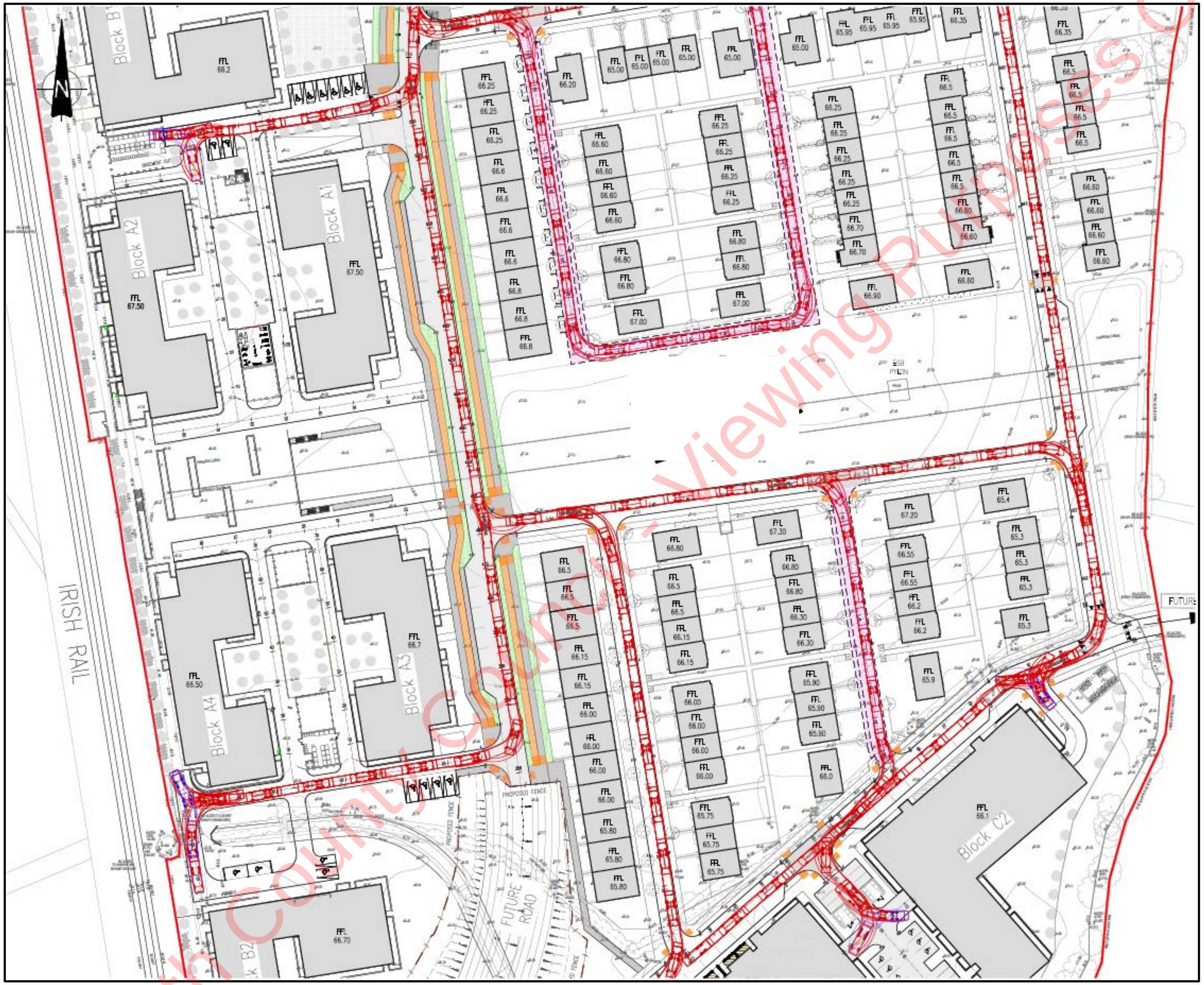
② Apartment Block C2_Bin & Bike Store Roof Plan
1 : 200

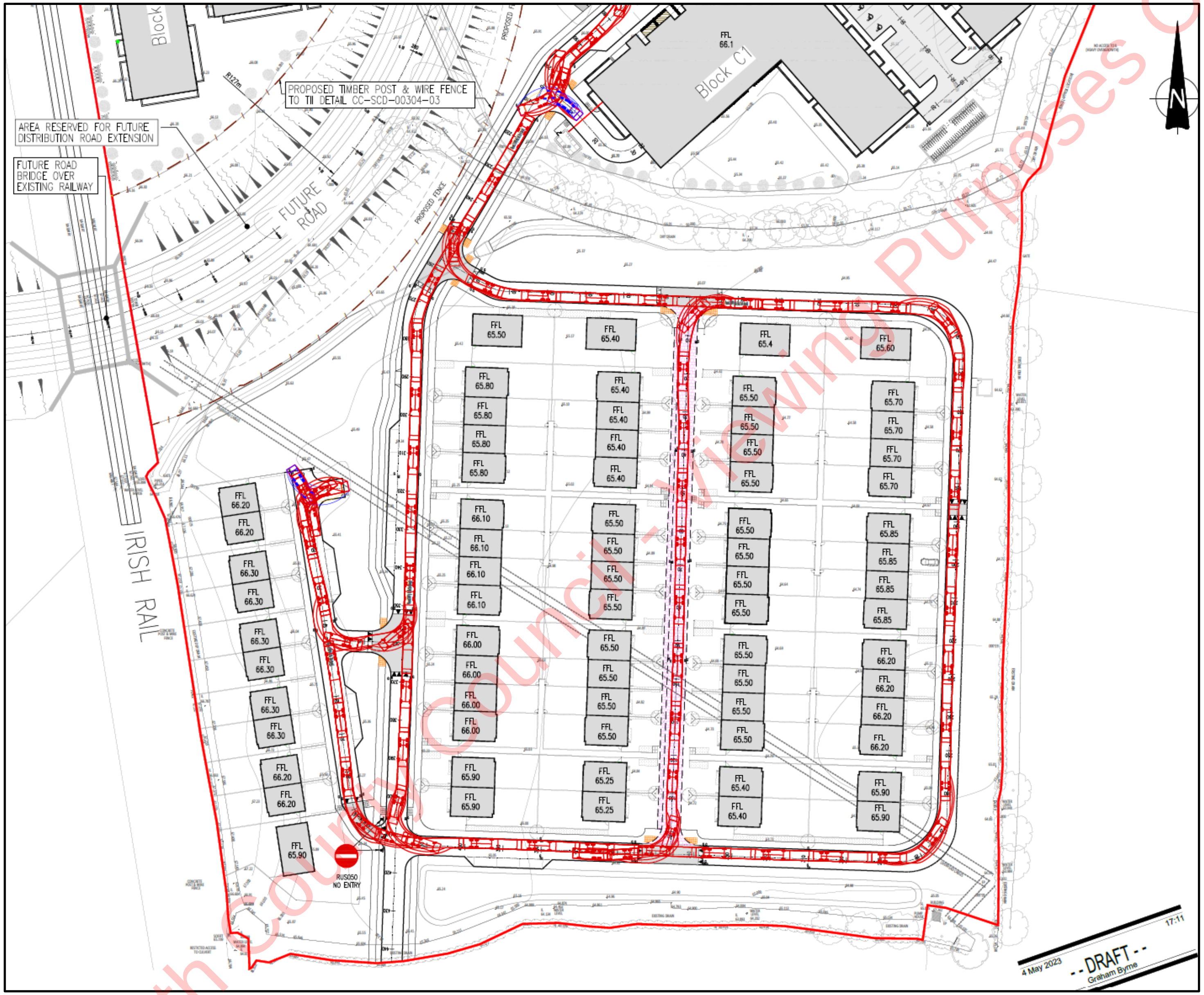
Ⓐ Section AA_Bin & Bike Store Block C2
1 : 200



⑦ Key Plan
NTS


L2228
NEW TACTILE PAVING
PROPOSED ISLAND REFUGE WITH TACTILE PAVING
TIE INTO EXISTING INFRASTRUCTURE
TIE INTO EXISTING INFRASTRUCTURE
TIE INTO EXISTING KERB LINE
N
FUTURE ACCESS
FUTURE ACCESS
FUTURE ACCESS
FUTURE ACCESS
PROPOSED ROAD BRIDGE OVER EXISTING RIVER FOR DETAILS SEE DRAWING NO. 21-061-P214
EXISTING RIVER
EXISTING RIVER
EXISTING RIVER
FFL 65.95
FFL 65.95
FFL 65.95
FFL 65.95
FFL 66.35
FFL 66.35
FFL 66.35


IRISH RAIL
Block A1
Block A2
Block A3
Block A4
Block B1
Block B2
Block C2
ESB PYLON
FUTURE ROAD
PROPOSED FENCE
FFL 67.50
FFL 66.50
FFL 66.7
FFL 66.70
FFL 66.1


Block
PROPOSED TIMBER POST & WIRE FENCE TO TII DETAIL CC-SCD-00304-03
AREA RESERVED FOR FUTURE DISTRIBUTION ROAD EXTENSION
FUTURE ROAD BRIDGE OVER EXISTING RAILWAY
R127m
FUTURE ROAD
PROPOSED FENCE
FFL 66.1
Block C1
N
IRISH RAIL
FFL 65.50
FFL 65.40
FFL 65.4
FFL 65.60
FFL 65.80
FFL 65.80
FFL 65.80
FFL 65.80
FFL 65.40
FFL 65.40
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FFL 65.90
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FFL 65.90
FFL 65.90
RUS050 NO ENTRY
4 May 2023
- - DRAFT - -
Graham Byrne
17:11

APPENDIX 19.1 ARCHAEOLOGICAL SURVEY OF IRELAND INVENTORY DESCRIPTIONS

APPENDIX 19.2 DATABASE OF IRISH EXCAVATION REPORTS

APPENDIX 19.3 PHOTOGRAPHIC RECORD

Appendix 19.1: Archaeological Survey of Ireland inventory descriptions

ME050-021005-
Class: Castle - tower house
Townland: CASTLEFARM
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Situated on a rise in a fairly level landscape, with the WNW-ESE Castle River c. 100m to the N. Following Hugh de Lacy's grant of Dunboyne to William le Petit the latter established a ringwork castle (ME050-021007-), perhaps adapting an older rath, on the S side of the stream, but this would not suffice for very long and may have been rebuilt at some stage in stone. A stone castle was mandated in 1475-6 when Edward IV 'Purposes by the grace of God to commence to erect a castle anew at Dunboyne' to be completed in one year (Connolly 2002). This was probably a tower house and possibly located on a new site. One stone house owned by Lord Dunboyne is recorded in the Civil Survey (1654), and the Down Survey (1656-8) barony map depicts a two storey gabled and probably then roofless structure on the S bank of the stream. The present Dunboyne Castle was built by the tenth or eleventh Baron of Dunboyne in the 1770s or 1780s with further work conducted in the 1830s (Bence-Jones 1988, 114).
Archaeological testing (01E0875) by S. Johnston on the N side of the eighteenth century house recorded modern disturbance over a cobbled surface that is probably associated with the eighteenth century building. Beneath the cobbles mixed layers produced seventeenth century gravel-tempered wares and beneath these was the base of a NNE-SSW wall (Wth 1.8m; max. H 1.6m) with an associated stone floor on its W side. The wall is likely to be medieval, and probably from the castle mentioned in the Statute Rolls. Archaeological testing (04E1040) by C. Cotter uncovered another building (ME050-021009-) outside the medieval enclosure at E. (Johnston 2001)

ME050-021008-
Class: Ring-ditch
Townland: CASTLEFARM
Scheduled for inclusion in the next revision of the RMP: No
Description: Situated on a rise in a fairly level landscape, with the WNW-ESE Castle River c. 100m to the N. Further work in monitoring (04E1040) a sewer pipe extending E from the medieval ring-work castle (ME050-021007-) identified a ring-ditch in the N part of its interior. It was c. 4m from the N edge of the medieval enclosure fosse and may have been preserved by being under its bank. It is a circular area (int. diam. c. 6m) defined by a fosse (Wth 1.05m; max. D 0.96m) that had been removed by medieval activity at N, and it was fully excavated (excavations.ie 2005: 1175). The fosse was filled with fairly sterile orange to grey and brown clays and silts. The remains of a compacted cordoned urn was in the ditch at E and sherds of pottery were found in other parts of the ditch, but there was no evidence of any internal features. (Cotter 2008, 289-90)

ME050-021009-
Class: Building
Townland: CASTLEFARM
Scheduled for inclusion in the next revision of the RMP: No
Description: Situated on a rise in a fairly level landscape, with the WNW-ESE Castle River c. 100m to the N. Archaeological testing (04E1040) by C. Cotter during 2005 uncovered the foundations of this structure just outside the outer edge of the fosse of the medieval ring-work castle (ME050-021007-) at E (excavations.ie 2005:1175). Parts of the W and S walls (Wth 1m) with the NW and SW angles of a rectangular building (ext. dims 8.65m plus E-W; c. 8m N-S) were recorded. The battered base of the W wall (H 0.6m) extended into the top of the enclosure fosse but it was not properly aligned with the ditch edge, indicating that the latter was fully backfilled when the wall was built. A blue/white jug, imported from the Low Countries and dating from the sixteenth century at the earliest is associated with this building as were two mid-sixteenth century coins. (Cotter 2008, 291)

ME050-031----
Class: Ring-ditch

Townland: DUNBOYNE
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Located on a level landscape. The cropmark of a small ring-ditch (diam. c. 8m) is visible on Bing images (c. 2013). It is located just N of a modern ENE-WSW field bank with two drains that is now removed but visible as cropmark features. The ring-ditch was first noted by Donal Lucy and the enclosure (ME050-032001-) and ring-ditch (ME050-032002-) are c. 250m to the S.

ME050-032001----
Class: Enclosure
Townland: DUNBOYNE
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Located on a level landscape. The cropmark of a D-shaped enclosure (dims c. 75m NW-SE; c. 40m NE-SW) defined by single fosse features and with straight sides at NW and SE is visible on Bing images (2013). It was first noted by Donal Lucy and is divided across the middle by another ditch feature while there may be an entrance gap on the SW side of the NW paddock. A small ring-ditch (diam. c. 10m) is in the SE enclosure, and it is cut slightly by the cropmark of a modern NE-SW drain. The ring-ditch (ME050-031----) is c. 250m to the N.

ME050-032002----
Class: Ring-ditch
Townland: DUNBOYNE
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Located on a level landscape. A small ring-ditch (diam. c. 10m) is visible on Bing images (2013) within a D-shaped enclosure (ME050-032001-). it is cut slightly by the cropmark of a modern NE-SW drain and It was first noted by Donal Lucy. The ring-ditch (ME050-031----) is c. 250m to the N.

ME050-045----
Class: Fulacht fia
Townland: BRACETOWN
Scheduled for inclusion in the next revision of the RMP: No
Description: Situated in the valley of the NNW-SSE meandering River Tolka with a W-E section of the stream immediately to the S. Archaeological centre-line testing (04E0489) by R. O'Hara of Testing Area 5, Contract 1, prior to the construction of the M3 motorway identified a burnt stone spread (excavations.ie: 2004:1191) that was fully excavated (E003028) by L. Clarke as Bracetown 1 in August 2005. It consisted of a crescent-shaped mound (dims 15.25m NW-SE; 8m NE-SW; max. D 0.34m) of heat-shattered stones, flecks of charcoal and charcoal-stained clay with some smaller detached portions. Some burnt bone and animal bone was recovered from the mound as well as a piece of polished bone and a chert blade. Most of the identified animal bone is from cattle but one dog bone was present. The mound was interleaved with alluvial deposits that sealed a smaller burnt mound (dims 1.5m x 1m). Beneath the large mound were two shallow depressions and a probable trough (dims 1.16m x 0.78m; D 0.29m), all filled with broken and burnt stone. A sample from the lower mound produced a C14 date of 2135-1908 cal. BC while a sample from the large mound yielded a determination of 1387-1129 cal. BC. (Clarke 2008)

ME050-046----
Class: Pit-burial
Townland: DUNBOYNE
Scheduled for inclusion in the next revision of the RMP: No
Description: Situated in the N-S valley of the meandering Tolka River. Archaeological centre-line testing (04E0489) by R. O'Hara prior to the construction of the M3 motorway identified two spreads of charcoal (excavations.ie: 2004:1191) that were fully excavated (E003029) by L. Clarke (excavations.ie 2005:AD8) as Dunboyne 1. A shallow pit (dims 0.46m x 0.41m; D 0.14) was 9.5m WNW of a second pit (dims 0.8mk x 0.7m; D 0.05m), both of which were filled with two layers of compact grey/black clays with varying inclusions of stone, charcoal and cremated bone. A sample of hazel or alder charcoal from the smaller pit produced a C14 date of 1530-1410 cal. BC, while a sample of hazel/whitethorn charcoal from the larger yielded a date of 1260-1000 cal.

BC. The bone from this pit could not be positively identified as human, but no other artefacts or features were recorded. (Clarke 2008)

ME050-047----
Class: Road - road/trackway
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: No
Description: Situated in the N-S valley of the meandering Tolka River, with the original stream c. 50m to the W. Archaeological centre-line testing (04E0489) by R. O'Hara prior to the construction of the M3 motorway identified a cobbled surface (excavations.ie: 2004:1191) that was further excavated (E003030) by L. Clarke (excavations.ie 2005:AD12) as Loughsallagh 1. The road surface, consisting of cobbles set in a compact grey/brown stoney layer (Wth 10m plus; T 0.3m), extended NNE-SSW beyond the excavation limits at N and S, and its E edge was not exposed. It was accompanied by a drain (Wth of top 2.1m; D 0.48m) filled with grey brown silty clays on its W side. A thin dark brown silty clay layer (max. T 0.22m) separated this surface from an earlier metaled surface (Wth 5.5m; max. T 0.15m) that had a drain (Wth of top 1.9m; D 0.48m) filled with brown/grey silty clay on the W side. Some metal fragments were recovered but none are diagnostic. Although the road is not precisely represented at this point on the 1836 edition of the OS 6-inch map both road surfaces are post-medieval in date and are earlier iterations of the 'old' road from Dublin to Dunshaughlin (R147). (Clarke 2008)

ME050-049001-
Class: Fulacht fia
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: No
Description: Located on a fairly level landscape. A gradiometer survey (17R0229) by Target Archaeological Geophysics of an extensive development area of c. 75 ha in the townlands of Loughsallagh, Portan, and Gunnocks, identified numerous anomalies of potential archaeological interest. Targeted archaeological testing (18E0013) by T. Coughlan in 2018 and M. Piera (19E0211) in 2019 was able to demonstrate that many of these were of fairly modern agricultural origin. However, sixteen locations were set aside for further investigation, which was undertaken by J. Whittaker under the licence (18E0013) between the beginning of April and the end of July 2019, and all but four of these proved to be of archaeological interest.
About 30m N of the ring-ditch (ME050-049002-) was the base of a rectangular trough (dims 1.58m x 0.95m; D 0.1-0.2m) which had a stake-hole in three of its corners. The two fills of brown sandy clay had a quantity of burnt stone and charcoal. There were no other associated features and no evidence of a burnt mound, but there was undoubtedly a fulacht fia at this location one time. Three small pits (diam. 0.5-0.8m; D 0.12-0.24m) were found 10-20m to the E which might not be connected with either monument but the largest of these pits (dims 1.41m x 1.24m; D 0.26m) had a high charcoal content, including burnt planks. (Whitaker 2020, 18-20 Site 6)

ME050-049002-
Class: Ring-ditch
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Located on a fairly level landscape. A gradiometer survey (17R0229) by Target Archaeological Geophysics of an extensive development area of c. 75 ha in the townlands of Loughsallagh, Portan, and Gunnocks, identified numerous anomalies of potential archaeological interest. Targeted archaeological testing (18E0013) by T. Coughlan in 2018 and M. Piera (19E0211) in 2019 was able to demonstrate that many of these were of fairly modern agricultural origin. However, sixteen locations were set aside for further investigation, which was undertaken by J. Whittaker under the licence (18E0013) between the beginning of April and the end of July 2019, and all but four of these proved to be of archaeological interest.
Situated in the N-S valley of the meandering Tolka River, with the stream c. 70m to the W. The E part of a ring-ditch (int. diam. 10.83m N-S) defined by a single fosse (Wth of top 1.2-1.3m; D 0.2-0.3m) had three fills of silty or sandy clay with flecks of charcoal and burnt bone, which are only missing from the mottled orange-grey sandy clay that was confined to the N end of the of the fosse where it peters out. No artefacts were recovered and

there were no concentrations of burnt bone. The trough from a fulacht fia (ME050-049001-) is c. 30m to the N. (Whitaker 2020, 18-20, Site 6)

ME051-006----
Class: Church
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Situated on a slight rise on a level landscape. A church at Loughsallagh is not listed in the Ussher (1622) (Erlington 1847-64, 1, lxviii-lxxii) or Dopping (1682-5) Visitations (Ellison 1971, 37-9) as a church in the deanery of Ratoath. Cogan (1862-70, vol. 1, 190) records that a church dedicated to St. Michael had been levelled. There is no evidence of a church within an oval graveyard (dims c. 55m N-S; c. 35m E-W) defined by an earthen bank (at SW: Wth 3.2m; int. H 0.5m; ext. H 1.8m) with trees and an outer flat-bottomed fosse or drain (at SW: Wth of top 4m; Wth of base 1.4m; ext. D 0.7m). Cogan (ibid.) records that devotions at St. Michael’s well within the graveyard had been discontinued since c. 1810, but the well remains as a rectangular sunken area (dims 1.1m x 1.1m; D 1m) retained by drystone walling and with a grass-covered mound (Wth 1-1.5m; H 0.2-0.4m) around it on every side, except the W. There is no evidence of veneration.

ME051-006001-
Class: Graveyard
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Situated on a slight rise on a level landscape. A church (ME051-006----) was within an oval graveyard (dims c. 55m N-S; c. 35m E-W) defined by an earthen bank (at SW: Wth 3.2m; int. H 0.5m; ext. H 1.8m) with trees and an outer flat-bottomed fosse or drain (at SW: Wth of top 4m; Wth of base 1.4m; ext. D 0.7m). St. Michael's holy well (ME051-006002-) is within the graveyard.

ME051-006002----
Class: Ritual site - holy well
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Situated on a slight rise on a level landscape and within the graveyard (ME051-006001-). Cogan (1862-70, 1, 190) records that devotions at St. Michael’s well within the graveyard had been discontinued since c. 1810, but the well remains as a rectangular sunken area (dims 1.1m x 1.1m; D 1m) retained by drystone walling and with a grass-covered mound (Wth 1-1.5m; H 0.2-0.4m) around it on every side, except the W. There is no evidence of veneration, but traditionally it had a cure for toothache and the customary offerings were pins (IFC, Schools Collection, 689, 11, 24). (French 2012, 90-1)

ME051-008----
Class: House - 17th/18th century
Townland: GUNNOCKS
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Located on a level landscape. The Civil Survey (1654) records ‘two thatched houses’, the property of a Mr. Plunkett of Dunshaughlin in 1640, in Upper Gunockes townland (Simington 1943, 121). Upper and Lower Gunnoggs are represented on the Dunboyne barony and parish maps from the Down Survey (1656-8) but no castle or substantial house is represented in either. Bence-Jones (1978) notes that the present two storey, three bay Gunnocks House was built by Laurence Ward in 1806 onto a structure that was originally thatched.

ME051-019----
Class: Enclosure
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Situated on a fairly level landscape. The cropmark of a circular enclosure (int. diam. c. 15m; ext. diam. c. 20m) defined by a single fosse feature was recorded by Noel Meehan using a drone-mounted camera

on 09/07/2018. It is bisected by a NE-SW drain feature (Wth c. 2m) and some pits are visible in the interior. The cropmark of what is probably a fairly modern quarry is c.20m to the NW, and there are other quarry-pits in the vicinity. The ring-ditch (ME051-019001-) is c. 20m to the S and ring-ditch (ME051-019002-) is c. 70m to the SW. The enclosure was also identified by Jean-Charles Caillere on Google Earth (24/06/2018), and it is also visible on Google Earth (11/06/2012; 12/07/2013) but the other features do not appear on any other media.

ME051-019001-
Class: Ring-ditch
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: Yes
Description**:** Situated on a fairly level landscape. The cropmark of a circular enclosure (int. diam. c. 5-10m) defined by a single fosse feature (Wth c. 2-3m) was recorded by Noel Meehan using a drone-mounted camera on 09/07/2018. It is cut by a NE-SW drain feature (Wth c. 2m) towards its SE edge. The enclosure (ME051-019----) is c. 20m to the N and ring-ditch (ME051-019992-) is c. 55m to the WSW. It is not recorded on any other maps or images.

ME051-019002-
Class: Ring-ditch
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Situated on a fairly level landscape with a N-S course of the Tolka River c. 50m to the W. The cropmark of a circular enclosure (int. diam. c. 10m) defined by a wide fosse feature (Wth c. 5m) was recorded by Noel Meehan using a drone-mounted camera on 09/07/2018. It is bisected by a N-S field bank and is not visible W of that feature. The ring-ditch (ME051-019001-) is c. 55m to the ENE and enclosure (ME051-019----) is c. 70m to the NE. It is not recorded on any other maps or images.

ME051-030----
Class: Pit
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: No
Description: Located on a fairly level landscape. A gradiometer survey (17R0229) by Target Archaeological Geophysics of an extensive development area of c. 75 ha in the townlands of Loughsallagh, Portan, and Gunnocks, identified numerous anomalies of potential archaeological interest. Targeted archaeological testing (18E0013) by T. Coughlin in 2018 and M. Piera (19E0211) in 2019 was able to demonstrate that many of these were of fairly modern agricultural origin. However, sixteen locations were set aside for further investigation, which was undertaken by J. Whitaker under the licence (18E0013) between the beginning of April and the end of July 2019, and all but four of these proved to be of archaeological interest.
A pit (dims 2.66m x 1.66m; D 0.38m) had two fills of grey-brown silty clay with varying amounts of charcoal flecks, animal bone and sea-shells. The pit was partly cut by linear furrows. No artefacts were recovered but a human femur that returned a post-medieval date, was in the topsoil. (Whitaker 2020, 30, Site 11)

ME051-031----
Class: Excavation - miscellaneous
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: No
Description: Located on a fairly level landscape. A gradiometer survey (17R0229) by Target Archaeological Geophysics of an extensive development area of c. 75 ha in the townlands of Loughsallagh, Portan, and Gunnocks, identified numerous anomalies of potential archaeological interest. Targeted archaeological testing (18E0013) by T. Coughlan in 2018 and M. Piera (19E0211) in 2019 was able to demonstrate that many of these were of fairly modern agricultural origin. However, sixteen locations were set aside for further investigation, which was undertaken by J. Whitaker under the licence (18E0013) between the beginning of April and the end of July 2019, and all but four of these proved to be of archaeological interest.

Twelve pits (dims 0.77m x 0.6m; D 0.07m to 1.96m x 1.38m; D 0.2m) in a concentrated area (dims 10m x 10m) were filled with single fills of grey-black silty or sandy clays, and five of the pits were covered by a spread of grey silty clay (dims 8m x 5m; max. T 0.1m). One of the largest pits (dims 1.94m x 1.5m; D 1m) had fills of a black silty clay over a grey sandy clay, and there were four stake-holes in its base. No charcoal flecking was noted and no artefacts were recovered, apart from a small quantity of animal bone. Two shallow E-W linear cuts just N of the pits are probably furrows. (Whitaker 2020, 21-5, Site 7)

ME051-035----
Class: Burnt mound
Townland: LOUGHSALLAGH
Scheduled for inclusion in the next revision of the RMP: No
Description: Located on a fairly level landscape. A gradiometer survey (17R0229) by Target Archaeological Geophysics of an extensive development area of c. 75 ha in the townlands of Loughsallagh, Portan, and Gunnocks, identified numerous anomalies of potential archaeological interest. Targeted archaeological testing (18E0013) by T. Coughlan in 2018 and M. Piera (19E0211) in 2019 was able to demonstrate that many of these were of fairly modern agricultural origin. However, sixteen locations were set aside for further investigation, which was undertaken by J. Whitaker under the licence (18E0013) between the beginning of April and the end of July 2019, and all but four of these proved to be of archaeological interest.
An irregularly shaped spread of broken and burnt stone (dims 5.03m x 2.5m; max. T 0.09m) produced some sherds of prehistoric pottery and is associated with four small pits (dims 0.13m x 0.13m; D 0.14m to 1m x 0.9m; D 0.12m), but a trough is not recognised. There are also eight post-holes and six stake-holes, but no pattern is discernible although five of the stake-holes are in a NW-SE line (L 1.7m). No artefacts were recovered. Just 2m N of the burnt mound material was an E-W gully (L 9.65m; Wth 0.37m; D 0.06-0.12m) and some post-holes and stake-holes. These features were filled with silty clays lacking any burnt stone content so they are probably unrelated to the burnt mound, and the gully was cut by a N-S agricultural drain. Extending E from the burnt mound was a line of pits (dims < 1m) also with fills of silty clays with charcoal and some burnt stone, but one of the pits produced a small sherd of glazed stoneware that could be post-medieval in date. (Whitaker 2020, 12-17, Site 4)

ME051-040----
Class: Well
Townland: CLONEE (Dunboyne By.)
Scheduled for inclusion in the next revision of the RMP: No
Description: Located on the S-facing slope of a slight rise in the flood-plain of the NW-SE Tolka River which is c. 220m to the N. Archaeological monitoring (08E0605) by C. McCarthy of topsoil stripping over an extensive area (max. dims c. 450m N-S; c. 350m E-W) identified five areas with archaeological deposits and features (McCarthy and Mitchell 2008; excavations.ie 2008:943). One was post-medieval, another (ME051-043----) is to be preserved in situ, and the other three were fully resolved (08E0840) by the same archaeologist (excavations.ie 2008:944).
In Area 2 a large pit or water-hole (dims 6.6m E-W; 6.2m N-S; max. D 1.65m) has a rounded base (Wth c. 0.5m) that was partly cut into the shale bedrock. The sides were steep, and the bottom was covered by a grey silty clay, the lowest of eight layers, that was impossible to excavate completely. However, a fragment from the wall of a wooden vessel (H 0.23m plus) with two lugs and an internal groove for the base was recovered from the black peaty clay above the basal layer. This alder bucket provided a C14 determination of 349-43 cal. BC. In all 49 pieces of wood were preserved in this layer, all the worked wood being alder. The upper fills of silty clays, with evidence of slumping of the sides of the pit, yielded no artefacts but there were some animal bones. About 10m N of the water-hole was a similar structure (dims 2m x 1.3m) with three corner postholes, one of which produced a sherd of pottery. Although there is no evidence of a fourth post-hole, it probably formed a shelter or platform like a more certain structure (dims 2.5m x 2.4m) with four corner post-holes that was just 2m N of the waterhole. A line of stake-holes, curving in a slight arc, ran through the interior of this structure. A hearth, evident as a fire-reddened patch of subsoil (dims 0.8m x 0.7m) within a small circular structure (diam. 2.7m) defined by seven post-holes was c. 4m NE of the waterhole but it is not known whether it related to the use of the waterhole or the fulacht fia (ME051-042001-) in the same area. (McCarthy et al. 2009, 31-39, 43-4)

ME051-040001-

Class: Fulacht fia

Townland: CLONEE (Dunboyne By.)

Scheduled for inclusion in the next revision of the RMP: No

Description: Located on the S-facing slope of a slight rise in the flood-plain of the NW-SE Tolka River which is c. 220m to the N. Archaeological monitoring (08E0605) by C. McCarthy of topsoil stripping over an extensive area (max. dims c. 450m N-S; c. 350m E-W) identified five areas with archaeological deposits and features (McCarthy and Mitchell 2008; excavations.ie 2008:943). One was post-medieval, another (ME051-043----) is to be preserved in situ, and the other three were fully resolved (08E0840) by the same archaeologist (excavations.ie 2008:944). Around the waterhole (ME051-040----) were some pits filled with soils that have traces of broken and burnt stone, and a rectangular, flat-bottomed pit (dims 1.95m NW-SE; 1.9m NE-SW; max. D 0.26m) at the SE edge of the waterhole has a post-hole at each corner. It undoubtedly served as a trough as it was filled with broken and burnt stone. A gully (L 13m plus; Wth; max. D 0.25m), originating in a pit (dims 0.93m x 0.65m; D 0.25m) c. 3m N of the trough, extended E and both features were filled with burnt mound material. However, only two small spreads (dims 0.5; 1.15m) of the burnt mound itself were in evidence c. 10m NE of the trough and 2-3m NE of the hearth. (McCarthy et al. 2009, 39-45)

ME051-041----

Class: Linear earthwork

Townland: CLONEE (Dunboyne By.)

Scheduled for inclusion in the next revision of the RMP: No

Description: Located in the flood-plain of the NW-SE Tolka River which is c. 100m to the N. Archaeological monitoring (08E0605) by C. McCarthy of topsoil stripping over an extensive area (max. dims c. 450m N-S; c. 350m E-W) identified five areas with archaeological deposits and features (McCarthy and Mitchelll 2008; excavations.ie 2008:943). One was post-medieval, another (ME051-043----) is to be preserved in situ and the other three were fully resolved (08E0840) by the same archaeologist (excavations.ie 2008:944). In Area 4 a SW-NE medieval boundary ditch with feeder drains was encountered, and it could be traced across the area to the SW where a medieval ditch (Wth c. 1.25m; D c. 0. 0.4m) on a NNE-SSW alignment and with feeder-drains but in the vicinity of the waterhole (ME051-042----) could be a continuation of it (McCarthy et al. 2009, 27-30). Four phases of medieval drainage works are associated with this section in Area 4 where the flat-bottomed boundary ditch (Wth 2.8-3.4m; D 0.8-1.2m) was open and drained NE into the Tolka. An organic-rich silt (T 0.1-0.2m) at the bottom was beneath re-deposited subsoil (T 0.5m) which is a deliberate attempt to close it. The pottery from the back-fill dates from the twelfth to the fourteenth century and was probably derived from a bank on the NW side of the ditch as the subsidiary drains (Wth 0.9-1.6m D 0.4-0.85m) all joined it from the SE. The remains of a child were found on top of the subsoil at the N end of the boundary ditch on its W side but a grave-cut was not discernible and it may have been beneath a bank associated with the drain. A fragment from the skull returned a C14 date of 1162-1252 cal. AD. (ibid. 50-63). There was a metalled surface close to the junction of the ditch and one of the drains. A pit (dims 3.6m x 2.13m; D 0.9m) had been filled with re-deposited subsoil and gravel that had a drystone revetment on the N side and stones on the upper surface. It may have served as a threshing floor and a deposit of carbonised chaff and cereal grains partly covered it. The floor was in an acute angle between the ditch and a drain, and was itself enclosed by a small ditch (L 16.9m; Wth 0.6m; D 0.2-0.3m) connecting both of these features. This ditch had three silt layers that produced medieval pottery (ibid. 50-63).

ME051-042----

Class: Well

Townland: CLONEE (Dunboyne By.)

Scheduled for inclusion in the next revision of the RMP: No

Description: Situated on the S-facing slope of a slight rise in the flood-plain of the NW-SE Tolka River which is c. 400m to the N. Archaeological monitoring (08E0605) by C. McCarthy of topsoil stripping over an extensive area (max. dims c. 450m N-S; c. 350m E-W) identified five areas with archaeological deposits and features (McCarthy and Mitchell 2008; excavations.ie 2008:943). One was post-medieval, another is preserved in situ and the other three were resolved (08E0840) by the same archaeologist (excavations.ie 2008:944). In Area 1 a water-hole (dims of top 7.8m x 5.4m; D 1.6m) with a fairly flat base (diam. c. 1.6m) has a ramp on the W side leading to the bottom. The basal fill of black silt (T 0.6m) had organic remains with a layer of compact clay and stones, some burnt, above it, and grey and orange silts above that. A distinct lens of charred wood, identified as alder, was within the lowest of these silts. No artefacts were recovered from the waterhole but a sample of hazelnut shell from its base produced a C14 determination of 1385-1212 cal. BC. There were numerous post-holes and pits beyond the edge of the waterhole, including a cluster of seven post-holes on the W side, although no pattern was discerned. They contained some bones, and were filled with silty, charcoal-flecked clays but only two sherds of pottery were recovered from them. One is a worn and probably intrusive residual sherd from a carinated bowl dating to the Neolithic while the other equally worn sherd is a coarse ware dating from the Middle Bronze Age. A NNE-SSW medieval field ditch (L c. 58m; Wth c. 1.25m; max. D 0.4m) with a terminus at its N end and two feeder drains was c. 20m to the W. There was an isolated burial of a young adult male in the supine position NE-SW at the N end of the ditch, but the skull, which was at NE, had been removed by a modern stone-filled drain. (McCarthy et al. 2009, 18-30)

ME051-043----
Class: Kiln
Townland: CLONEE (Dunboyne By.)
Scheduled for inclusion in the next revision of the RMP: Yes
Description: Situated on a gentle NW-facing slope in the flood-plain of the NW-SE Tolka River which is c. 300m to the N. Archaeological monitoring (08E0605) by C. McCarthy of topsoil stripping over an extensive area (max. dims c. 450m N-S; c. 350m E-W) identified five areas with archaeological deposits and features (excavations.ie 2008:943). One was post-medieval, and three of the others were resolved under a different licence (08E0840) by the same archaeologist. This is Area 5, which is preserved in situ under the re-constituted ground (dims c. 40m N-S; c. 35m E-W) where extensive archaeological deposits were uncovered. Numerous features such as pits, linear features, cereal-drying kilns and furrows were identified overlying deeper deposits. A large spread of charcoal-rich soil is probably related to a kiln and there were thick spreads of silty clay containing charcoal, animal bones and pottery. Three possible kilns were identified as figure-of-eight spreads (dims 2.5m x 0.7m to 5.5m x 1.5-2.9m) with high volumes of charred material including nuts and seeds. Some post-medieval furrows and drainage ditches run NNE-SSW across the area, but three large ditches (Wth 2.5m; D 0.95m plus; Wth 4.5m; D 0.75m plus; Wth 3.9m; D 1m plus) with plentiful large stones were also sampled. The complex is probably medieval in date, and a smaller area of drainage ditches further to the S was also encountered. (McCarthy and Mitchell 2008, 16-19)

ME051-044001-
Class: Building
Townland: CLONEE (Dunboyne By.)
Scheduled for inclusion in the next revision of the RMP: No
Description: Archaeological testing (04E1383) by A. Hayden on a large development site of about 8 hectares (c. 20 acres) uncovered evidence of furrows at its N limit, and more complex evidence of medieval fields at its SW edge (Hayden 2004). Further excavation under the same licence (Hayden 2005) recorded this rectangular stone-walled structure, a kiln and a sod-walled structure (excavations.ie 2004:1207). Part of a rectangular stone-footed but clay-bonded building (int. dims 3.9m NW-SE; 2.8m NE-SW) was built at the SW corner of a rectangular cutting (dims 10m NE-SW; 6.5m NW-SE, max. D 0.45m) that had no other features. The SE and SW walls were stone-facings of the cutting but the other walls (Wth 0.75-0.8m) were free-standing and double-faced. The entrance may have been at the W angle since the SW wall-facing continued beyond the NW end of the building, perhaps forming an external porch. A small fire was lit on the subsoil before the laying of a clay floor (D 0.14m) which included two defleshed horse skulls and an animal leg bone in its composition. Over this floor was a grey silty clay (T 0.03m) beneath a compacted yellow clay (T 0.03-0.04m) which morphed into a slightly oxidised clay (T 0.03m) with charcoal flecks, but there was no hearth. No pottery was recovered from within the structure. The bases of two pits outside the SE wall were equally unrevealing, but the building was overlaid by the two systems of medieval furrows in the field system (ME051-044----). (Hayden 2005, 6-8)

ME051-044002-
Class: Kiln
Townland: CLONEE (Dunboyne By.)
Scheduled for inclusion in the next revision of the RMP: No
Description: Archaeological testing (04E1383) by A. Hayden on a large development site of about 8 hectares (c. 20 acres) uncovered evidence of furrows at its N limit, and more complex evidence of medieval fields at its SW edge (Hayden 2004). Further excavation under the same licence (Hayden 2005) recorded a rectangular stone-walled structure, this kiln and a sod-walled structure. (excavations.ie 2004:1207). The kiln is located c. 4m NW of the stone-footed building (ME051-044001-), and outside its cutting. This is a subrectangular pit (dims 3.2m N-S; 1.2m E-W; max. D 0.45m) with an oxidised base at its S end. It was filled with stony cultivation soil with patches of charcoal and oxidized clay. (Hayden 2005, 8)

ME051-044003-
Class: Structure
Townland: CLONEE (Dunboyne By.)
Scheduled for inclusion in the next revision of the RMP: No
Description: Archaeological testing (04E1383) by A. Hayden on a large development site of about 8 hectares (c. 20 acres) uncovered evidence of furrows at its N limit, and more complex evidence of medieval fields at its SW edge (Hayden 2004). Further excavation under the same licence (Hayden 2005) recorded a rectangular stone-walled structure, a kiln and this sod-walled structure (excavations.ie 2004:1207). This house (ext. dims 10.1m N-S; 5.8m E-W; int. dims 6.5m N-S; 4m E-W) was constructed with clay walls (Wth up to 1.1m at E and W and up to 1.7m at N and S) laid directly on subsoil. There was no clear entrance but it may have been in the E wall where the wall material was thinnest and an external drip-gully (Wth up to 0.4m; max. D 0.1m) was present. The clay floor was partly oxidised and there were two small post-holes. Dublin glazed wares are associated with the building. (Hayden 2005, 4-5)

ME051-044----
Class: Field system
Townland: CLONEE (Dunboyne By.)
Scheduled for inclusion in the next revision of the RMP: No
Description: Archaeological testing (04E1383) by A. Hayden on a large development site of about 8 hectares (c. 20 acres) uncovered evidence of furrows at its N limit, and more complex evidence of medieval fields at its SW edge (Hayden 2004). Further excavation under the same licence (Hayden 2005) recorded a NE-SW boundary ditch with furrows relating to it on the NW side where a rectangular stone-walled structure (ME051-044001-) and kiln (ME051-044002-) pre-dated the furrows. South-west of the boundary a drainage ditch extended SW, and the remains of a small sod-walled structure (ME051-044003-) survived (excavations.ie 2004:1207).

The boundary was visible as a relict surface feature further NE but at SW it had no surface trace. Excavation revealed a ditch (Wth of top 5m; max. D 1.4m) filled with silts and loams and containing medieval pottery. It originated at an amorphous wet boggy hollow (D c. 0.5m) at SW, and a ditch (Wth 3-4m; max. D 1.1m) bifurcating into two drains (Wth 1-1.2m; max. D 0.4m) extended from this to the SW. North-west of the boundary there was evidence of two cultivation systems, both of which were later than the building and kiln. The earlier consisted of lazy-bed trenches (max. Wth 0.2m; max. D 0.1m) placed c. 2-3m apart and aligned E-W. The second system comprised furrows (Wth 0.2-0.5m; D 0.1-0.3m) placed closer together and aligned NW-SE. These were within a plot (dims 30m NE-SW; 26m plus NW-SE) bounded by the NE-SW boundary drain at SE, by a double drain (Wth 1.8-2m; max. D 0.4m) at NE, and a single gully (Wth c. 1m; D 0.3-0.5m) at SW. (Hayden 2005, 2-5, 9)

Appendix 17.2: Database of Irish Excavation Reports

Summaries of licenced archaeological investigations undertaken in townlands within the study area

Location	Licence and Author	Summary
Loughsallagh	98E0295 Rosanne Meenan	Monitoring of excavation of part of the Clonee-Dunboyne sewerage scheme was carried out in June 1998 in the area of ridge and furrow and a tree ring, which had been recorded by Emmet Byrnes. A 20m-wide strip was cleared of topsoil by a machine with a grading bucket. The trench for the pipe was then excavated to a depth of 3-4m and to a width of 2-3m, cutting through a ploughsoil and into very sandy material. The area of ridge and furrow stretched eastwards from the field fence east of the tree ring for c. 138m and north-south for c. 40-50m. The pipeline corridor cut the ridge and furrow. The ridges were flat-topped, with 4.5-5m between the top of each ridge; the furrows were c. 1.7m wide. The height of the ridges was c. 350-400mm from top of the ridge to the bottom of the furrow. No finds were recovered from the fill of the furrows. Nothing of significance was noted during the rest of the soil-stripping and of the trenching.
Testing Area 5, Bracetown/ Dunboyne/ Loughsallagh	04E0489 Robert O'Hara	An assessment of the M3 Contract 1 (Clonee-Dunshaughlin), Testing Area 5, along the proposed route of the Mainline (Chainage 700-1100) and Bracetown Road (Chainage 200-900) was requested by Meath County Council. Located in the townlands of Bracetown, Dunboyne and Loughsallagh, the area comprised six fields along both banks of the Tolka River. A geophysical survey suggested that the area had the potential to contain archaeological sites. A total of 79 test-trenches were excavated through the area, with a combined length of 4046m (resulting in a total excavated area of 8699m2). The assessment determined that some of the anomalies recorded in the geophysical survey were archaeological sites. A single rim sherd of medieval pottery was located within this area. It was a locally produced fabric with traces of an external dark-green glaze. Three separate sites were located within this area. Bracetown 1 was a disturbed spread of heat-fractured stone and charcoal c. 13.2m north-south by 8.9m. There were no discernible associated features, which were probably obscured by the spread. The feature was situated next to the Tolka River, directly opposite the site of Dunboyne 1. Dunboyne 1 comprised two circular pits containing cremated bone and charcoal. Each pit was 0.4m in diameter and survived to a depth of c. 0.1m. Loughsallagh 1 was a post-medieval road or path. The road was noticeable at ground level as a raised area flanked by a narrow marshy line and an existing hedgerow. The road was constructed of rounded and angular cobbles, possibly sourced from the nearby Tolka River. The road measured 7.5m wide and had an average height of 0.25m. The road extends towards Loughsallagh cemetery (SMR 51:6), a 17th-century graveyard, and it is possible the road may be contemporary with that site.
DUNBOYNE CASTLE, CASTLEFARM, DUNBOYNE, Meath	04E1040 Claire Cotter	Dunboyne Castle is an 18th-century house cut off from the village of Dunboyne by the Castle River, a tributary of the River Tolka. The house with its 87acre demesne is at the time of writing being developed for mixed residential/commercial use. Planning permission has been approved for 564 units of housing/apartments and for the extension and conversion of the existing building to a hotel and leisure complex. Pre-development testing was carried out at the site by Stephen Johnston in November 2001 (01E0875). A number of archaeological features came to light at that time and further investigation was advised. Because of its proximity to the 18th-century house, and the fact that it was partly covered by two 20th-century wings, the medieval ditch was not recorded during testing. A condition of the planning permission stipulated that monitoring of groundworks should be undertaken. This licence relates to monitoring, excavating and recording of

archaeological features in the vicinity of the house and to pre-development testing in the fields to the south and east. The landscaped gardens north of the house are being retained. The work was carried out over a period of twelve weeks, commencing on 22 July 2004. The licence was subsequently extended for a further three weeks, commencing on 8 December 2004, to monitor underpinning of the basement walls of the 18th-century house and lowering of the basement floor. During the first two weeks of September 2004, a licensed metal detector survey (No. 1231 below, 04R143) was also carried out at the site. The survey focused on spoil excavated from the medieval enclosure ditch.

The medieval enclosure was evidenced by a massive ditch, of which only the southern half fell within the area being developed. In all, a 72m arc of the perimeter of the ditch was revealed and mapped. Moving clockwise from the west, the ditch survived as follows. The west sector was deeply truncated by an 18th- or early 19th-century vaulted cellar and was further disturbed by the construction of a 20th-century 'west wing'. At the south, part of the rear (southern) elevation of the 18th-century house was built over the inner edge of the ditch. At the southeast, the line of the ditch ran under the house foundations to emerge again near the north-east gable. Because of the proximity of the house and ditch, and indeed the scale of the ditch, safety factors more or less determined the level to which the archaeology could be investigated. A full cross-section of the ditch was excavated at the south-west using both manual and mechanical means. The fill from the adjoining southern sector was removed mechanically. The demolition and cleaning out of a sunken basement that ran along the rear elevation of the house also revealed part sections of the ditch. At the south-east and east, and at basement level within the house, the line of the ditch was recorded and some ditch fill was removed during underpinning works.

The full width of the ditch was exposed only at the south-south-west; its maximum dimensions were 8m wide by 4.5m deep. The west and south portions were cut through hard yellow boulder clays and the underlying calp limestone rock of the area. The eastern sector was not emptied out, but, along some of its length at least, it appears to have been cut through softer, siltier clays. The land slopes down gently from west to east. The absence of a basement level in the north-west quadrant of the house may be due to high levels of bedrock. In contrast the eastern area would have lain within the flood-plain of the Castle River. There was evidence to indicate that upcast was spread over the area immediately outside the ditch in the east sector. This may have been done to maintain a uniform depth and/or to prevent erosion of the ditch by floodwaters. The ditch was U-shaped in section, with very steep sides that are nearly vertical in places. The break of slope is very sharp – almost a right angle – at the outer lip and is only slightly more gradual on the inner edge. No trace of any entrance feature was noted in the area investigated. The line of the unexcavated northern sector of the ditch is masked by later landscaping and there are no topographic clues as to where exactly an entrance might have been located.

The fill of the ditch can be broadly divided into three 'spits': lower, middle and upper. The lower and middle were segregated largely on the basis of water content and differential preservation of organic remains. Where the ditch was fully emptied at the south-south-west, the lower spit was made up of waterlogged black or dark-brown silty deposits. Some food refuse (mainly animal bones and oyster shells) was recovered at this level but not in any great quantity. Worked and unworked timbers and brushwood were plentiful and appeared to have been thrown into the ditch while it was still empty. The worked timbers included thinly split planks, wooden pegs, a possible shingle or paddle fragment, stave fragments and parts of at least two wooden bowls. Post-excavation analysis is ongoing, but it appears likely that the planks and pegs derive from one or more structures that were located in the interior of the site. There is evidence to suggest that the structures were deliberately destroyed, although the absence of any very substantial timbers suggests that some elements may have been salvaged and

		recycled. The bulk of the middle fill was made up of dried-out and compacted silty deposits. Organic remains were limited to fairly dispersed remains of food refuse. Analysis of the relatively small pottery assemblage is not yet completed but 12th/13th-century cooking wares predominate. A localised dump of small-stone rubble occurred in the southwest sector of the ditch. The stones had been thrown in from the exterior but were too low down in the ditch to have been used as a dry causeway. The upper fill was similar in make-up to the middle spit, but there was a noticeable decrease in pottery finds. There was also evidence for later intrusive activity in the form of trenches, pits, wells and drains and some chronological mixing of finds is possible. Only a very small proportion of what would have been the interior of the medieval enclosure was available for excavation. The 18th-century house occupies roughly a third of the enclosed area. Monitoring of the lowering of the basement floor of the house showed that the basement had been cut down into undisturbed natural clays. Underpinning of one of the interior dividing walls also exposed a 'high spot' of bedrock. The only other part of the enclosure that could be examined was a 4m-wide strip of ground lying between the west gable of the house and the subterranean cellar. This area had been disturbed by the construction of the 20th-century west wing. Intermittent traces of a deposit of dark soil were recorded between intrusive modern features, but no dating evidence was forthcoming. It remains unclear whether the site was a motte, a ringwork or some other class of enclosure. The primary ditch fill seems to have accumulated within a relatively short period and, at this stage of the post-excavation analysis, the evidence suggests that the ditch went out of use at some time during the 13th century. It is planned to submit some of the timbers for dendrochronological dating. By the later medieval period (i.e. the 15th/16th centuries), if not a century or two earlier, the line of the ditch was probably marked by only a slight hollow, averaging around 0.5m in depth. Only a few sherds of later medieval pottery were recovered on the site and all of these came from secondary contexts. The absence of any very definite evidence for later medieval activity was surprising, as there is historical reference to the proposed building of a castle at Dunboyne in the 16th century. The 17th-century Down Survey map of the area also shows a fairly substantial building standing more or less on the site of the present house. It is possible that traces of these structures still survive in the unexcavated area to the north of the house, but only a very small number of finds from the site fall into the period 1300-1700. These include a late 17th-century silver penny found at the interface between the backfilled ditch and 18th-century level-raising material. The post-medieval features recorded at the site include a large mid-18th-century ha-ha and later 18th- and 19th-century features such as cobbled yards, wells, culverts and a subterranean vaulted cellar.

DUNBOYNE CASTLE, CASTLEFARM, DUNBOYNE, Meath	04E1040 EXT. Claire Cotter	This was the second phase of excavation at 'Dunboyne Castle', an 18th-century house and demesne, the first having taken place in 2004 (Excavations 2004, No. 1230). A description of the site, some historical information and the background to the archaeological excavations can be found in the 2004 entry. The 2004 testing/excavations took place mainly in advance of development and focused on the wider demesne and the gardens at the rear south side of the house. A substantial medieval ditched enclosure came to light on a ridge of higher ground in the latter area. The 18th-century house stands in the south half of the enclosure, with the truncated medieval ditch running under its south-west corner. Altogether a 75m-long segment of the south half of the ditch was excavated in 2004 and the finds indicated a 13th- or 13th/14th-century date for the backfill. A broad 13th-century date was subsequently confirmed by dendrochronological analysis of timbers from the waterlogged base of the ditch. The excavations suggested that there had been very little activity in that part of the site during the period from c. 1300 to 1750, when the present house was constructed. This was surprising, as a substantial building is shown at, or close to, the house on the mid-17th-century Down Survey map. By autumn 2005, many of the housing units had been constructed and the conversion of the 18th-century house to a hotel and leisure complex was also well advanced. The 2005 excavations, in advance of the construction of a mains sewer pipeline and other more minor service trenches, were concentrated in the northern half of the medieval enclosure. The line of the north sector of the ditch was first traced by opening a series of shallow trenches. On foot of mitigation discussions, those service trenches that could be rerouted were moved further north, outside the enclosure. It did not prove possible to completely reroute the main sewer pipeline, however, and a line of least impact was agreed. This involved full excavation of a cross-section of the ditch at the east (Trench 1, Area C) and an L-shaped linear strip in the interior of the enclosure (Trench 1, Area B/Area B ext.). The discovery of the remains of a Bronze Age ring ditch in the latter area resulted in the excavations being extended north of the pipeline trench, but still within the medieval enclosure (Trench 1B, Northern ext.). The remains of a stone building were found on the exterior of the ditch at the east and a limited amount of excavation was also carried out in that area (Trench 1, Area A). Unfortunately, part of the building had already been destroyed by the time excavations commenced. Finally, the initial testing had exposed the remains of revetment walling on the inner lip of the ditch at the west (Trench 2). The pipeline was rerouted to avoid the feature, but a limited amount of further excavation was carried out in an attempt to establish its context. Excavations took place over a 14-week period from September to December 2005. A subsequent period of monitoring in other areas of the demesne (along the main avenue, in the old stables) did not reveal any further features of archaeological interest. Post-excavation analysis is ongoing at the time of writing. Prehistoric The Bronze Age ringditch was located on the ridge summit within the northern sector of the medieval enclosure; the interval between the prehistoric ringditch and the northern ditch of the medieval enclosure was only 4m. The monument was first identified after the removal of a post-medieval (probably 17th-century) metalled roadway (Trench 1B, F9) which sealed it. The forecourt area of the house had been scarped to create a level surface for the roadway and it is quite possible that the ring ditch was truncated to some degree during that process. This could explain the flat, featureless and slightly sloping interior. The northern sector of the ring ditch had earlier been truncated by medieval activity. The monument was circular in plan, with an overall diameter of 7.8m and an internal diameter of less than 6m. The ditch had a surface width of 1.05m and was less than 0.94m in depth. It was cut into boulder clay; some patchy traces of the old ground level were recorded on the exterior west side.

		Along most of its length, the ditch fill consisted of orange, yellow, grey and brown clays and silt, much of it sterile but with dispersed or, occasionally, concentrated charcoal flecking present intermittently. A small fragment of flint was found in the west sector of the ditch. The remains of a shattered and compacted cordoned urn were found in the eastern sector. The urn had been placed less than 0.25m below the top of the ditch and 0.35m above the base. No definite cut was identified, but the sediments underlying the urn were distinctive and confined to the immediate vicinity. As found, the vessel appeared to have compacted while lying on its side, but whether this was its original position or resulted from falling over was impossible to say. Post-excavation analysis is ongoing; at the time of excavation there were no visible fragments of burnt bone in the soils surrounding the urn. Additional fragments of pottery were retrieved from the fill in the southern and northern sectors of the ditch. As the latter area was truncated by medieval activity, it is possible that there may originally have been other urn burials along that sector of the ditch Early medieval. Most commentators suggest that Dunboyne was probably the site of an early historic fort, but its exact location remains unknown. Dunboyne Castle occupies the only elevated ground in the immediate vicinity of the village. However, no definitive traces of a pre-Norman enclosure came to light during the present excavations. A portion of a lignite bracelet found in drain upcast just outside the Bronze Age ringditch may be of early medieval date. Two other features, as yet undated, could be either early medieval or medieval in date The first was the remains of a circular double-ring stake-built structure (F324) and the second, which lay immediately beside it, was a kiln (F144). A third feature, a 'four-poster', is more likely to date to the medieval period. All three features lay in the west half of the medieval enclosure (Trench 1, Area B). The stake structure measured 7m in external diameter (outer ring) and 3.2m internally (inner ring) and was respectively made up of 31 and 24 surviving stake-holes, set at average intervals of 0.38m. The individual stakes averaged 0.07m in diameter and had been driven to a depth of 0.15m into an old sod layer. Five other stake-holes were recorded adjacent to, or in the interior of, the structure. No definite entrance was identifiable, but there were a number of gaps, any of which could have been the site of a doorway. The interior was devoid of any contemporary features or surfaces, etc. The kiln was roughly oval in plan (1.3m by 0.98m and less than 0.25m deep), with the remains of a flue at the south side. The fill layers contained frequent amounts of charcoal and seeds and the south side of the pit was also fire-baked. The only find was a small piece of flint from the flue. The most likely interpretation is that it was a corn-drying kiln. The rectilinear four-post structure measured 4m by 2.3m in plan and was made up of substantial circular post-holes of comparable size (less than 0.55m in diameter and 0.4m in depth). The post-holes were cut down from the same horizon (the old sod layer) as the stake-built structure, but the ground plans of the two features overlapped. Even if the four-poster was a raised structure (e.g. a granary), it seems highly unlikely that it could have been in use at the same time as the circular building. Either structure could, however, have been contemporary with the kiln. The medieval enclosure The east sector of the medieval ditch was similar in most respects to the south sector excavated in 2004. It averaged 8.5m wide by 4.5m deep and was extremely steep on both the inner and outer sides. The lie of the land meant that the inner edge was higher than the outer. For the most part, the ditch was cut through hard stony boulder clays, but the upper outer edge was cut through much softer sandier clays. The remains of a timber structure were recorded 1m inside the inner edge of the ditch. The outline was that of a four-post structure with linking slot timbers and a

		few subsidiary angled supports. At this stage in the post-excavation it is unclear whether a) this is the remains of a gate/guardhouse or b) it was part of a box-built palisade. The former seems more likely, although no trace of a bridge was noted within the ditch itself or on the exterior. The footprint of the feature is similar to the palisade uncovered during Alan Hayden's excavation of the ringwork at Trim Castle. However, taking erosion into consideration, the Dunboyne structure appears to be placed too far back from the edge of the ditch to have acted as a defensive palisade. Further analysis is required before this, or indeed the bigger question – whether the site was a motte, ringwork, or some other class of defensive enclosure – can be addressed. The remains of well-built revetment walling were exposed along the upper inner edge of the ditch at the west and north. The walling was not excavated and it remains unclear whether or not it was carried the full depth of the ditch. The construction technique was similar in both areas. The upper inner edge of the ditch was first cut back, leaving an open-sided trench, up to 1m deep. The battered face of the revetment wall and its supporting rough mortar bonding were then put in place. The interval between the rear of the wall and the back of the trench was then filled with a looser mixture of mortar and rubble. At the west, the surviving south end of the revetment wall was truncated by 19th-century outbuildings, but the north end terminated at a short return that ran back into the interior of the enclosure. The foundations of a faced opening midway along the surviving portion may be the remains of a chute, or a doorway that gave access to the ditch. A few individual sherds of 13th/14th-century pottery (Leinster cooking ware and Dublin-type fineware) were recovered from the rubble-filled void at the north, and from a construction pit (F26) associated with the return of the revetment wall at west. The 'revetment' does not appear to have been a continuous feature, as there was no evidence for any walling along the eastern and southern sectors of the ditch. One possibility is that the walling formed an integral part of buildings that were located immediately behind the defences. Ditch fill The ditch was bottomed in the stepped section opened at the east. Two broad horizons were identified (Phases 1 and 2) separated by a distinctive layer of soft yellow boulder clay that occurred about 1.5m below the top of the ditch. At the time of excavation, the boulder clay was considered to be the construction level for the late medieval building described below. Subsequent analysis of the pottery suggests that this might not, however, be the case. The basal fill was waterlogged and four complete ash bowls were recovered, as well as worked and unworked pieces of timber. As in 2004, there were no large structural timbers present. The Phase 1 and 2 fills included dumps of mortar and stone rubble; these horizons were absent from the south part of the ditch excavated in 2004. There were some notable differences also in terms of the finds recovered in both seasons (the pottery from the site has been analysed by Clare McCutcheon and other specialist work is ongoing). The south sector of the ditch yielded a relatively large quantity of metal objects, including a 13th/14th-century seal, iron keys and decorative strapwork. All of the 279 sherds of medieval pottery recovered in 2004 can be classified as 'local', with most belonging to the class known as Dublin-type wares. By comparison, the east sector of the ditch yielded very few metal objects, but 5% of the 233 medieval pottery sherds recovered were imports, all but two of those being French in origin. The most interesting piece was part of a jug with a zoomorphic spout, similar to three examples from Wood Quay and a possible fourth from Usher's Quay. On the evidence of the pottery, the ditch could have been completely backfilled either by the end of the 13th century or at some stage during the 14th. While there is an ongoing debate regarding the possibly longer currency of some of the native wares, in the case of the medieval enclosure at Dunboyne, all the chronologically diagnostic artefacts would fit comfortably into the 13th/14th-century date bracket. However, as there is a 15th-century documentary reference to the granting of monies to build a castle at Dunboyne,

		the medieval ‘hiatus’ will have to be scrutinised more closely. Apart from the truncated foundations of five roughly rectilinear features, the interior was devoid of any definite medieval stratigraphy. The rectilinear features presented as sunken trenches (average 0.6m deep) filled with mortared rubble, and may have been foundation platforms for timber buildings. If this was the case, the floors must have been well above the surviving ground level, as no trace of any post-holes or residues of occupation soils were evident. Indeed, less than half a dozen sherds of medieval pottery were recovered from the interior, suggesting that the whole area had been severely truncated. A sherd of late 12th/mid-13th-century Ham Green B ware came from the rubble fill of one of the rectilinear structures (F392). The structure had a peculiar dogleg outline and extended into the interior from the revetment walling on the north side of the ditch. Late medieval The foundations of a masonry building F503 were uncovered on the outer edge of the eastern sector of the medieval ditch. The western wall, north-west return, what may be the south-west return and a disconnected fragment of the south wall were recorded. The external dimensions of the building were c. 8m north–south by at least 8.65m and the walls were less than 1m thick. The north and south walls did not survive above foundation level. The west wall was reduced to contemporary ground level. Its battered outer face was carried down into the ditch for a distance of 0.6m. The wall ran at a slight angle relative to the ditch edge, with the result that the northern portion sat on ditch fill and the southern portion was set into an L-shaped cut in the outer side of the ditch. A slope-sided trench running parallel to the rear of the wall is probably the remains of the eroded outer edge of the ditch. The eroded edge was levelled up with large stones set an angle. Blue/white pottery found amongst the stones has been identified as part of a Malling jug, an import from the Low Countries, probably Antwerp (Clare McCutcheon). The origins of Malling ware go back to the mid-16th century and this dating is confirmed at Dunboyne by the finding of two closely associated mid-16th-century coins. The interior of the building did not survive; this part of the site was also scarped when the post-medieval roadway (F9) was constructed. Post-medieval Apart from the roadway (F9), the 17th to mid-18th-century activity at the site was represented almost exclusively by pottery (Merida ware, Frechen ware, Westerwald, North Devon gravel-tempered and sgraffito ware, and tin-glazed earthenware). The majority of the 17th-century pottery came from Area A on the exterior of the ditch and is likely to be associated with the occupation of building F503. There is a strong possibility then that that structure is the remains of the building shown on the Down Survey map of c. 1660. Only a small quantity of 18th/19th-century pottery was found at the site. Most of this came from the ruins of demolished outbuildings located to the west of the present house.
Loughsallagh 1, Loughsallagh	A017/008 Linda Clarke	This site was located within Contract 1 (Dunboyne to Dunshaughlin) of the proposed M3 Clonee to North of Kells motorway and was excavated during August 2005. The remains of a roughly cobbled stone roadway were discovered by Robert O’Hara during the assessment phase of works in 2004 (Excavations 2004, No. 1191, 04E0489). During the resolution phase, an area 30m by 30m was stripped of topsoil. The roadway extended the entire length of, and beyond, the cutting. Test sections were excavated through this roadway and it had an average width of 10m and an average thickness of 0.3m. An associated ditch, probably used for drainage, ran along the entire length of the roadway. The remains of an earlier roadway and associated ditch were also exposed below the aforementioned roadway. This earlier road was of similar construction and had an average thickness of 0.15m. Both of these roadways may represent early routes to Dunboyne and are probably post-medieval in date.

Dunboyne Junior and Senior National School, Station Road, Dunboyne	16E0498 Deirdre Murphy	The proposed development is located at Dunboyne Junior & Senior National School, Station Road, Dunboyne, Co Meath. There is no recorded zone of archaeological potential associated with the village of Dunboyne, however a number of recent archaeological assessments and excavations have proven the landscape around the village to be rich in previously unrecorded archaeological features and deposits. The archaeological assessment of the proposed site was carried out on 27 September 2016 and involved the excavation of 6 test trenches located within the area of proposed development. During the excavation it was noted that parts of the site appeared to have been subject to levels of ground disturbance with areas that appeared to have been previously stripped of topsoil, noted by areas containing a very shallow soil profile. No evidence of any archaeological features or deposits were recorded.
Station Road, Dunboyne	17E0399 David McIlreavy	A programme of test trenching was undertaken at Dunboyne, Co. Meath in September 2017. A desktop assessment of the site undertaken by Dr Karen Dempsey of IAC Ltd identified three archaeological sites (ME050-031, ME050-032002, ME050-032001) which are due for inclusion in the Record of Monuments and Places at its next revision. Geophysical survey of the site, conducted by Earthsound Archaeological Geophysics under licence 17R0075 (Grimson and Regan, 2017) identified three anomalies which corresponded to the archaeological sites noted above. A number of previously unknown features were also identified across the proposed development area at this time. Testing confirmed the presence and extent of enclosure ME050-032002. The two ring ditches (ME050-032001/031) were not tested as it is intended to preserve the features in-situ (Archaeological Areas 1 and 2). Enclosure ME050-032002 will also be preserved in-situ and represents a settlement site that either dates to the early medieval or medieval period. Two pieces of 13th-century ceramic from Test Trenches 45 and 51 (17E0399:1:1-2) may suggest that the enclosure was in use during this period. Potential isolated archaeological activity may be present within Archaeological Areas 3, 4 and 5. Evidence of this activity consisted of a charcoal deposit in Test Trench 2 (AA3), charcoal within the upper ditch fill in Trench 3 (AA4), and a charcoal and ash deposit encountered within Trench 28 (AA5). The nature or date of the activity could not be discerned during testing but the features may possess moderate archaeological potential. Archaeological Area 6 consists of two parallel curvilinear ditches that may represent a former trackway through the landscape. It is possible that, based on the alignment of the feature, it is post-medieval in date. However, it may be associated with the enclosure ME050-032001 to the east and as such may be earlier in origin. A series of mitigation measures were recommended in the report submitted to the NMS and NMI including preservation in-situ of Archaeological Areas 1 and 2, and excavation of Archaeological Areas 3-6. Furthermore, it was recommended that a Conservation Plan be carried out in order to ensure the continued protection of the features throughout the life time of the development.
Area C, Dunboyne	18E0282 Liza Kavanagh	Four trenches (158 linear meters) were excavated within the footprint of a proposed development bounding the west side of Dunboyne Train Station, Co. Meath. This programme of test-trenching took place as part of due diligence works at the pre-planning stage. This report follows on from an uncompleted geophysical survey, due to poor ground conditions, carried out by Joanna Leigh in May 2018. A magnetic scan suggested the area had been disturbed by modern activity. **No features of archaeological potential were uncovered within this area**. The site had been heavily disturbed by previous construction works.
Rooske Road, Rusk, Dunboyne	18E0581 Tim Coughlan	Testing was carried out at the site of a proposed residential development, located at Rooske Road, Dunboyne, Co. Meath. It follows a geophysical survey by Target Geophysics (Target Geophysics 2018) in September 2018 and desktop assessment carried out by Ross Waters and Grace Corbett of IAC Ltd in August 2018. The proposed development area is c. 5ha in size and located c. 1km to the south of Dunboyne village centre. Rooske Road forms the western limit of the site with

		farmland to the east, north, and south. There are farmhouses to the immediate north and south-west. The area is mainly flat with a gentle eastwards slope and mature trees along the boundaries. The site is situated in the townland of Rusk. There are no recorded monuments within the proposed development area. The closest monument is a tower-house castle (ME050-021005) in the townland of Castlefarm c. 1.1km to the north-north-east of the proposed development. The site is included on the Garden Survey as Rusk House (ME-50-O017408), which records the demesne landscape as 'main features unrecognisable – peripheral features visible'. The remains of Rusk House and associated farm outbuildings, which date to at least the 18th-19th century, are located at the northern end of the site. Prior to the testing, the removal of rubble from in and around the location of the 18th-century. Rusk House was monitored to ensure no damage was inflicted on any structural remains which may survive beneath the rubble. The clearance of rubble did reveal the remains of Rusk House, surviving in some areas to a height of c.2m. Eighteen trenches were excavated across the site in October 2018 which targeted anomalies identified during the geophysical survey, blank areas where no known archaeological features were located and the location of Rusk House. Two separate cobbled surfaces were encountered, along with evidence of a formal entrance-way associated with the upstanding remains of Rusk House, which partially survive at the northern end of the site. The remains of Rusk House, its outbuildings and yard surfaces, will be negatively impacted upon by the proposed development. There may also be an adverse impact on previously unrecorded archaeological features or deposits that have the potential to survive beneath the current ground level.
Station Road, Castlefarm, Dunboyne	19E0525 Steven McGlade	A site off Station Road, Dunboyne, was archaeologically monitored intermittently throughout 2020. A geophysical survey was carried out on the site by Joanna Leigh in 2019 (19R0197). A number of indistinct anomalies were noted, however the interpretation urged caution in interpreting these as archaeological in nature. Two phases of agricultural field boundaries and drainage were revealed within the site. The existing field system appears to have been in place in the 19th century, and several ditches depicted on the 1830s Ordnance Survey map were identified during the monitoring works. An earlier field system, possibly dating to the 17th century, was also uncovered. Brick was retrieved from one of the earliest ditches indicating that all the ditches and drainage features were post-medieval in date. Two waste pits of unknown date were excavated. One of these was truncated by one of the probable 17th-century ditches, indicating they predated this phase of field layout. The pits contained charcoal-rich layers, however no in situ burning was noted. There was nothing to indicate that these pits were not for agricultural waste disposal. No archaeology was uncovered during the topsoil stripping and no further archaeological work is recommended.
Rooske Road, Castlefarm, Dunboyne	20E0121 ext. Liam Coen	A previous assessment of the northern and eastern margins of the development site had been undertaken some months earlier. More lands became available and were assessed under an extension to the earlier licence. Eight trenches using a 16-tonne tracked excavator with a 2m grading bucket were excavated. Excavation proceeded in level spits no greater than 0.2m. All potential features identified within the trenches were tested to determine their archaeological nature, extent, composition and depth and to ascertain potential dating material. Evidence for the earlier landscaping of the site in the form of introduced soils was present in the eastern and northern areas. No features, structures or deposits of archaeological significance were identified during the course of the test-excavation. Two sherds of medieval pottery were retrieved from the topsoil.

Appendix 17.3: Photographic record

Plate 19.1. *View of northern area of proposed development site, facing southeast*

Plate 19.2. *View of northern area of proposed development site, facing east*

Plate 19.3. *View of northern area of proposed development site, facing southwest*

Plate 19.4: *View of northern area of proposed development site, facing west*

Plate 19.5: *View of northern area of proposed development site, facing east*

Plate 19.6. *View of electricity pylon, facing southwest*

Plate 19.7: *View of entrance to southern area of proposed development site with railway to west, facing south*

Plate 19.8. *View of southern area of proposed development site, facing east*

Plate 19.9: *View of stream in southern area of proposed development site, facing southeast*

APPENDIX 19.4 GEOPHYSICAL SURVEY REPORT

Geophysical Survey Report
Castlefarm, Rusk & Clonee, Dunboyne, Co. Meath
Part 1: Survey information

License No.: 23R0167
RMP: N/A

ITM : 702320 , 741250

Ger Dowling, PhD MIAI
April 2023

Summary

This report details the results of a geophysical survey (Licence No.: 23R0167) at lands at Geophysical Survey Report, Castlefarm, Rusk and Clonee townlands, near Dunboyne, Co. Meath. The investigation as part of an archaeological appraisal of lands requested in a condition issued by Meath County Council in a response to a proposed development.

The investigation, comprising high resolution magnetic gradiometry, was implemented over several adjoining fields and covered an area of approximately 14 ha. in total size. This work has resulted in the identification of several features of archaeological and possible archaeological interest, including an ovaloid enclosure, a possible early field system and other potential features. Evidence for former land division was also detected.

Survey details

Site Name: Castlefarm, Rusk and Clonee
Townlands: Castlefarm, Rusk and Clonee
County: Meath

Parish: Dunboyne
Barony: Dunboyne

RMP/SMR No.: N/A
ITM (centroid): 702320, 741250

Land use: Pasture & tillage
Geology: Dark limestone and shale (‘Calp’) (Lucan Formation)
Soils: Fine loamy drift with limestones (Elton series)

Detection License No.: 23R0167
Planning Reference No.: See Part 2 of this report

Survey Type & Instrument: Fluxgate Gradiometer – Five-channel magnetometer
Sample/Transverse Interval: 0.10m/0.5m

Area Surveyed: *c*.14 ha.
Survey Date: 24–25 April 2023

License Holder: Ger Dowling
Report Author: Ger Dowling
Report Date: 26 April 2023

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Abbreviations

GPS	Global Positioning System
ITM	Irish Transverse Mercator
ME	Meath
nT	nanoTesla (unit of magnetic measurement)
OS	Ordnance Survey
QGIS	Quantum Geographical Information Systems
SMR	Sites and Monument Record
RMP	Record of Monument and Places

Coordinate System

All GPS coordinates given in this report are in Irish Transverse Mercator (ITM)

1 Introduction

This report details the results of a geophysical survey (Licence No.: 23R0167) at lands at Castlefarm, Rusk and Clonee townlands, near Dunboyne, Co. Meath. The survey, comprising high resolution magnetic gradiometry, was focused on several adjoining fields and covered an area of approximately 14 ha. in total size. The investigation was conducted as part of an archaeological appraisal of lands requested in a condition issued by Meath County Council in a response to a proposed development.

The site has not previously been subjected to geophysical survey and it was hoped that the investigation would help identify and map any subsurface archaeology that may be present.

2 Site Location

The survey is located in the townlands of Castlefarm, Rusk and Clonee, Co. Meath (Figure 1). The site, which lies on the south-eastern edge of Dunboyne town, is in the Civil Parish of Dunboyne and the Barony of Dunboyne.[1]

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[1] Https://www.logainm.ie/en/s?txt=Rusk&str=on (Rusk); https://www.logainm.ie/en/37766 (Castlefarm); & https://www.logainm.ie/en/37768 (Clonee): accessed on 28 March 2023.

3 Survey Background

The investigation was conducted as part of an archaeological appraisal of lands requested in a condition issued by Meath County Council in a response to a proposed development.

Details on the proposed development and Meath County Council condition that relates specifically to archaeology are found in Part 2 of this report.

4 Archaeological Background

4.1 Recorded/Known Archaeology

There are no recorded archaeological monuments within the lands of the survey area (Figure 2). The nearest known site is a church (SMR ME051-006), with associated graveyard (SMR ME051-006001) and holy well (SMR ME051-006002), located about 500m to the northeast (Figure 2).[2] Although no longer displaying any surface trace, the church (ME051-006), known as 'Loughsallagh Church', lay within an oval graveyard (ME051-006001: dims *c*.55m N–S; *c*.35m E–W) defined by an earthen bank and an outer flat-bottomed fosse or drain; a well (ME051-006002), dedicated to St. Michael, also lies within the graveyard. [3]

Numerous recorded archaeological investigations have been conducted in the wider locality of the survey area. These include test excavations in the townland of Rusk in 2018, which revealed the subsurface remains of Rusk House, an eighteenth-century building, and several of its outbuildings and cobbled yard surfaces.[4] Other recorded excavations in the townlands of Castlefarm and Clonee include those focused on an early medieval enclosure at Castlefarm 1,[5] and multi-period features (prehistoric, early medieval and medieval) at Dunboyne Castle, Castlefarm,[6] and Clonee.[7]

Early historic maps show the survey area as farmland (Figure 3 & 4).

4.2 Previous Investigations

No recorded archaeological investigations have previously been conducted at the survey area.[8]

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[2] Historic Environment Viewer (archaeology.ie): accessed on 28 March 2023.
[3] Ibid.
[4] Https://excavations.ie/report/2018/Meath/0027771/: accessed on 28 March 2023.
[5] Https://excavations.ie/report/2005/Meath/0014275/: accessed on 28 March 2023.
[6] Https://excavations.ie/report/2005/Meath/0014181/: accessed on 28 March 2023.
[7] Https://excavations.ie/report/2008/Meath/0019958/ & https://excavations.ie/report/2019/Meath/0032430/: accessed on 28 March 2023.
[8] Https://excavations.ie: accessed on 28 March 2023.

5 Survey Location and Aims

The investigation, comprising high resolution magnetic gradiometry, encompassed a combined area of approximately 14 ha. The gradiometry survey was implemented over three adjoining fields of pasture and tillage (Plates 1–3; Figure 5). The southern portion of a proposed access road (*c*.25m in width) at the northern end of the site was also surveyed; the upper, northern, section of the latter proposed road was unsuitable for geomagnetic prospection owing to its small size and proximity to modern metallic features (fields gates, etc.).

Located on the southeastern edge of the town of Dunboyne, the survey area lies directly east of the Docklands to M3 Parkway Commuter Rail line. The target fields are separated by mature hedgerows supplemented by post-and-wire fences. The terrain is generally flat, though a low, artificial, embankment runs along the western boundary of the southern field, next to the rail line (Plate 4). Overhead electricity wires extend across the southernmost field and the field directly south of the proposed access road (hereafter 'the northern field'), with the latter high-voltage cable supported by a large electricity pylon located in the eastern sector of the field. A small concrete shed lies next to the field boundary in the southeast corner of the southern field (Plate 5).

The underlying bedrock of the locality comprises dark limestone and shale ('calp') (Lucan Formation).[9] The soils are dominated by fine loamy drift with limestones (Elton series).[10]

The geophysical investigation aimed to:

- identify any geophysical anomalies of possible archaeological origin within the specified survey area
- accurately locate these anomalies and present the findings in map form
- describe the anomalies and discuss their likely provenance in a written report
- incorporate all of the above in a report to the Client

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[9] Geological Survey of Ireland Spatial Resources, Public Data Viewer Series: https://dcenr.maps.arcgis.com/apps/MapSeries/index.html?appid=a30af518e87a4c0ab2fbde2aaac3c228 [accessed on 28 March 2023].

[10] Irish National Soils Map, 1:250,000k, V1b (2014): http://gis.teagasc.ie/soils/map.php [accessed on 28 March 2023].

6 Survey Methodology and Instrumentation

The survey involved high-resolution magnetic gradiometry survey (Table 1). This technique measures changes in the magnetic properties of the soil and is widely used in modern investigations due to its ability to detect a broad range of sub-surface archaeological remains, including ditches and pits, and industrial features associated with metalworking and pottery production.

The magnetic survey was conducted using a five-channel fluxgate gradiometer system combined with cm-precision GPS (georeferenced to Irish Transverse Mercator and Ordnance Datum). Mounted on a cart, the system records magnetometer and GPS data simultaneously into a single data file. The data capture strategy involved logging readings every 0.05m intervals along transects spaced 0.5m apart, with a maximum traverse width of 2.5m. The sampling strategy produces a high-resolution dataset, giving clarity to any archaeological features detected.

The highly accurate positioning of the survey data provides strong confidence when integrating the geophysical results with other datasets such as aerial imagery in GIS, and also ensures repeatability should further investigation of anomalies (e.g., test excavation) be required.

Table 1. Geophysical survey details

Technique	Instrumentation	Sensor spacing	Sample rate	Survey Area	Number of recorded data
Magnetic Gradiometry	Five-channel fluxgate gradiometer array	0.5m	50 Hz	*c*.14 ha.	730,649

7 Data Management, Processing and Interpretation

Gradiometry data was logged to a laptop computer and archived daily to an external hard drive. The collated data was processed using the following methodology:

- Real-time positioning of magnetometer data based on GPS measurements;
- Processing (Zero Mean Transect) of collated magnetometer data;
- Gridding (nearest neighbour interpolation); and
- Export of georeferenced greyscale images at optimum visual range

The processed data was imported into QGIS for final image production (Figures 6–8). Final geophysical datasets have been formatted as raster data models/GeoTiffs (projected to ITM, EPSG:2157) to enable subsequent geospatial analysis. Fieldwork, data processing and reporting adhered to the most up-to-date guidelines for conducting archaeo-geophysical surveys.[11] All geophysical raster datasets will be digitally archived to best practice.[12]

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[11] Schmidt A., Linford P., Linford N., David, A., Gaffney C., Sarris A., and Fassbinder J. 2016. *EAC Guidelines for the Use of Geophysics in Archaeology*: *Questions to Ask and Points to Consider*. EAC Guidelines 2. [Online] Available from: https://f64366e3-8f7d-4b63-9edf5000e2bef85b.filesusr.com/ugd/881a59_fdb1636e95f64813a65178895aea87cf.pdf

[12] Niven, K. 2012. *Raster Images: A Guide to Good Practice*. Archaeology Data Service/Digital Antiquity, Guides to Good Practice. [Online] Available from: http://guides.archaeologydataservice.ac.uk/g2gp/RasterImg_Toc; & Schmidt, A. and Ernenwein, E. 2012. *Guide to Good Practice: Geophysical Data in Archaeology*. Oxford: Oxbow.

8 General Considerations and Complicating Factors

8.1 Access and Ground Conditions

The survey area comprises four fields currently used for both pasture and tillage. Several small obstacles to the survey were encountered in the northern field. These comprised an electricity pylon, an overgrown fallen tree trunk and, on the western side of the field, a small tract of deeply (vehicular) rutted terrain. There were no other impediments to the survey.

8.2 Modern Interference

Numerous small-scale and zones of 'ferrous-type' (dipolar) responses are evident in the results from the gradiometry survey. These are a common occurrence in magnetic data and in most cases represent modern metal debris contained within the topsoil. However, given the identification of features of archaeological and potential archaeological interest in the northeast corner of the northern field, some of the ferrous responses mapped in that locality may reflect objects of archaeological interest.

Small areas of ferrous disturbance deriving from survey in proximity to field fences and field gates were registered in places along the edges of the survey area, with the electricity pylon providing another source of magnetic interference. A broad, intense zone of ferrous disturbance (labelled '12' on Figure 7) mapped by the investigation in the northern field likely represents buried modern iron debris and other magnetised material. A similarly intense zone of magnetic disturbance (labelled '13' on Figure 7) in the southern field corresponds to the embankment constructed next to the rail line. A smaller area of ferrous disturbance mapped next to the shed in the southeast corner of the latter field also likely reflects modern activity.

8.3 Former Settlement and Land Use

A field boundary (labelled '10' on Figure 7) marked on early historical maps appears to have been mapped in the northern field; its magnetic signature is difficult to discern in the survey results owing to adjacent magnetic disturbance. A possible relict field boundary (labelled '11' on Figure 7) was revealed extending north–south across the approximate centre of the southern field.

9 Survey Results

Table 3. Area 1: survey results

Area	Castlefarm, Rusk & Clonee
ITM (centroid)	702320, 741250
Area surveyed	*c*.14 ha.
Figure Numbers	6–8

Anomaly Number	***Form/nature of anomaly***	***Possible sources(s) of anomaly***	***Interpretative discussion***
1	Sub-circular positive anomaly	Archaeology	Probable ditch of ovaloid enclosure measuring approx. 70m N–S by 80m E–W. Appears to extend under modern field boundaries on N and E. Enclosure boundary breached by *c*.3.5m-wide gap on SW that may represent an original entrance. Interior is traversed NW to SE by [2], while the partial footprint of a possible sub-rectangular structure [3] was mapped on SE. Enclosure [1] surrounds, and lies next to, several slender positive curvilinears and multiple 'pit-type' responses that may represent associated features (e.g., trenches/pits/spreads). The magnetic strength of some of the 'pit-type' responses suggest the presence of burnt or fired material in their fill. Enclosure [1] is conceivably also associated with [4–7]. ***See Figure 8 for detailed view***
2	Positive linear	Possible archaeology	Possible ditch extending NW–SE across interior of enclosure [1]. Suggestive of an internal partition. Flanked to either side by 'pit-type' anomalies and slender positive curvilinears that may represent associated features (e.g., pits/spreads/trenches). ***See Figure 8 for detailed view***
3	'C-shaped' positive anomaly	Possible archaeology	Potential ditch feature (*c*.8m in width). May comprise northern portion of sub-rectangular structure/building associated with [1]. Tentative interpretation. Anomaly [3] appears to extend under short treeline on S. ***See Figure 8 for detailed view***
4	Bifurcating positive anomalies	Possible archaeology	Possible interconnecting ditches/spreads. May comprise part of [6] and contain burnt or fired

			material in their fills. ***See Figure 8 for detailed view***
5	Slender linear	Possible archaeology	Possible ditch. May represent part of [6]. ***See Figure 8 for detailed view***
6	Integrated array of slender linear and curvilinear positive magnetic anomalies	Possible archaeology	Network of interconnected ditches, seemingly indicative of an ancient, E–W/oriented, field system. Recorded anomalies cover an area about 100m in E–W length, though may extend beyond this area, being potentially obscured by [12]. [6] may be associated with [1], though this is uncertain. Anomalies [4–5] & [7] may reflect associated 'ditch-type' features. ***See Figure 8 for detailed view***
7	Slender, semi-circular positive anomaly	Possible archaeology	Possible foundation trench for circular structure/building/enclosure (*c*.12m in diameter). Appears to append onto [6] on N. Located about 70 SW of [1]. ***See Figure 8 for detailed view***
8	Irregular zone of enhanced magnetism	Possible archaeology/ agricultural/modern	Potential spread of burnt material, measuring some 16m N–S by 14m E–W. Interpretation as archaeology is cautious and modern (ferrous/buried debris) origin also possible. Overlaps with [9] but exact relationship is uncertain.
9	Narrow, 'C-shaped' positive anomaly	Possible archaeology/ agricultural/modern	Possible small field defined by narrow ditches. Mapped for approx. 40m in length (N–S) by 28m in width (E–W). Open to the N. Precise nature and significance is unknown. Could equally reflect interlinked field drains of relatively modern origin. Not depicted on historical maps. Overlaps with [8].
	Several 'pit-type' responses	Possible archaeology/ agricultural/natural	Several possible isolated pits/spreads mapped within northern field. Uncertain significance. A modern (i.e., agricultural) or natural origin for these cannot be discounted.
	Positive tends	Possible archaeology/ agricultural/natural	Possible ditches/drains.
10	Diffuse positive linear	Possible agricultural	Possible relict field boundary recorded on early historical maps. Difficult to discern owing to nearby magnetic disturbance. ***See Figure 8 for detailed view***
11	Faint positive linear	Possible agricultural	Possible relict field boundary. Extends N–S across approximate centre of southern field.
	Faint, narrow positive lineations	Agricultural	Possible field drains

	Multiple ‘ferrous-type’ responses	Modern	Ferrous debris and other weakly magnetised material.
12	Mass anomalies of enhanced magnetism	Modern	Concentration of modern iron litter and other magnetised material.
13	Mass anomalies of enhanced magnetism	Modern	Probable gravels and other magnetised material associated with embankment construction.
	Areas of magnetic disturbance	Modern	Disturbance from adjacent post-and-wire fences and field gates.

10 Conclusion

The geophysical investigation at Castlefarm, Rusk and Clonee townlands has identified a range of features of archaeological and potential archaeological significance. The most impressive discovery is an ovaloid enclosure [1] in the northeastern corner of the northern field. Although seeming to extend under the modern field boundaries on the north and east, the enclosure (as mapped by the survey) measures at least 70m north–south by 80m east–west. It appears to have a southwest-facing entrance and can be seen to surround a varied array of potential features, including a partition ditch [2] and the northern segment of a sub-rectangular structure/building. Numerous curvilinear and 'pit-type' anomalies identified by the survey both inside and immediately outside the enclosure also hint at the existence of other possible archaeological structures and features (e.g., trenches and pits/spreads) at this location.

Evidence for what may be an early agricultural landscape, one perhaps associated with the enclosure, is also suggested by a series of long-running 'ditch-type' features [4–6]. Taken together, these may form part of a field system. This putative field system is not recorded on early historical maps and includes what could be a semi-circular structure/enclosure [7: *c*.12m in diameter]. Although the survey in the northern field is much affected by magnetic disturbance arising from likely buried modern material [12], the putative field system can be seen to extend westwards from the enclosure for about 100m, though it may be more extensive. Other potential features of possible interest comprise a possible burnt spread [8] and an adjacent narrow field [9]; these interpretations are tentative, however. Of more recent origin is evidence for two possible former field boundaries [10] and [11], as well as buried modern material [12] and [13].

10.1 Statement of Indemnity

The geophysical properties of sub-surface features must contrast sufficiently with the surrounding soils/background variation to enable them to be detected and mapped using geophysical methods. As such, the clarity and definition of buried features can vary considerably, with some having well-defined signatures while others are only barely visible, or not discernible, in geophysical imagery. A lack of geophysical anomalies cannot be taken to imply the absence of archaeological features.

The interpretations presented here are invariably provisional and further work (e.g. test trenching) is required to fully assess the nature and archaeological potential of the anomalies identified by the present investigation.

11 Figures

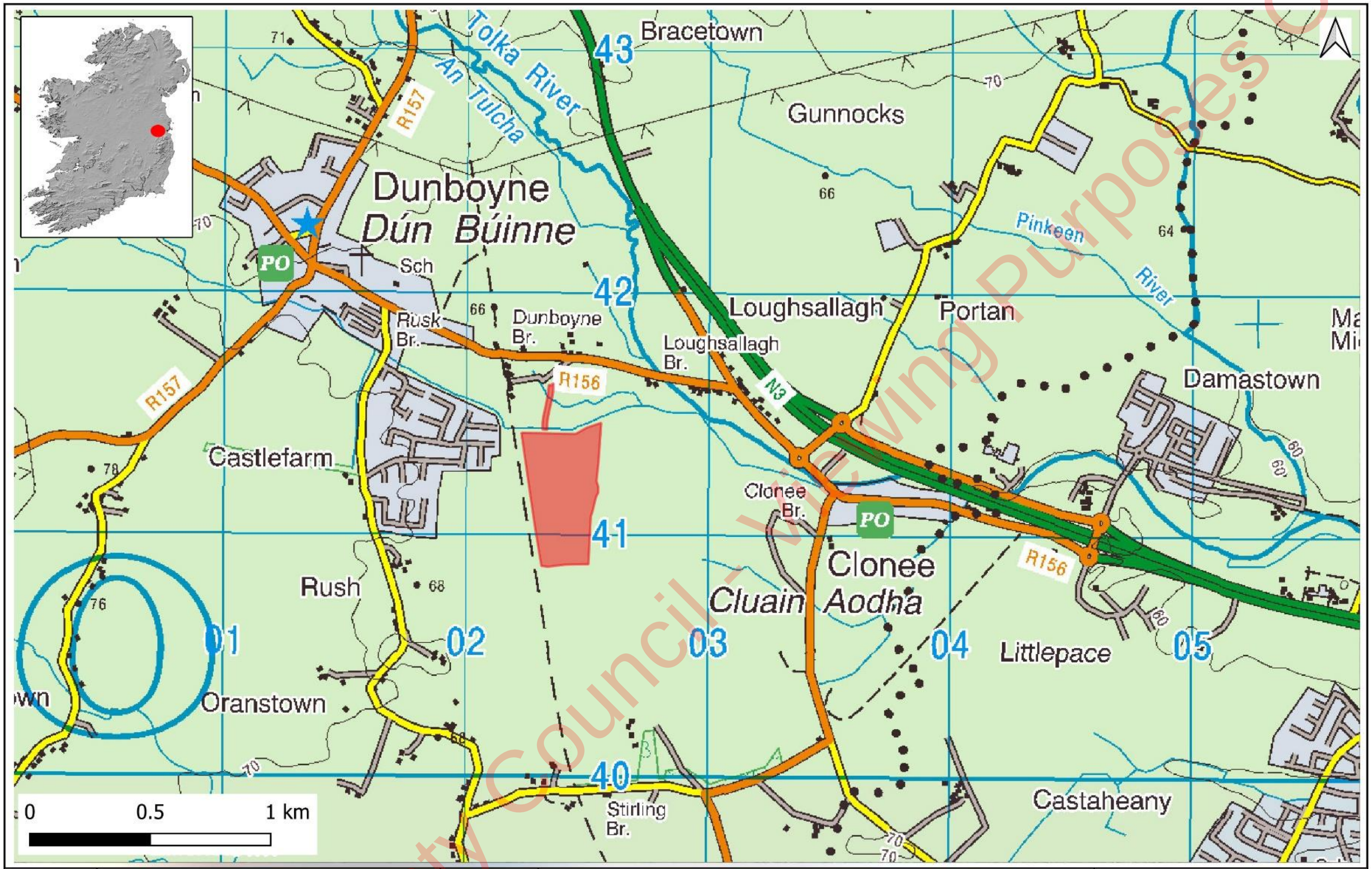

Figure 1	Castlefarm, Rusk and Clonee, Dunboyne, Co. Meath: Geophysical survey	Scale 1:20000@A4	Legend	Source of background mapping: Discovery Series Map, sheet 50
	Site location map	Date 28.03.2023	🟥 Survey area	

Figure 1. Site location map, showing survey areas highlighted in red.

Figure 2	Castlefarm, Rusk and Clonee, Dunboyne, Co. Meath: Geophysical survey	Scale 1:6000@A4	**Legend**	Source of background mapping: Google Satellite, April 2021 (https://qms.nextgis.com/geoservices/678/)
	Recorded monuments in the vicinity of the survey area	Date 28.03.2023	▭ Survey area ● Recorded monument 🟪 SMR zone	

Figure 2. Location of recorded archaeological sites in the vicinity of the survey areas.

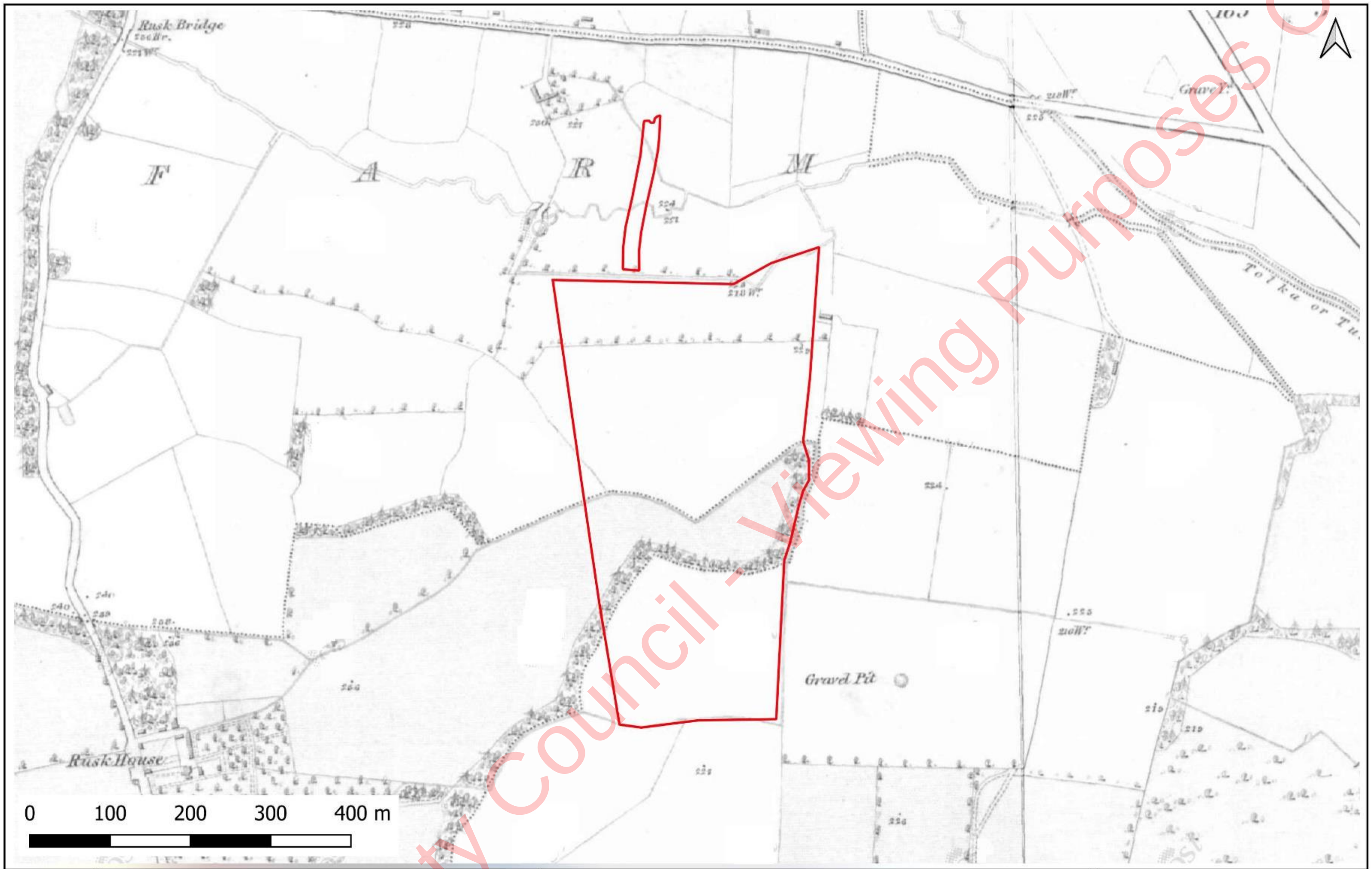

Figure 3	Castlefarm, Rusk and Clonee, Dunboyne, Co. Meath: Geophysical survey	Scale 1:6000@A4	**Legend** 🟥 Survey area	Source of background mapping: Archaeological Survey of Ireland (https://maps.archaeology.ie/ HistoricEnvironment/)
	Survey area overlaid on the first-edition six-inch Ordnance Survey Map (1837—42)	Date 28.03.2023		

Figure 3. The survey areas overlaid on the first-edition six-inch Ordnance Survey Map (1837—1842).

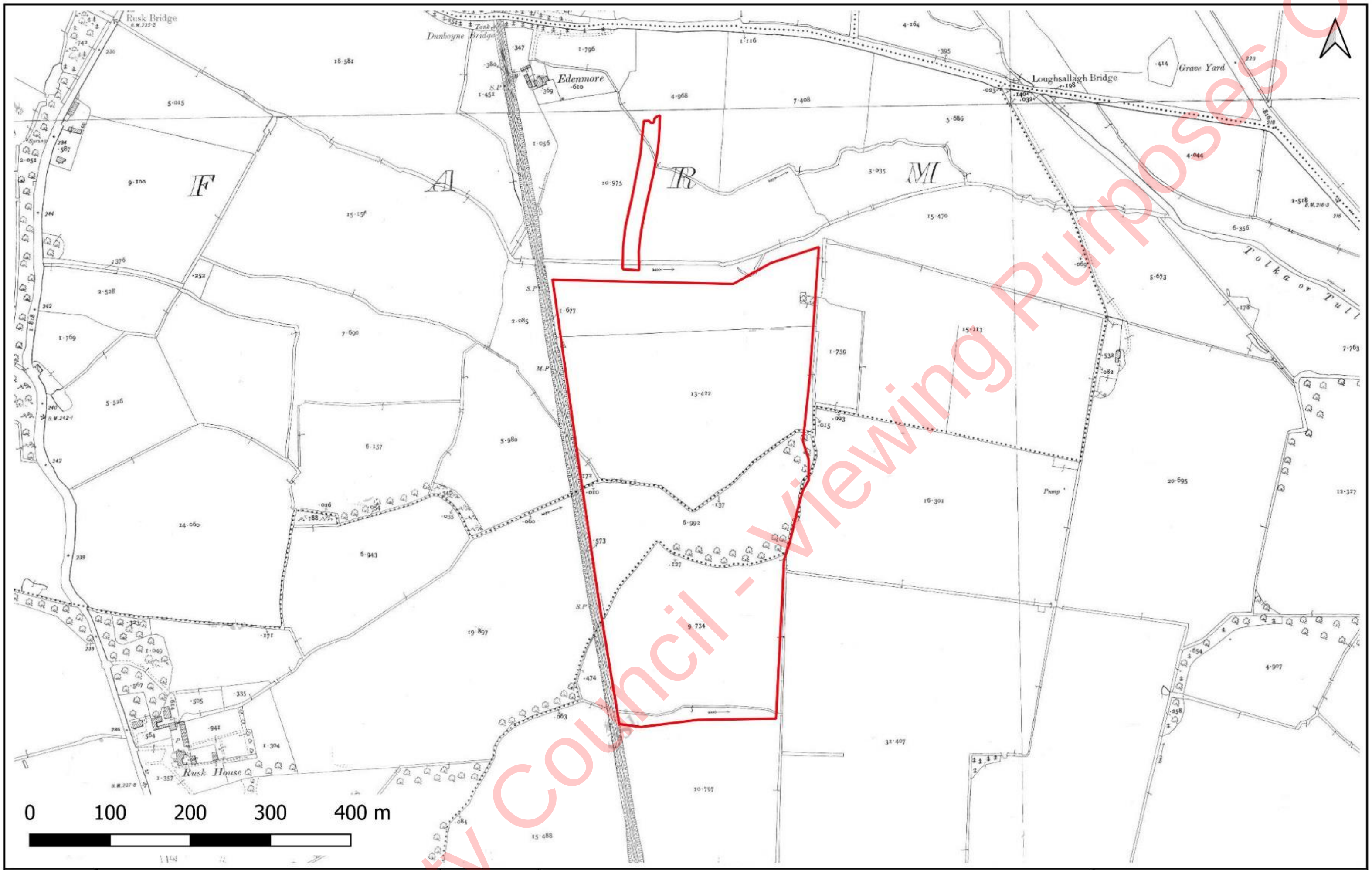

Figure 4	Castlefarm, Rusk and Clonee, Dunboyne, Co. Meath: Geophysical survey	Scale 1:6000@A4	**Legend**	Source of background mapping: Archaeological Survey of Ireland (https://maps.archaeology.ie/HistoricEnvironment/)
	Survey area overlaid on the first-edition 25-inch Ordnance Survey Map (1888—1913)	Date 28.03.2023	🟥 Survey area	

Figure 4. The survey area overlaid on the first-edition 25-inch Ordnance Survey Map (1888—1913).

Figure 5	Castlefarm, Rusk and Clonee, Dunboyne, Co. Meath: Geophysical survey	Scale 1:6000@A4	**Legend** ▭ Survey area	Source of background mapping: Google Satellite, April 2021 (https://qms.nextgis.com/geoservices/678/)
	Survey area	Date 28.03.2023		

Figure 5. The survey area.

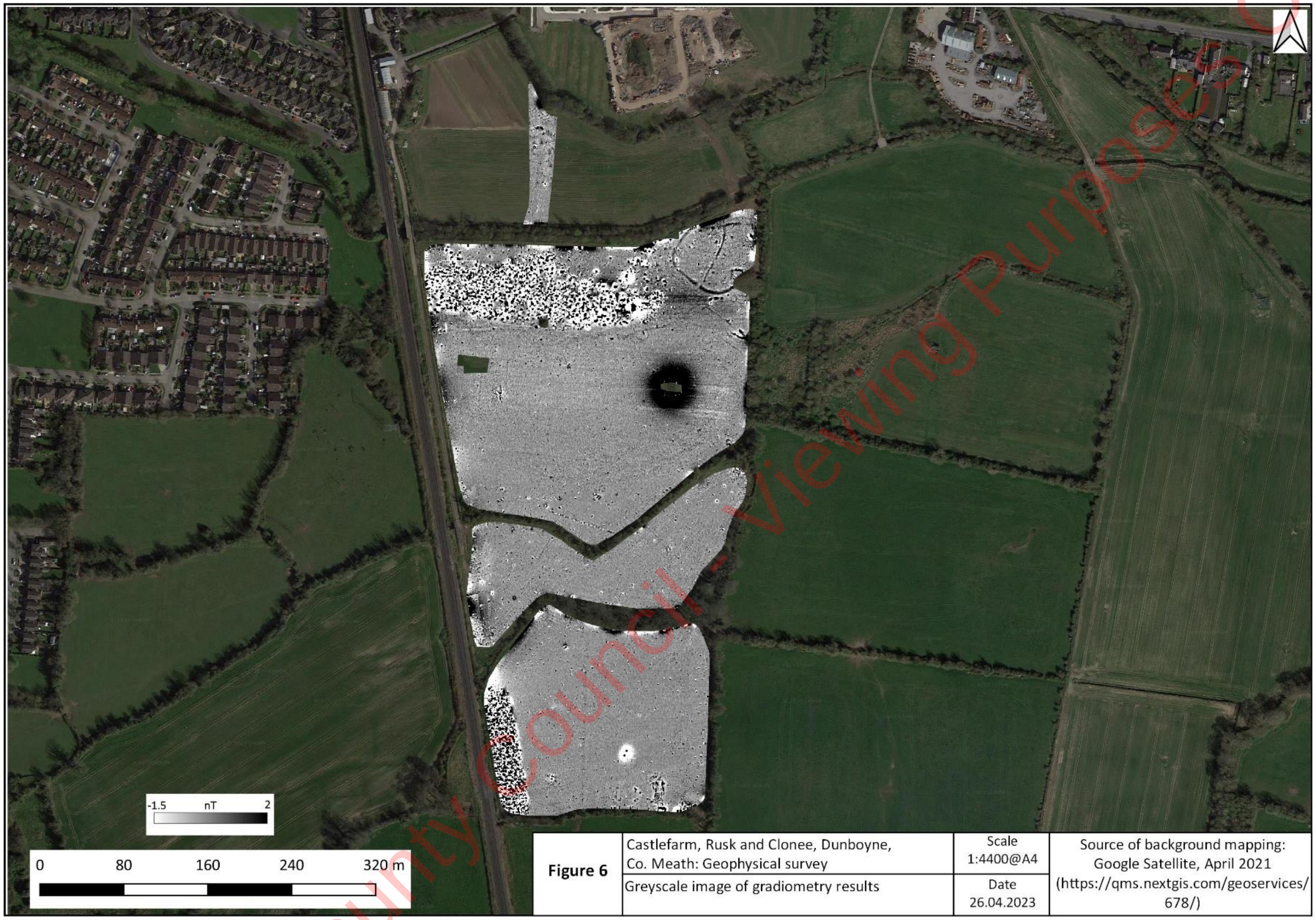

Figure 6. Greyscale image of gradiometry results.

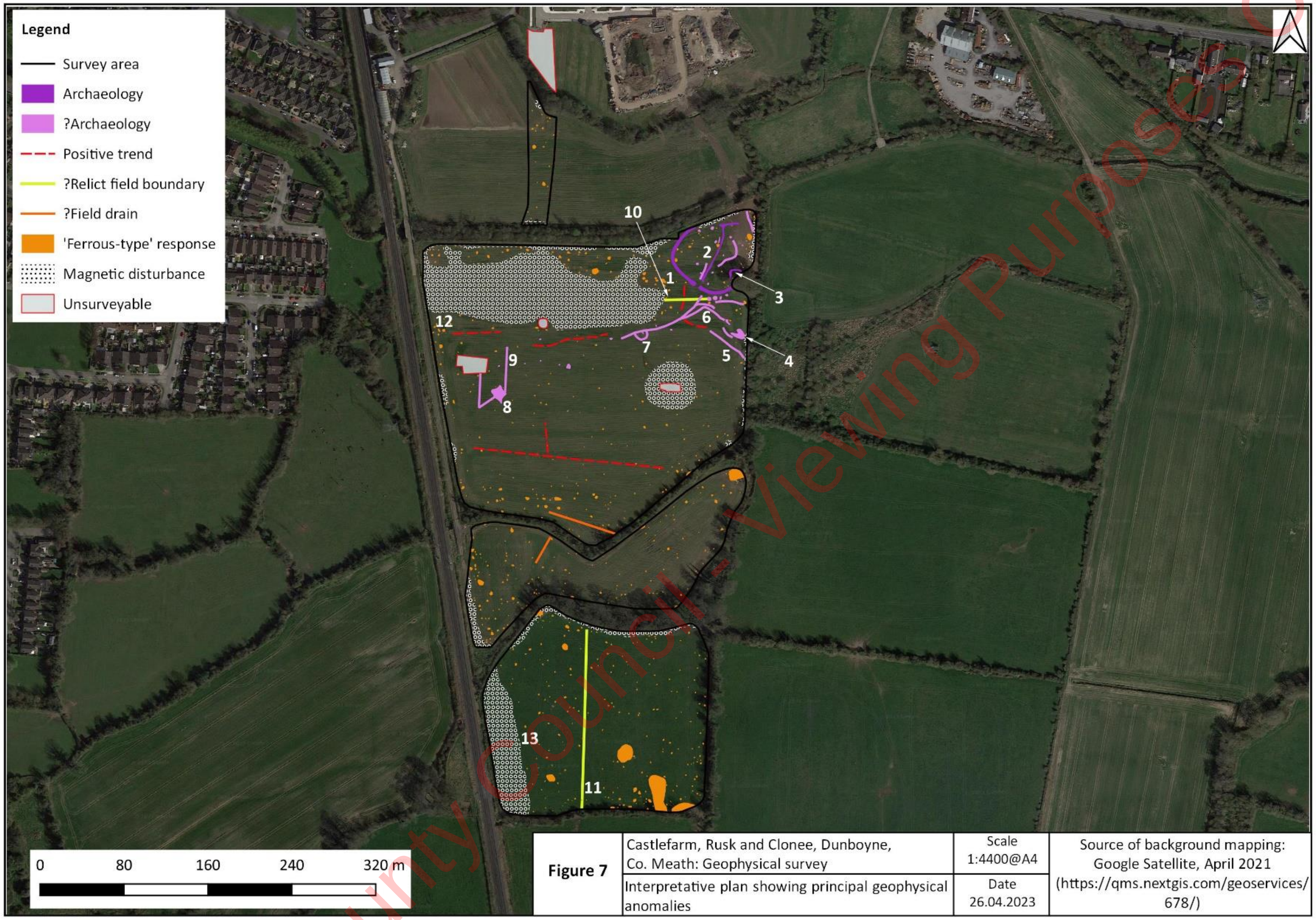

Figure 7. Interpretative plan showing principal geophysical anomalies.

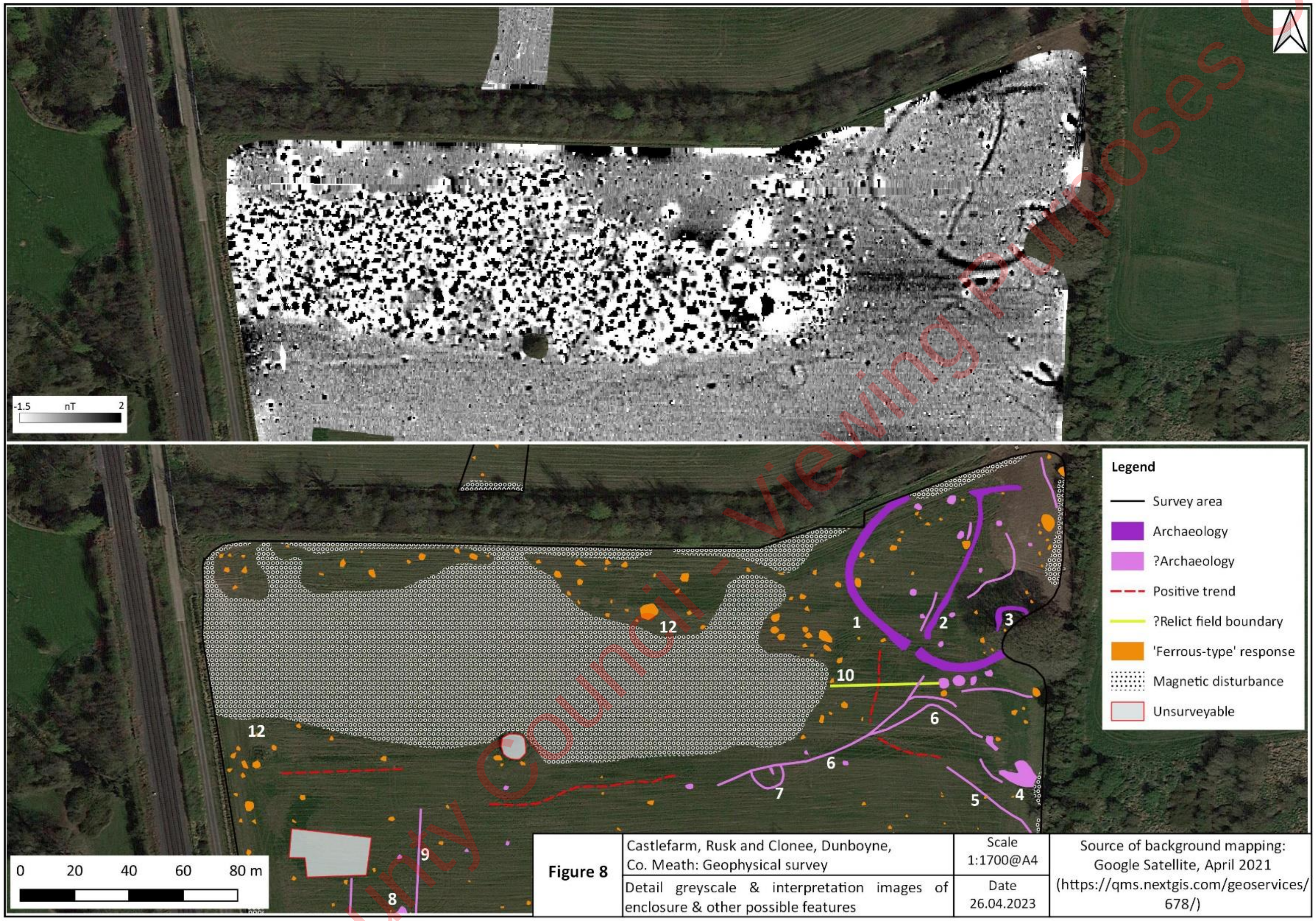

Figure 8. Detail greyscale and interpretation images of enclosure [1] and other possible features.

12 Plates

Plate 1. Location of proposed access road (northern field), viewed from the west.

Plate 2. Looking southeast across the large field directly south of proposed access road.

Plate 3. Southern field, looking northwest.

Plate 4. Low embankment (arrowed) next to rail line in southern field, looking southwest.

Plate 5. Shed in southern field, viewed from the east.