APPENDICES

APPENDIX A

Kildare County Council

Environment Section

Waste Management Act 1996 - 2011, Section 22 Site

Greenhills, Athy, Co. Kildare

Conceptual Site Model and Risk Assessment.

Index

Kildare County Council,
Environment Section

Greenhills Refuse Depot, Athy, Co. Kildare

Site Summary

Relevant Risk Screening Parameters.

Name: Greenhills Refuse Depot, Athy, Co. Kildare
Source: Municipal Waste 1st January '80 to 31st December '85.
Geology: Milford Formation Peloidal Calcarenitic Limestone
Groundwater: Inner Source Protection Area, Extreme Vulnerability (SI/E).
Surface Water: The River Barrow adjoins the waste site. The Grand Canal is 335m from the waste site
Human Presence: Nearest dwellings 15m west of the landfill site and the pool is on the landfill site.
Protected Areas: The River Barrow adjoins the waste site. The river Barrow is an SAC.
SPR Linkage: SPR8 score of 70% for leachate migration to Surface Water Body i.e. the River Barrow.
SPR9 Score of 70%leachate migration to a protected area (SWDTE)
SPR10 Score of 70% for landfill gas migration affecting humans as there is a swimming pool on the site and dwellings within 15m of the landfill site.

Risk Classification: **High Risk**

Background

Location Appendix 1: Site Location Map
Greenhill Refuse Depot is located adjacent to a residential area of Athy Town. A swimming pool was built on the landfill site and large residential areas are located to the west of east of the landfill site. The River Barrow separates the waste body and the housing estate to the east.

The River Barrow adjoins the Greenhills Refuse Depot along the eastern boundary of the site.

There are 2 public ground water wells located to the north of the site.

Desk Top Study

Kildare County Council's files on the Greenhills Refuse Depot do not indicate the nature of the waste material deposited at the site.

The site was used as a refuse depot for the period 1st January 1980 to 31st December 1985 approx.
The site has been capped with clay.

Walkover Survey (Appendix 7)

The exact extent of the Greenhills Refuse Depot in Athy, Co. Kildare is estimated to match the footprint of the area outlined in red, on the maps in Appendix 1.

The plan area is approximately 4 hectares.
The current land use of the site consists of a swimming pool development and its associated car park with green open space to the north and south of the site. There is a slightly raised grass area to the west of the site.
The area to the west of the landfill is residential.
There is a slight slope from the swimming pool development to the River Barrow to the east.

There is no sign of surface ponding of leachate or leachate seepage from the waste body.
There are no landfill odours.

Geology

The GSI groundwater vulnerability mapping identifies the site of the Greenhills Refuse Depot as being located within an Inner Source Protection Area and has an extreme vulnerability SI/ E zone

The Rock Type is Milford Formation Peloidal Calcarenitic Limestone.

Tier 1 Risk Assessment Findings.

Following the Tier 1 Risk Assessment carried out on the site of the Greenhills Refuse Depot a risk rating of 70% was assigned for:
SPR8: A risk rating of 70 % was assigned for leachate migration to a surface water body i.e. the River Barrow.
SPR9: A risk rating 70% was assigned for leachate migration to a protected area (SWDTE).
SPR10: A risk rating of 70% for landfill gas migration affecting humans as there is a swimming pool on the waste body and dwellings within 15m of the waste body.

Accordingly this historic unregulated waste disposal site is categorised as a High Risk site.

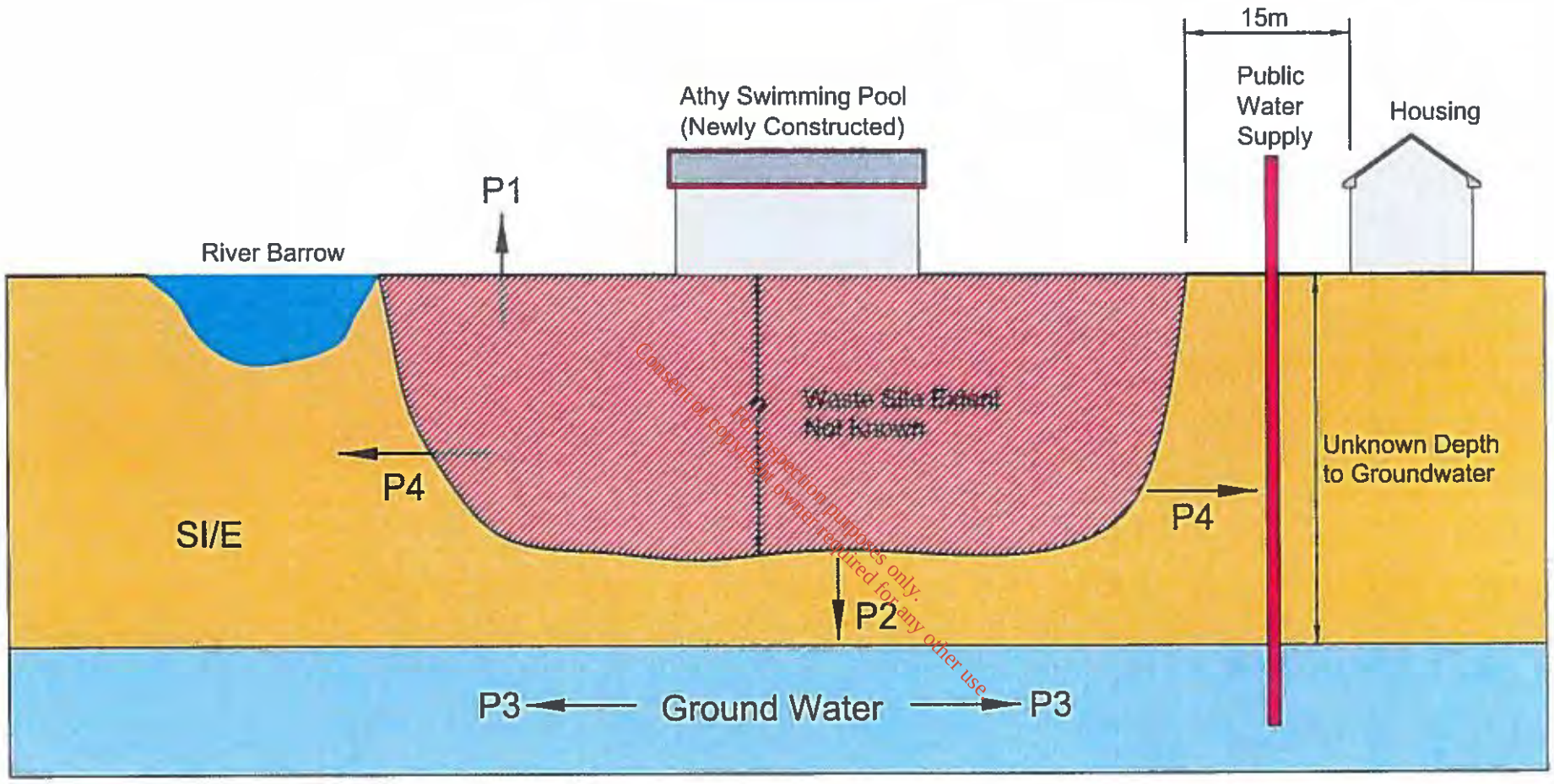
Access to site.

The portion of the site containing the Athy swimming pool development is accessible when the facility is open.
The areas outside the swimming pool development to the north, south and west of the site are accessible from the residential area.

Ciara Corrigan,
Assistant Environmental Scientist,
Environment Section.

Michael Holligan,
Senior Engineer,
Environment Section.

Section 1: Conceptual Site Model, Risk Screening and Prioritisation



NOTES:

Waste Body

P1: Outdoor Inhalation
P2: Unsaturated Zone
P3: Saturated Zone
P4: Gas Migration

TITLE: *Environmental Risk Assessment for Unregulated Waste Disposal Sites*

DRAWING NUMBER: ERA / GH / CON

KILDARE COUNTY COUNCIL
Environment Section
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DIRECTOR OF SERVICES: JOE BOLAND
SENIOR ENGNEER: MICHAEL HOLLIGAN

PROJECT: Conceptual Site Model

DRAWING: Greenhills Refuse Depot, Athy

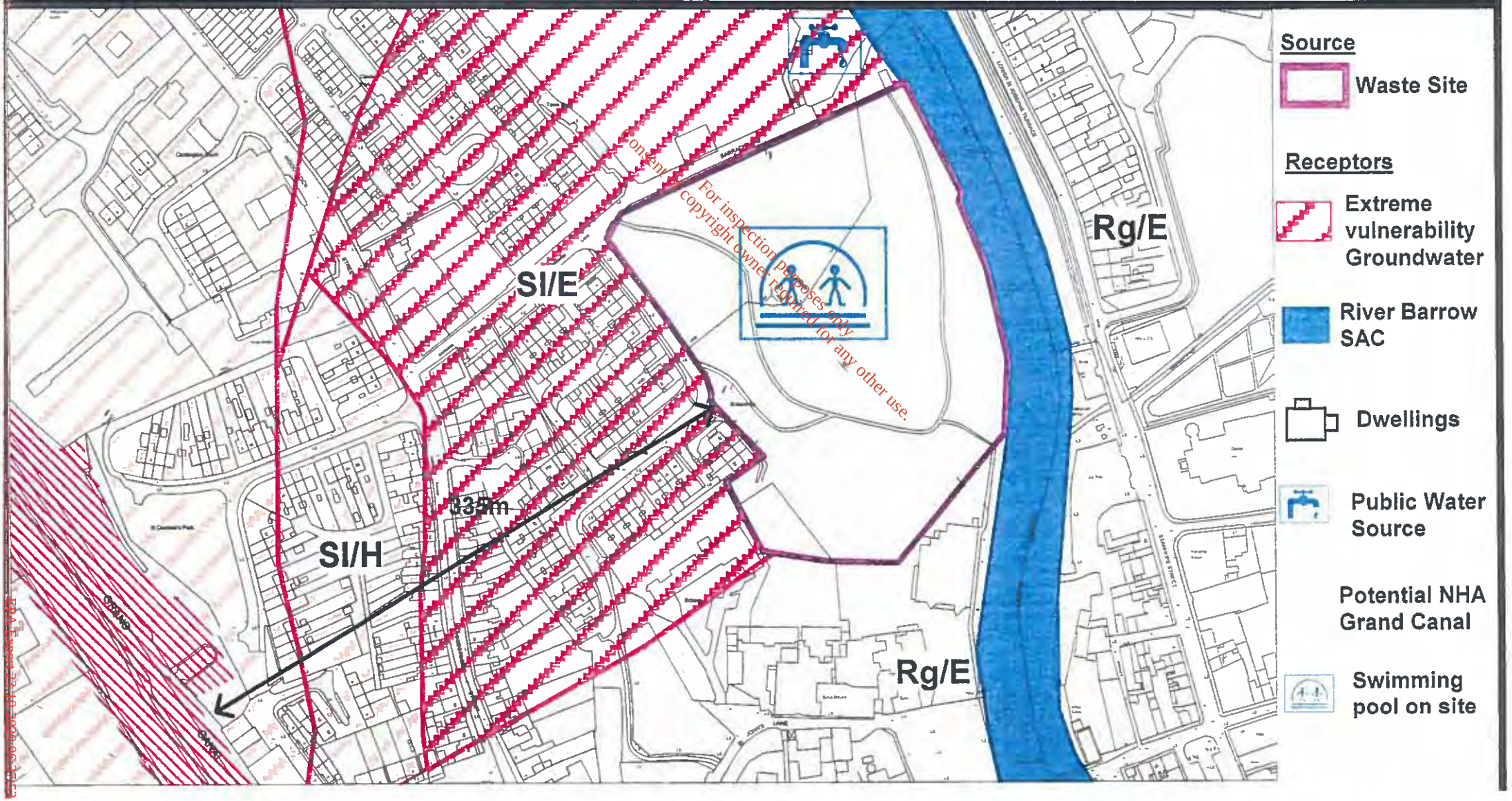
Scale:	Date:	Drawn by:
N.T.S.	Sept. 2011	D.O.B.

Kildare County Council
Environment Section

Waste Management Act 1996 - 2008
Section 22 Site

Site: Greenhills, Athy

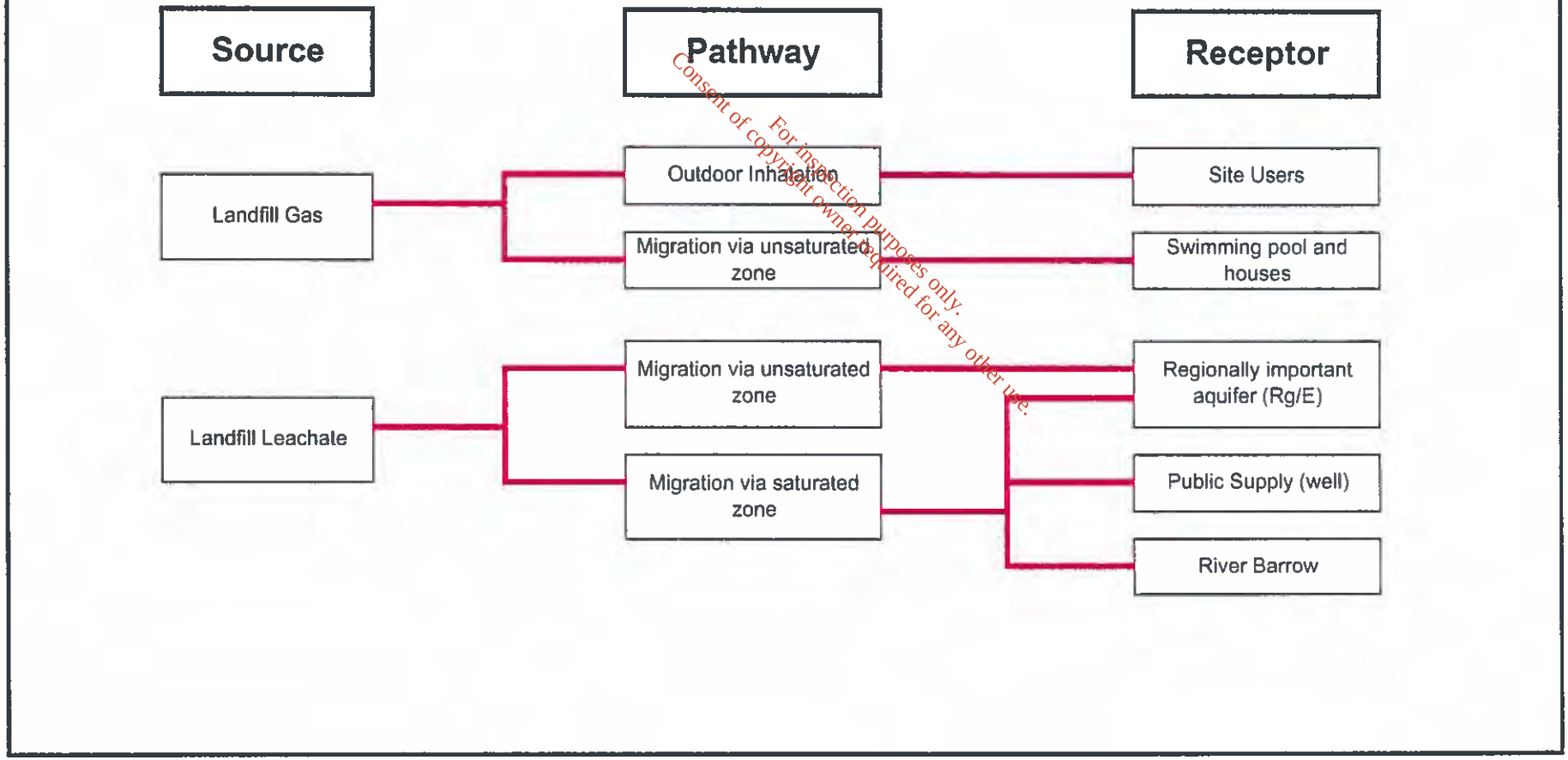
Conceptual Site Model - Site Plan Rev1



Kildare County Council
Environment Section

Waste Management Act 1996-2008
Section 22 Sites

Greenhills Refuse Depot, Athy | **Conceptual Site Model - Network Diagram**



Site : Greenhills, Athy

Table	Score	Rationale
1a: Leachate Hazard	7	Municipal waste in an area of approx 3.7ha
1b: Landfill Gas Hazard	7	Municipal waste in an area of approx 3.7ha
2a: Leachate Migration - GW Vulnerability	3	Extreme Vulnerability
2b: Leachate Migration - GW Flow Regime	2	Gravel ground water bodies (Rg)
2C: Leachate Migration - SW Drainage	2	River runs beside the site
2d: Landfill Gas - Laterial Migration	3	Receptor located within 250m of source and in a gravel area
2e: Landfill Gas - Vertical Migration	0	Prior to current swimming pool development there was no receptor above source
3a: Leachate Migration - Human Presence	3	Receptor within 50m
3b: Leachate Migration - Protected Area	3	SAC runs along the boundary
3c: Leachate Migration - Aquifier Category	5	Regionally Important Aquifer
3d: Leachate Migration - Public Water Supply	7	Public well withiun 100m of source
3e: Leachate Migration - Surface Watewr Bobied	3	River runs beside the site
3f: Landfill Gas - Human Presence	5	Receptor within 50m

SPR (Source Pathway Receptor) Linkage

SPR 1= 1a X (2a + 2b + 2c) X 3e
SPR 2= 1a X (2a + 2b + 2c) X 3b (SWDTE)
SPR 3= 1a X (2a + 2b) X 3a
SPR 4= 1a X (2a + 2b) X 3b
SPR 5= 1a X (2a + 2b) X 3c
SPR 6= 1a X (2a + 2b) X 3d
SPR 7= 1a X (2a + 2b) X 3e
SPR 8= 1a X 2c X 3e
SPR 2= 1a X 2c X 3b (SWDTE)
SPR 10= 1b X 2d X 3f
SPR 11= 1b X 2e X 3f

	Site score	Max score	%
SPR 1:	147	300	49.00%
SPR 2:	147	300	49.00%
SPR 3:	105	240	43.75%
SPR 4:	105	240	43.75%
SPR 5:	175	400	43.75%
SPR 6:	245	560	43.75%
SPR 7:	105	240	43.75%
SPR 8:	42	60	70.00%
SPR 9:	42	60	70.00%
SPR 10:	105	150	70.00%
SPR 11:	0	250	0.00%

High Risk (Class A) site

Site: Greenhills Athy

Table 1a: LEACHARE: SOURCE/HAZARD SCORING MATRIX

WASTE TYPE	WASTE FOOTPRINT (ha)		
	≤ 1 ha	>1≤ 5 ha	> 5 ha
C&D[20]	0.5	1	1.5
Municipal[21]	5	7	10
Industrial[22]	5	7	10
Pre 1977 sites[23]	1	2	3
		Max	10

1a	7

Table 1b: LANDFILL GAS: SOURCE/HAZARD SCORING MATRIX

WASTE TYPE	WASTE FOOTPRINT (ha)		
	≤ 1 ha	>1≤ 5 ha	> 5 ha
C&D[20]	0.5	1	1.5
Municipal[21]	5	7	10
Industrial[22]	5	7	10
Pre 1977 sites[23]	1	2	3
		Max	10

1b	7

Table 2a: LEACHATE MIGRATION: PATHWAYS

Parameter	Points available
GROUNDWATER FLOW REGIME (Vertical Pathway)	
Extreme Vunerability	1
High Vunerability	2
Moderate Vunerability	1
Low Vunerability	0.5
High - Low Vunerability	2

2a	3

Table 2b: LEACHATE MIGRATION: PATHWAYS

Parameter	Points available
GROUNDWATER FLOW REGIME (Horizontal Pathway)	
Karstified Groundwater bodies (Rk)	5
Productive Fissured Bedrock Groundwater Bodies (Rf and Lm)	3
Gravel Groundwater bodies (Rg and Lg)	2
Poorley Productive Bedrock Ground Water Bodies (Ll, Pl, PU)	1

2b	2

Table 2c: LEACHATE MIGRATION: PATHWAYS

Parameter	Points available
SURFACE WATER DRAINAGE (surface water pathway)	
Is there a direct connection between drainage ditches associated with the waste body and adjacent surface water body? Yes	2
If no direct connection	0

2c	2

Table 2d: LANDFILL GAS. PATHWAY assuming receptor within 250m of source

Parameter	Points available		
LANDFILL GAS LATERIAL MIGRATION POTENTIAL			
Sand and gravel, Made ground, urban, Karst			
Bedrock	2		
All other Tills (including limestone, sandstone etc - moderate Permeability	1.5		
All Namurian or Irish Sea Tills (low permeability)	1		
Clay, Alluvium, Peat	1	2d	3

Table 2e: LANDFILL GAS: PATHWAY assuming receptor located above source

Parameter	Points available		
LANDFILL GAS LATERIAL MIGRATION POTENTIAL			
Sand and gravel, Made ground, urban, Karst	5		
Bedrock	3		
All other Tills (including limestone, sandstone etc - moderate Permeability	2		
All Namurian or Irish Sea Tills (low permeability)	1		
Clay, Alluvium, Peat	1	2e	0

Table 3a: LEACHATE MIGRATION: RECEPTORS

Parameter	Points available		
HUMAN PRESENCE (presence of a house indicates potential private well)			
On or within 50m of waste body			
Greater than 50m but less than 250m of the waste body	2		
Greater than 250m but less than 1km of the waste body	1		
Greater than 1km of the waste body	0	3a	3

Table 3b: LEACHATE MIGRATION: RECEPTORS

Parameter	Points available		
PROTECTED AREAS (SWDTE or GWDTE)			
On or within 50m of waste body			
Greater than 50m but less than 250m of the waste body	2		
Greater than 250m but less than 1km of the waste body	1		
Greater than 1km of the waste body	0		
Undesignated sites within 50m of waste body	1		
Undesignated sites greater than 50m but less than 250m of the waste body	0.5		
Undesignated sites greater than 250m of the waste body	0	3b	3

Table 3c: LEACHATE MIGRATION: RECEPTORS

Parameter	Points available
AQUIFER CATEGORY (resource potential)	
Regionally Important Aquifer (Rk, Rf, Rg)	5
Locally Important Aquifer (Ll, Lm, Lg)	3
Poor Aquifer (Pl, Pu)	1

3c	5

Table 3d: LEACHATE MIGRATION: RECEPTORS

Parameter	Points available
PUBLIC WATER SUPPLY (other than private wells)	
Within 100m of site boundary	7
Greater than 100m but less than 300m or within Inner SPA (SI) for GW supplies	5
Greater than 300m but less than 1km or within Outer SPA (SO) for GW supplies	3
Greater than 1km (karst aquifier)	3
Greater than 1km (no karst aquifier)	0

3d	7

Table 3e: LEACHATE MIGRATION: RECEPTORS

Parameter	Points available
SURFACE WATER BODIES	
Within 50m of site boundary	3
Greater than 50m but less than 250m	2
Greater than 250m but less than 1km	1
Greater than 1km	0

3e	3

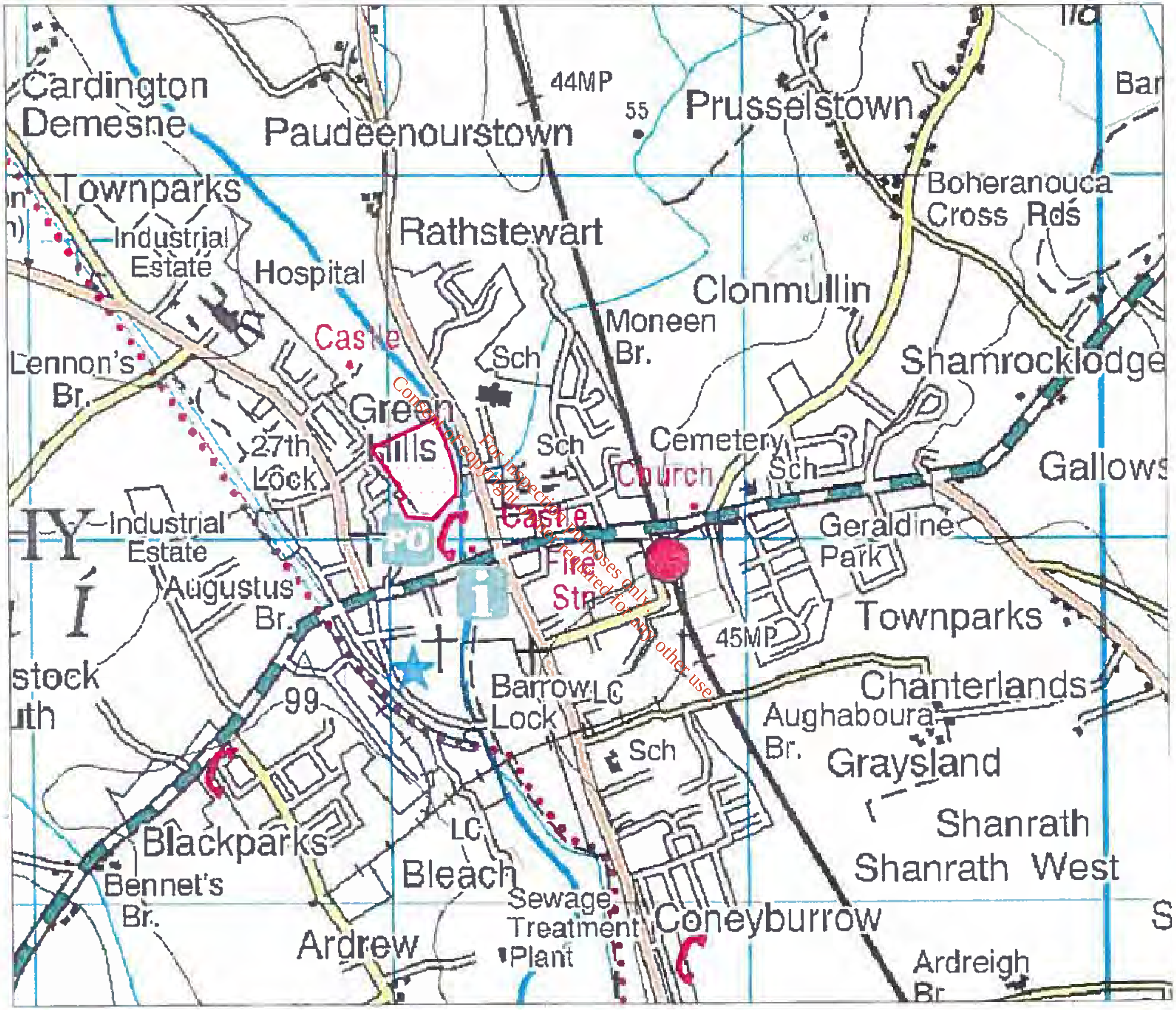
Table 3f: LANDFILL GAS: RECEPTORS

Parameter	Points available
HUMAN PRESENCE	
On site or within 50m of site boundary	5
Greater than 50m but less than 150m	3
Greater than 150m but less than 250m	1
Greater than 250m	0.5

3f	5

Appendix 1: Site Location Map.

Gre?nhills Refuse De?ot, Athy



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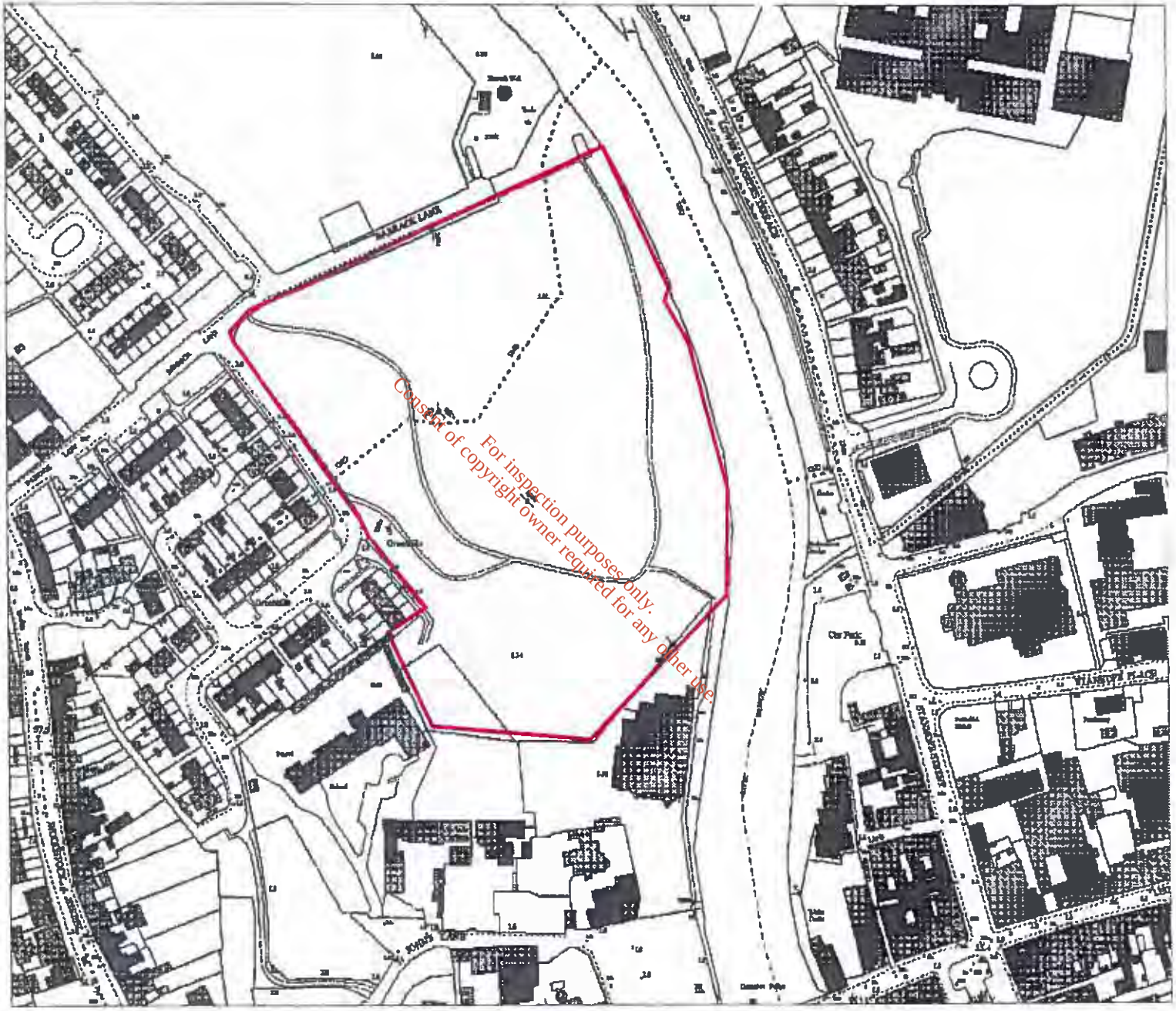
Greenhills Refuse Depot, Athy



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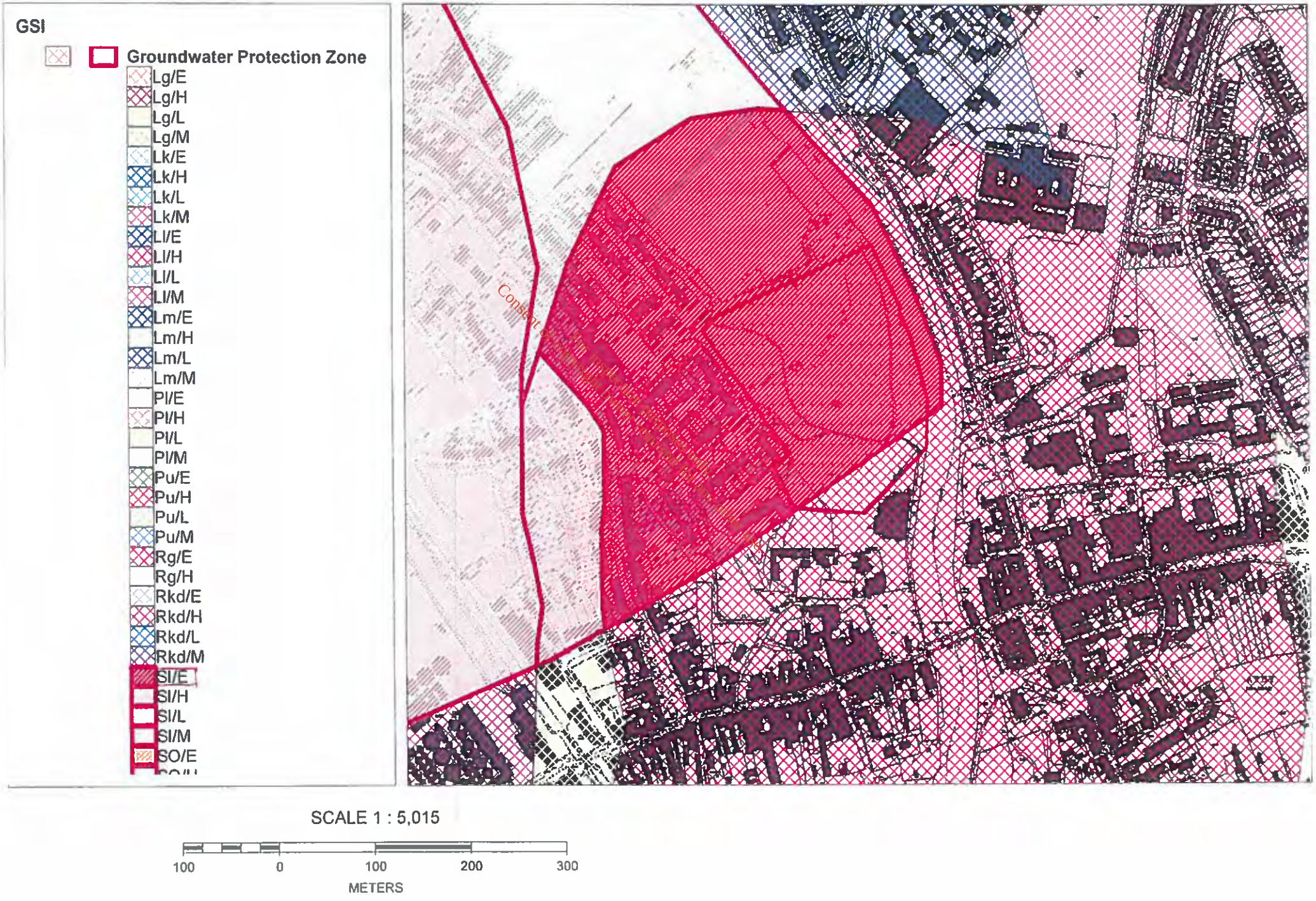
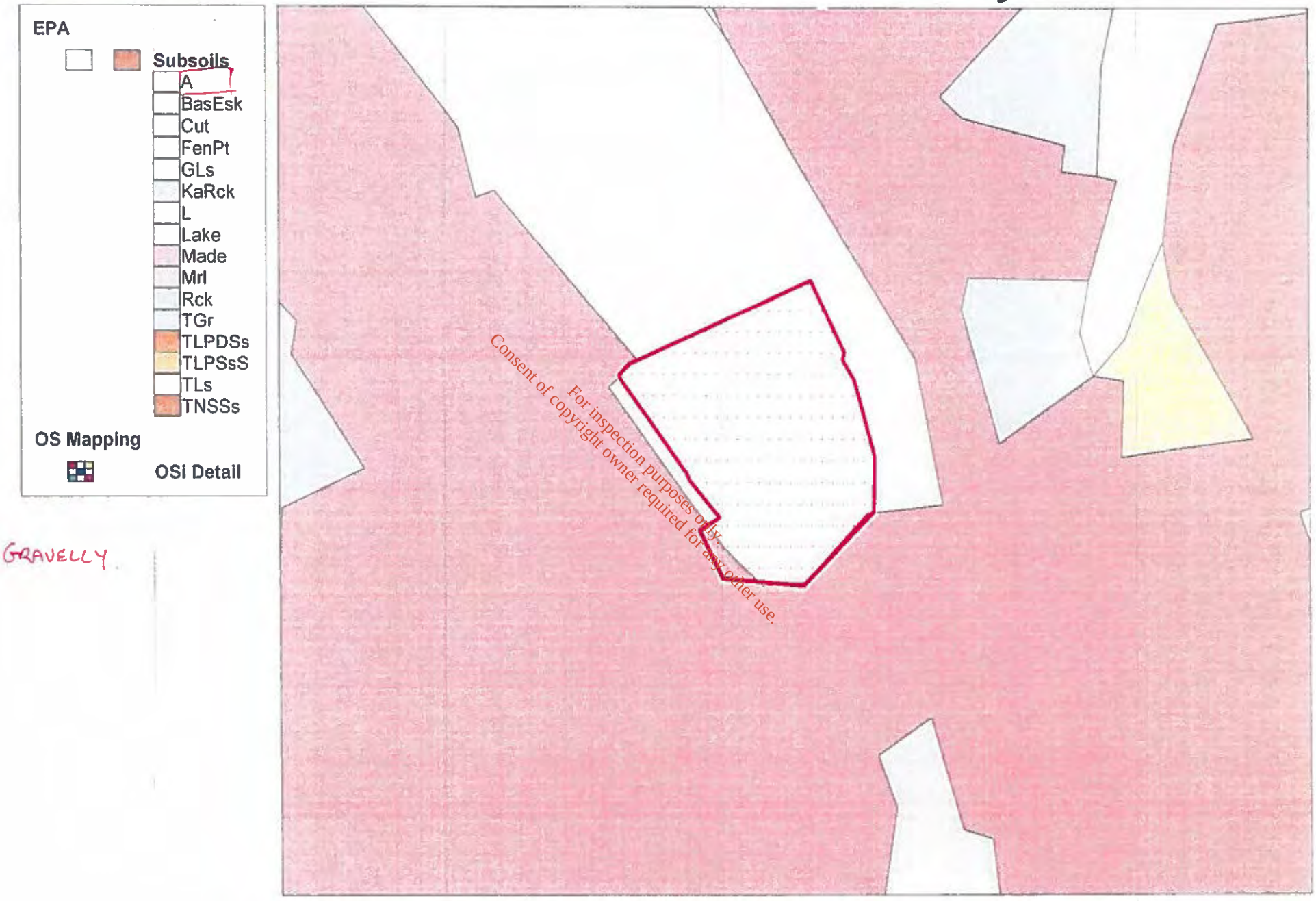
Appendix 2: Ground Water Protection Map.

Greenhills Refuse Depot, Athy



Appendix 3: Subsoil Map.

Greenhills Refuse Depot, Athy



A - GRAVELLY.

Appendix 4: NHA, SAC.

Greenhills Refuse Depot, Athy

Appendix 5: Photographs of site

Photograph 1: Swimming Pool Development

Photograph 2: View of River Barrow and grass area

Photograph 3: Residential Area west of site

Photograph 4: Residential Area west of site

Photograph 5: River Barrow east of site

Photograph 6: Public Water Supply north of site

Appendix 6: Cost Estimate

Appendix 7: Walkover Survey Checklist

Walkover Survey Checklist

Section 22 - Waste Management Act 1996-2011

Location: Greenhills Refuse Depot

Information	Checked	Comment (include distances from site boundary)
1. What is the current land use?		Swimming Pool Development and grass area
2. What are the neighbouring land uses?		Green area open space, residential areas 15 metres from the landfill site. The River Barrow adjoins the waste site
3.What is the size of the site?		The site is approximately 3.7 hectares in size
4. What is the topography?		It slopes towards the River Barrow. The land is flat close to the river Barrow
5. Are there potential receptors (if yes give details)?		
Houses		Yes
Surface water featyres (if yes distance and direction of flow)		The River Barrow adjoins the landfill site
Public Water Supplies		There are 2 public wells beside the site.
Private Wells		
Services		
Other Buildings		Swimming pool development
Other		
6. Are there any potential sources of contamination (if yes give details)?		
Surface waste (if yes what type)		No surface water visible
Surface ponding of leachate		No
Leachate seepage		No

Landfill gas odours		No
7. Are there any outfalls to surface water? (If so are there discharges and what is the nature of the discharge)		None visible
8. Are there any signs of impact on the environment? (If yes take photographic evidence)		
Vegetation die off bare ground		No
Leachage seepages		No
Odours		No
Litter		No litter on site
Gas bubbling through water		No
Signs of settlement, subsidence, water logged areas		No settlement visible
Drainage of hydraulic issues		No
Downstream water quality appears poorer than upstream quality		Not tested
9. Are there any indication of remedial measures		
Capping		Clay Cap
Landfill gas collection		No
Leachate collection		No
10. Describe fences and security features (if any)		The swimming pool development has fencing around it. The rest of the landfill site is in a public grass area.
Any other relevant information		

APPENDIX B

Table 1a: Leachate: Source/hazard Scoring Matrix

Waste Type	Waste Footprint (ha)		
	≤ 1 ha	> 1 ≤ 5 ha	>5
C&D[1]	0.5	1	1.5
Municipal[2]	5	7	10
Industrial[3]	5	7	10
Pre 1977 sites[4]	1	2	3
		Max	*10*
		Result (1a)	**7**

Table 1b: Landfill Gas: Source/hazard Scoring Matrix

Waste Type	Waste Footprint (ha)		
	≤ 1 ha	> 1 ≤ 5 ha	>5
C&D[1]	0.5	0.75	1
Municipal[2]	5	7	10
Industrial[3]	3	5	7
Pre 1977 sites[4]	0.5	0.75	1
		Max	*10*
		Result (1b)	**7**

Table 2a: Leachate Migration: Pathways

Parameters		Points Available
Groundwater Vulnerability (Vertical Pathway)		
Extreme Vulnerability		3
High Vulnerability		2
Moderate Vulnerability		1
Low Vulnerability		0.5
High – Low Vulnerability		2
	Max	*3*
	Result (2a)	**1**

Table 2b: Leachate Migration: Pathways

Parameters		Points Available
Groundwater Flow Regime (Horizontal Pathway)		
Karstified Groundwater Bodies (Rk)[5]		5
Productive Fissured Bedrock Groundwater Bodies (Rf and Lm)[5]		3
Gravel Groundwater Bodies (Rg and Lg)[5]		2
Poorly Productive Bedrock Groundwater Bodies (Li, Pl, Pu)[5]		1
	Max	*5*
	Result (2b)	**5**

[1] Predominantly inert waste with low biodegradable fraction and/or small industrial waste fraction.
[2] Typically non-hazardous domestic waste (highly biodegradable) with potentially small hazardous waste fraction and/or small industrial waste fraction, e.g. town dump.
[3] Generally industrial waste where hazardous waste was known to have been deposited or there is a strong likelihood that hazardous waste was deposited due to the close proximity of such industries.
[4] Pre 1977 wastes would have been substantially degraded within the landfill.
[5] Refer to DEHLG/EPA/GSI 1999, Groundwater Protection Scheme.

Table 2c: Leachate Migration: Pathways

Parameters		Points Available
Surface Water Drainage[6] (surface water pathway)		
Is there a direct connection between drainage ditches associated with the waste body and adjacent surface water body? Yes		2
If no direct connection		0
	Max	*2*
	Result (2c)	**2**

Table 2d: Landfill Gas: Pathways (assuming receptor within 250m of source)

Parameters		Points Available
Landfill Gas Lateral Migration Potential		
Sand and Gravel, Made ground, urban, karst		3
Bedrock		2
All other tills (including limestone, sandstone etc – moderate permeability)		1.5
All Namurian or Irish Sea Tills (low permeability)		1
Clay, Alluvium, Peat		1
	Max	*3*
	Result (2d)	**3**

Table 2e: Landfill Gas: Pathways (assuming receptor located above source)

Parameters		Points Available
Landfill Gas Vertical (upwards) Potential		
Sand and Gravel, Made ground, urban, karst		5
Bedrock		3
All other tills (including limestone, sandstone etc – moderate permeability)		2
All Namurian or Irish Sea Tills (low permeability)		1
Clay, Alluvium, Peat		1
	Max	*5*
	Result (2e)	**1**

Table 3a: Leachate Migration: Receptors

Parameters		Points Available
Human Presence (presence of a house indicates potential private wells)		
On or within 50m of the waste body		3
Greater than 50m but less than 250m of the waste body		2
Greater than 250m but less than 1km of the waste body		1
Greater than 1km of the waste body		0
	Max	*3*
	Result (3a)	**3**

[6] This element needs to be determined during the site inspection (including walkover survey). The presence of a direct link between surface water drainage from the waste body and any adjacent surface water body implies the existence of a pathway.

Table 3b: Leachate Migration: Receptors

Parameters		Points Available
Protected Areas (SWDTE or GWDTE)		
Within 50m of the waste body		3
Greater than 50m but less than 250m of the waste body		2
Greater than 250m but less than 1km of the waste body		1
Greater than 1km of the waste body		0
Undesignated sites[7] within 50m of site of the waste body		1
Undesignated sites[7] greater than 50m but less than 250m of the waste body		0.5
Undesignated sites[7] greater than 250m of the waste body		0
	Max	*3*
	Result (3b)	**3**

Table 3c: Leachate Migration: Receptors

Parameters		Points Available
Aquifer Category[8] (resource potential)		
Regionally Important Aquifers (Rf, Rk, Rg)		5
Locally Important Aquifers (Li, Lm, Rg)		3
Poor Aquifers (Pl, Pu)		1
	Max	*5*
	Result (3c)	**5**

Rk Regionally Important Karstified Aquifers
Rf Regionally Important Fissured Bedrock Aquifers
Rg Regionally Important Extensive Sand/Gravel Aquifers
Ll Locally Important Sand/Gravel Aquifers
Lm Locally Important Bedrock Aquifers – Generally Moderately productive
Lg Locally Important Bedrock Aquifers – Generally productive only in local zones
Pl Poor Bedrock Aquifers - Generally unproductive except in local zones
Pu Poor Bedrock Aquifers - Generally unproductive

Table 3d: Leachate Migration: Receptors

Public Water Supplies (other than private wells)		
Within 100m of site boundary		7
Greater than 100m but less than 300m or within Inner SPA (SI) for GW supplies		5
Greater than 300m but less than 1km or within Outer SPA (SO) for GW supplies		3
Greater than 1km (karst aquifer)		3
Greater than 1km (no karst aquifer)		0
	Max	*7*
	Result (3d)	**7**

[7] The term "Undesignated sites" refers to wetland sites that are not designated under the Habitats or Bird Directive or Wildlife Act but are considered on a local scale. Consultation with NPWS is required to identify such sites.
[8] (DOHLG/EPA/GSI 1999) Groundwater Protection Scheme

Table 3e: Leachate Migration: Receptors

Parameters		Points Available
Surface Water Bodies		
Within 50m of site boundary		3
Greater than 50m but less than 250m		2
Greater than 250m but less than 1km		1
Greater than 1km		0
	Max	*3*
	Result (3e)	**3**

Table 3f: Leachate Gas: Receptors

Parameters		Points Available
Human Presence		
On site or within 50m of site boundary		5
Greater than 50m but less than 150m		3
Greater than 150m but less than 250m		1
Greater than 250m		0.5
	Max	*5*
	Result (3f)	**5**

Table 1a: Leachate: Source/hazard Scoring Matrix

Waste Type	Waste Footprint (ha)		
	≤ 1 ha	> 1 ≤ 5 ha	>5
C&D[1]	0.5	1	1.5
Municipal[2]	5	7	10
Industrial[3]	5	7	10
Pre 1977 sites[4]	1	2	3
		Max	*10*
		Result (1a)	**7**

Table 1b: Landfill Gas: Source/hazard Scoring Matrix

Waste Type	Waste Footprint (ha)		
	≤ 1 ha	> 1 ≤ 5 ha	>5
C&D[1]	0.5	0.75	1
Municipal[2]	5	7	10
Industrial[3]	3	5	7
Pre 1977 sites[4]	0.5	0.75	1
		Max	*10*
		Result (1b)	**7**

Table 2a: Leachate Migration: Pathways

Parameters		Points Available
Groundwater Vulnerability (Vertical Pathway)		
Extreme Vulnerability		3
High Vulnerability		2
Moderate Vulnerability		1
Low Vulnerability		0.5
High – Low Vulnerability		2
	Max	*3*
	Result (2a)	**3**

Table 2b: Leachate Migration: Pathways

Parameters		Points Available
Groundwater Flow Regime (Horizontal Pathway)		
Karstified Groundwater Bodies (Rk)[5]		5
Productive Fissured Bedrock Groundwater Bodies (Rf and Lm)[5]		3
Gravel Groundwater Bodies (Rg and Lg)[5]		2
Poorly Productive Bedrock Groundwater Bodies (Li, Pl, Pu)[5]		1
	Max	*5*
	Result (2b)	**2**

[1] Predominantly inert waste with low biodegradable fraction and/or small industrial waste fraction.
[2] Typically non-hazardous domestic waste (highly biodegradable) with potentially small hazardous waste fraction and/or small industrial waste fraction, e.g. town dump.
[3] Generally industrial waste where hazardous waste was known to have been deposited or there is a strong likelihood that hazardous waste was deposited due to the close proximity of such industries.
[4] Pre 1977 wastes would have been substantially degraded within the landfill.
[5] Refer to DEHLG/EPA/GSI 1999, Groundwater Protection Scheme.

Table 2c: Leachate Migration: Pathways

Parameters		Points Available
Surface Water Drainage[6] (surface water pathway)		
Is there a direct connection between drainage ditches associated with the waste body and adjacent surface water body? Yes		2
If no direct connection		0
	Max	*2*
	Result (2c)	**0**

Table 2d: Landfill Gas: Pathways (assuming receptor within 250m of source)

Parameters		Points Available
Landfill Gas Lateral Migration Potential		
Sand and Gravel, Made ground, urban, karst		3
Bedrock		2
All other tills (including limestone, sandstone etc – moderate permeability)		1.5
All Namurian or Irish Sea Tills (low permeability)		1
Clay, Alluvium, Peat		1
	Max	*3*
	Result (2d)	**1**

Table 2e: Landfill Gas: Pathways (assuming receptor located above source)

Parameters		Points Available
Landfill Gas Vertical (upwards) Potential		
Sand and Gravel, Made ground, urban, karst		5
Bedrock		3
All other tills (including limestone, sandstone etc – moderate permeability)		2
All Namurian or Irish Sea Tills (low permeability)		1
Clay, Alluvium, Peat		1
	Max	*5*
	Result (2e)	**1**

Table 3a: Leachate Migration: Receptors

Parameters		Points Available
Human Presence (presence of a house indicates potential private wells)		
On or within 50m of the waste body		3
Greater than 50m but less than 250m of the waste body		2
Greater than 250m but less than 1km of the waste body		1
Greater than 1km of the waste body		0
	Max	*3*
	Result (3a)	**3**

[6] This element needs to be determined during the site inspection (including walkover survey). The presence of a direct link between surface water drainage from the waste body and any adjacent surface water body implies the existence of a pathway.

Table 3b: Leachate Migration: Receptors

Parameters		Points Available
Protected Areas (SWDTE or GWDTE)		
Within 50m of the waste body		3
Greater than 50m but less than 250m of the waste body		2
Greater than 250m but less than 1km of the waste body		1
Greater than 1km of the waste body		0
Undesignated sites[7] within 50m of site of the waste body		1
Undesignated sites[7] greater than 50m but less than 250m of the waste body		0.5
Undesignated sites[7] greater than 250m of the waste body		0
	Max	*3*
	Result (3b)	**3**

Table 3c: Leachate Migration: Receptors

Parameters		Points Available
Aquifer Category[8] (resource potential)		
Regionally Important Aquifers (Rf, Rk, Rg)		5
Locally Important Aquifers (Li, Lm, Rg)		3
Poor Aquifers (Pl, Pu)		1
	Max	*5*
	Result (3c)	**5**

Rk Regionally Important Karstified Aquifers
Rf Regionally Important Fissured Bedrock Aquifers
Rg Regionally Important Extensive Sand/Gravel Aquifers
Ll Locally Important Sand/Gravel Aquifers
Lm Locally Important Bedrock Aquifers – Generally Moderately productive
Lg Locally Important Bedrock Aquifers – Generally productive only in local zones
Pl Poor Bedrock Aquifers - Generally unproductive except in local zones
Pu Poor Bedrock Aquifers - Generally unproductive

Table 3d: Leachate Migration: Receptors

Public Water Supplies (other than private wells)		
Within 100m of site boundary		7
Greater than 100m but less than 300m or within Inner SPA (SI) for GW supplies		5
Greater than 300m but less than 1km or within Outer SPA (SO) for GW supplies		3
Greater than 1km (karst aquifer)		3
Greater than 1km (no karst aquifer)		0
	Max	*7*
	Result (3d)	**7**

[7] The term "Undesignated sites" refers to wetland sites that are not designated under the Habitats or Bird Directive or Wildlife Act but are considered on a local scale. Consultation with NPWS is required to identify such sites.
[8] (DOHLG/EPA/GSI 1999) Groundwater Protection Scheme

Table 3e: Leachate Migration: Receptors

Parameters		Points Available
Surface Water Bodies		
Within 50m of site boundary		3
Greater than 50m but less than 250m		2
Greater than 250m but less than 1km		1
Greater than 1km		0
	Max	*3*
	Result (3e)	**3**

Table 3f: Leachate Gas: Receptors

Parameters		Points Available
Human Presence		
On site or within 50m of site boundary		5
Greater than 50m but less than 150m		3
Greater than 150m but less than 250m		1
Greater than 250m		0.5
	Max	*5*
	Result (3f)	**5**

APPENDIX C

AGL18194_02

REPORT ON THE GEOPHYSICAL INVESTIGATION AT GREENHILS LANDFILL ATHY, CO. KILDARE, FOR MALONE O'REGAN

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24TH JUNE 2019

PRIVATE AND CONFIDENTIAL

THE FINDINGS OF THIS REPORT ARE THE RESULT OF A GEOPHYSICAL SURVEY USING NON-INVASIVE SURVEY TECHNIQUES CARRIED OUT AT THE GROUND SURFACE. INTERPRETATIONS CONTAINED IN THIS REPORT ARE DERIVED FROM A KNOWLEDGE OF THE GROUND CONDITIONS, THE GEOPHYSICAL RESPONSES OF GROUND MATERIALS AND THE EXPERIENCE OF THE AUTHOR. APEX GEOSERVICES LTD. HAS PREPARED THIS REPORT IN LINE WITH BEST CURRENT PRACTICE AND WITH ALL REASONABLE SKILL, CARE AND DILIGENCE IN CONSIDERATION OF THE LIMITS IMPOSED BY THE SURVEY TECHNIQUES USED AND THE RESOURCES DEVOTED TO IT BY AGREEMENT WITH THE CLIENT. THE INTERPRETATIVE BASIS OF THE CONCLUSIONS CONTAINED IN THIS REPORT SHOULD BE TAKEN INTO ACCOUNT IN ANY FUTURE USE OF THIS REPORT.

PROJECT NUMBER	AGL18194		
AUTHOR	**CHECKED**	**REPORT STATUS**	**DATE**
TONY LOMBARD M.SC (GEOPHYSICS)	KEVIN GALVIN B.A. (MOD)	V.01	11TH JUNE 2019
TONY LOMBARD M.SC (GEOPHYSICS)	KEVIN GALVIN B.A. (MOD)	V.02	24TH JUNE 2019

CONTENTS

1. EXECUTIVE SUMMARY

APEX Geoservices Limited was requested by Malone O'Regan to carry out a geophysical investigation at the site of Greenhills Landfill in Athy, Co. Kildare. The purpose of the investigation is to assess the nature of a historical landfill on site.

Greenhills Landfill site is in a residential area in Athy, the site is c. 4Ha in extents and topography ranges from c. 52 – 60 m OD.

The Geological Survey of Ireland (GSI) maps for the area indicate the site is underlain by undifferentiated alluvial deposits with some limestone gravels in the south-west of the site and the bedrock type across the site is the Milford Formation which is described as peloidal calcarenitic limestone.

The objectives of the investigation are to aid in determination of the extent of the waste body, the thickness of the waste, the presence of anomalous features, a volume calculation and depth to bedrock (if within limits of survey).

The geophysical investigation was conducted on the 5th of November 2018 and consisted of EM Ground Conductivity mapping, Electrical Resistivity Tomography (ERT), Seismic Refraction surveying and Multi-Channel Analysis of Surface Waves (MASW) across accessible parts of the site (areas around the existing building were not surveyed).

A suite of 2019 direct investigation information, consisting of trial pits, leachate monitoring wells and groundwater wells, was supplied by the client for incorporation into this report. The trial pits encountered made ground of gravelly clay, bricks, metal, plastic, wood and cloths to depths 1.1 – 4.4m below ground level (BGL). While one pit terminates in made ground at 4.4m BGL the remaining four pits terminate in sandy gravelly clay and sand & gravel at depths of 2.2 – 4.3m BGL.

Soils consisting of sandy gravelly clay and silty clay are interpreted across the site. Where **MADE GROUND / WASTE** is interpreted the capping / topsoil of silty clay which 0.5 – 2.2m thick.

One type of waste is interpreted on site;

- **MADE GROUND/WASTE (municipal, including minor organic, mixed with C&D & CLAY)**. Where present this material is c. 0.2 – 5.6m thick with the thickest areas east and south of the main building on site.

In total **MADE GROUND / WASTE** covers approximately 1.62 Ha. The volume of waste is estimated as **48,600 cu.m** and tonnage is estimated at **68,040 tonnes**.

The **MADE GROUND / WASTE** is underlain by sandy gravelly clay, silty clay and limestone bedrock. Depth to bedrock across the site varies form 3.7 - >16.0m BGL.

The geophysical report should be reviewed after the completion of any further direct investigation.

2. INTRODUCTION

APEX Geoservices Limited was requested by Malone O'Regan to carry out a geophysical investigation at the site of Greenhills Landfill in Athy, Co. Kildare. The purpose of the investigation is to determine the extent, thickness and type of waste that may be buried across the site.

The geophysical investigation was conducted on the 5th November 2018 and consisted of EM Ground Conductivity mapping, Electrical Resistivity Tomography (ERT), Seismic Refraction surveying and Multi-channel Analysis of Surface Wave (MASW) across accessible parts of the site.

2.1 Survey Objectives

The objective of the investigation is to aid in determination of:

- The extent of the waste body,
- The thickness of the waste body,
- A volume calculation,
- Depth to bedrock (if within limits of survey).

2.2 Site Background & Topography

Greenhills Landfill site is within a residential area in Athy, Co. Kildare and is bounded to the east by the River Barrow. The area under investigation covers c. 4Ha and there is a leisure centre located within the site. The topography ranges from c. 52 – 60 m OD.

The site location is shown in Fig. 2.1.

Fig 2.1: Location map (site marked in red).

2.2.1 Soils and Bedrock

The Teagasc soils map for the site primarily describes the soil as undifferentiated alluvial deposits with some limestone gravels in the south-west of the site (Fig. 2.2).

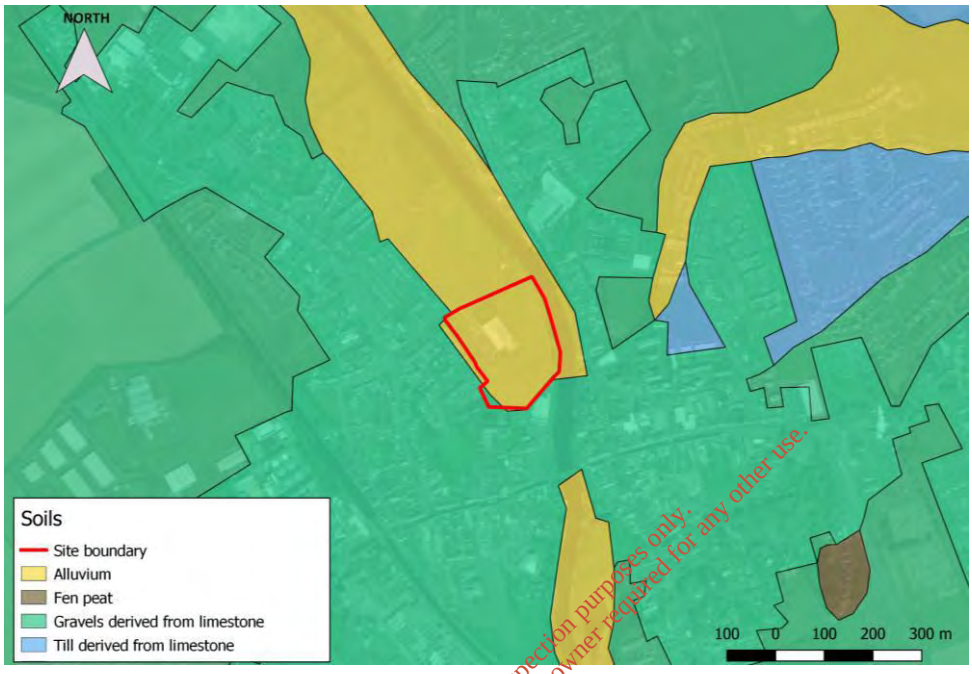


Fig 2.2: The Teagasc soils map (site marked in red).

The GSI bedrock geology map (Fig. 2.3) shows the area under investigation is located within the Milford Formation which is described as peloidal calcarenitic limestone.

Fig 2.3: The GSI bedrock map (site marked in red).

2.2.2 Groundwater vulnerability and aquifer classification

The area under investigation lies within an area of moderate groundwater vulnerability (Fig. 2.4). Bedrock within the site has been classified as "Regionally Important Aquifer - Karstified (diffuse)" (Fig. 2.5).

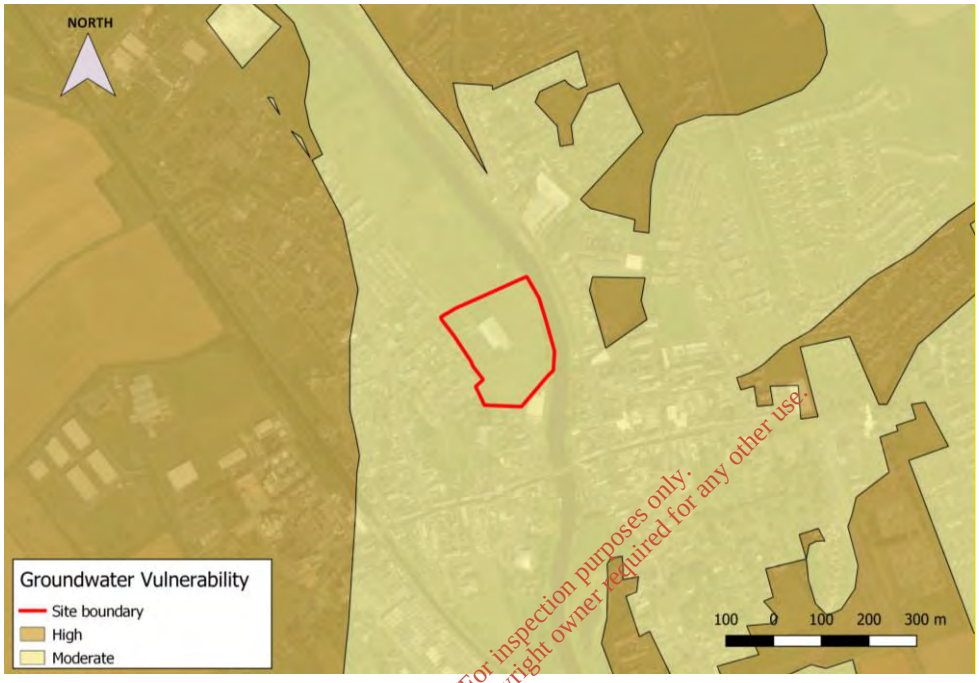


Fig 2.4: The GSI vulnerability map (site marked in red).

Fig 2.5: The GSI aquifer map (site marked in red).

2.2.3 Historical Data

The historical 6 inch map shows limestone gravel in the vicinity of the site.

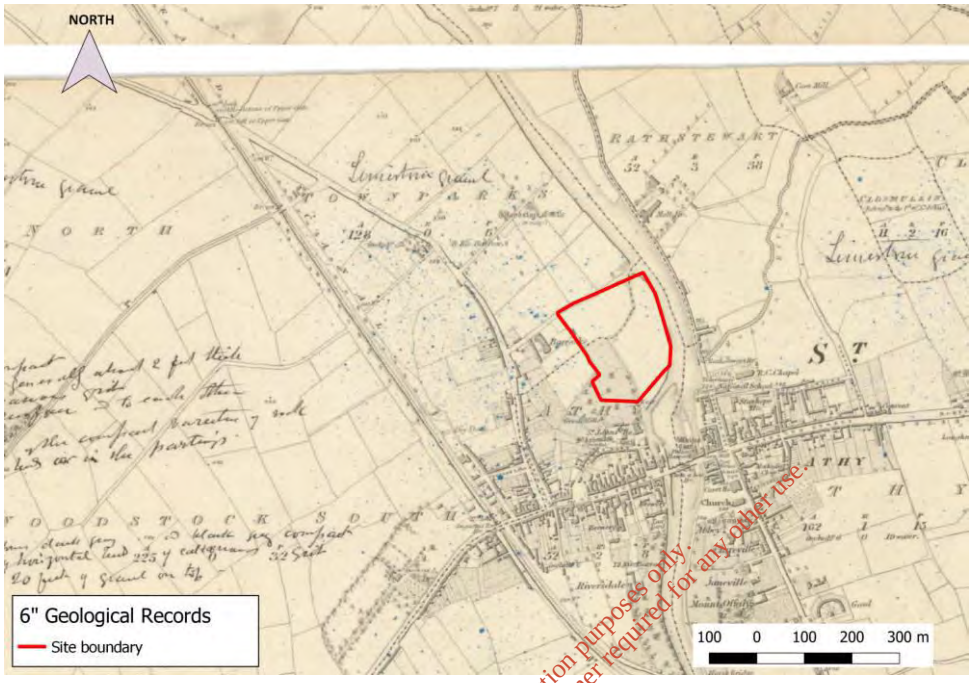


Fig 2.6: The historical 6inch map (site marked in red).

2.2.4 Direct Investigation Data

A suite of 2019 direct investigation information, consisting of trial pits, leachate monitoring wells and groundwater wells, was supplied by the client for incorporation into this report.

Five trial pits acquired across the site encountered made ground of gravelly clay, bricks, metal, plastic, wood and cloths to depths 1.1 – 4.4m below ground level (BGL). While one pit terminates in made ground at 4.4m BGL the remaining four pits terminate in sandy gravelly clay and sand & gravel at depths of 2.2 – 4.3m BGL.

Three leachate monitoring wells encountered made ground to depths of 2.5 – 6.7m BGL with the made ground overlying clay in two of the wells.

Three groundwater wells encountered a sequence of gravelly clay, silty clay, clayey sand and clayey gravel to depths of 5.4 – 7.9m BGL overlying weathered bedrock. The logs describe the rock as grey/black slightly clayey weathered limestone. GW2-GH encountered rock at 5.9m BGL with the rock between 10.9 and 13.0m BGL described as karstified.

The GSI online Geotechnical viewer shows ten boreholes across the site. The boreholes encountered thin topsoil 0.2 – 0.3m thick overlying clayey gravel, gravelly clay and made ground of sandy gravelly clay / silt with bricks, plastic, timber, cables, metal and concrete. The boreholes terminate at depths of 1.7 – 9.7m and did not encounter bedrock. The location of these trial pits is shown on Drawing AGL18194_01.

2.3 Survey Rationale

The following techniques have been employed to achieve the objectives of the investigation:

- Electromagnetic ground conductivity mapping has been carried out across the site in order to map the extent of the fill and variations in the fill, and also to screen for any leachate plumes and obtain background values for the soils and rock.

- Electrical Resistivity Tomography (ERT) has been carried out across the site to investigate variations in the thickness and extent of the fill material and leachate, as well as to investigate the overburden and bedrock geology.

- Seismic refraction was carried out at selected locations. The results of the seismic survey have been used to outline the fill/soil boundary.

- Multi-Channel Analysis of Surface Waves (MASW) was carried out on the seismic refraction profiles. The results of the MASW have been used to indicate base of waste material. The MASW method is used to estimate shear-wave (S-wave) velocities in the ground material to indicate possible soft zones. Soil / fill material with an S-wave velocity of <175 m/s is generally classified as soft/loose.

As with all geophysical methods the results are based on indirect readings of the subsurface properties. The effectiveness of the proposed approach will be affected by variations in the ground properties. By combining a number of techniques it is possible to provide a higher quality interpretation and reduce any ambiguities which may otherwise exist. Further information on the detailed methodology of each geophysical method employed in this investigation is given in **APPENDIX B: DETAILED GEOPHYSICAL METHODOLOGY**.

3. RESULTS

The investigation was carried out on the 5th of November 2018 and involved the collection of 780 EM conductivity data points, 5 ERT profiles and 3 seismic refraction profiles (3 x 46m) and associated MASW across the site.

3.1 EM Electromagnetic Conductivity Mapping

The EM ground conductivity survey locations are shown on Drawing AGL18194_01. The recorded EM conductivity values are contoured on Drawing AGL18194_02. The conductivity values range from 4-63 milliSiemens/metre (mS/m).

The conductivity values have been interpreted as follows:

Conductivity (mS/m)	*Interpretation*
4-16	Sandy Gravelly CLAY with Silty CLAY
16-63	MADE GROUND / WASTE (Municipal, including minor organic, mixed with C&D & CLAY)

3.2 ERT

Five ERT profiles were recorded across the site (Profiles R1 to R5). The locations are shown on Drawing AGL18194_01. Interpreted cross sections were compiled for the profiles and are presented on Drawings AGL18194_R1 to AGL18195_R5.

In determining the various types of imported material present from the resistivity sections R1-R5 it should be noted that:

a) typical resistivities of Irish soils range from 20 Ohm-m (clays) to around 3000 Ohm-m (dry gravel),
b) the resistivity generally increases as the sand/gravel content increases,
c) silt/clay typically has values in the range 30-50 Ohm-m,
d) silty gravelly clay typically has resistivity values in the range 50-100 Ohm-m,
e) deposits of predominantly organic waste such as those occurring in municipal landfills typically have resistivities in the range 5-30 Ohm-m.
f) leachate saturated soils originating from predominantly organic waste have a similar resistivity range to organic waste, but will be influenced by the resistivities of the host material and the degree of dilution and dispersion of the leachate,
g) inert construction and demolition (C&D) waste such as concrete, brick and mixed rock fill, stone and clay will usually have resistivities similar to gravelly material (50-500 Ohm-m).

The resistivity values recorded at this site have been interpreted on the following basis:

	Resistivity (Ohm-m)	*Interpretation*
Waste	14 - 80	MADE GROUND / WASTE (Municipal, including minor organic, mixed with C&D & CLAY)
Natural Ground	< 80	Silty CLAY
	80 - 260	Sandy Gravelly CLAY
	120 - 260	Highly - Moderately Weathered LIMESTONE
	260 - 3451	Moderately - Slightly Weathered - Fresh LIMESTONE

3.3 Seismic Refraction Profiling

Three seismic refraction profiles (S1-S3) were recorded across the site. The locations are shown on Drawing AGL18194_01 and the results are included on the interpreted cross sections in Drawings AGL18194_R1, AGL18194_R4 & AGL18194_R5 in Appendix A.

The P-wave seismic velocities (Vp) have been interpreted as follows:

Layer	*Average P-Wave Seismic Velocity (m/s)*	*Interpretation*	*Stiffness/Rock Quality*
1	278 - 500	MADE GROUND / WASTE / SOIL	Soft / Loose
2	500 - 1000	MADE GROUND / WASTE / SOIL	Firm / Medium Dense
3	1000 - 1800	SOIL	Stiff / Dense
4	1800 - 2500	Weathered LIMESTONE	Fair – Good
5	2500 - 4203	Slightly Weathered – Fresh LIMESTONE	Good

3.4 MASW

Three 1D MASW soundings were recorded across the site at the centre of each seismic refraction profile. Shear wave (S-wave) velocity (Vs) values were determined for the made ground/waste and underlying soil material.

Vs velocities and corresponding soil cohesion ranges are summarised in Figure 3.1.

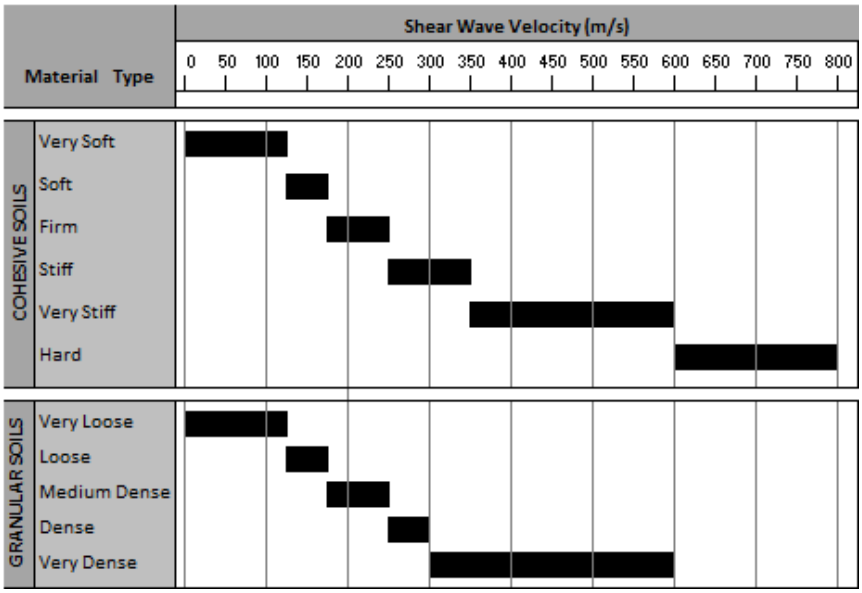


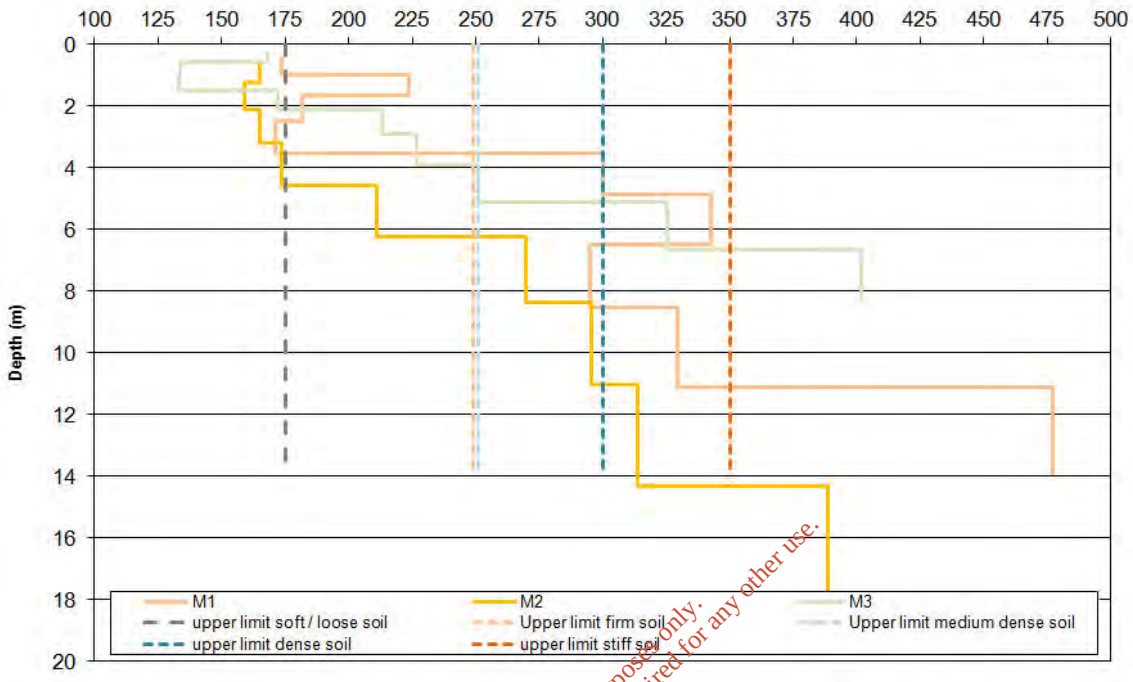
Fig 3.1: Vs velocities and corresponding soil cohesion ranges.

The velocities from this site have been interpreted as follows;

Layer	*S-Wave Seismic Velocity (m/s)*	*Interpretation*
1	133 - 175	MADE GROUND / WASTE
2	211 - 400	SOIL

The Vs seismic velocities and stiffness ranges are shown below in Figure 3.2.

Fig.3.2 Shear wave Velocity, V_s (m/s)



3.5 Integrated Interpretation

The interpretation of the geophysical data is plotted on Drawings AGL18194_03 and AGL18194_R1 to AGL18194_R6.

3.5.1 Extent of the waste

Client supplied trial pit data, leachate and monitoring well logs are combined with areas of elevated EM conductivity readings (16 - 63 mS/m) and reduced electrical resistivity readings (14 - 80 Ohm-m) to indicate areas of MADE GROUND / WASTE. The MADE GROUND / WASTE covers part of the site only (see Drawing AGL18194_03.)

Away from the MADE GROUND / WASTE the soil layers consist of predominantly sandy gravelly clay and silty clay. The seismic refraction data indicates the upper 4.0m of soil is soft – firm / loose – medium dense becoming stiff – very stiff / dense – very dense with depth.

3.5.2 Type of waste

The EM Conductivity and the ERT profiles in conjunction with the intrusive data have outlined one type of waste present across the site:

MADE GROUND/WASTE (municipal, including minor organic, mixed with C&D & CLAY) has been interpreted based on EM conductivity values of 16 - 63 mS/m) and ERT resistivity values (14 - 80 Ohm-m).

The trial pit data indicates this material is dominated by clay with the waste material mixed in.

3.5.3 Thickness of waste

Where MADE GROUND / WASTE is interpreted it is present beneath a thin capping layer of silty clay which ranges in thickness from 0.5 – 2.2m.

Across the site MADE GROUND/WASTE (municipal, including minor organic, mixed with C&D & CLAY) is c. 0.2 – 5.6m thick with the thickest areas east and south of the main building (see Drawings AGL18194_R1, AGL18194_R4 & AGL18194_R5).

Electrical contrasts between the MADE GROUND / WASTE and underlying silty clay are poor where the waste is thick (see Drawings AGL18194_R1, AGL18194_R4 & AGL18194_R5) and the best thickness information comes from the trial pit and MASW data.

ERT profiles R1, R4 and R5 show the low resistivity zone to extend between 0.1 and 8.8m below the bottom of the waste as found on the trial pit logs. This has been interpreted as a zone of low model resistivity silty clay beneath the waste body. These areas correlate with the areas of alluvium shown on the Teagasc Soils map (see Figure 2.2) and with a layer of clay on trial pit TP4-GH and L1-GH. The nature of this clay could be further investigated by a borehole to c. 10m BGL.

The seismic refraction and the MASW datasets indicate the MADE GROUND / WASTE is soft / loose as Vp and Vs velocities within the waste range from 278 – 500m/s and 133 – 175m/s respectively.

3.5.4 Volume Calculation

The volume of waste calculated across the site is as follows;

Extent (Ha.)	*Average Thickness (m)*	*Volume (cu. m)*	*Tonnes (@ 1.4 tonnes/cu.m)*
1.62	3.0	48,600	68,040
TOTAL		**48,600**	**68,040**

3.5.5 Depth to Bedrock

Bedrock across the site is interpreted as limestone. Areas of low model resistivity values, 120 – 260 Ohm-m, and Vp velocities of 1800 – 2500m/s indicate weathering of the bedrock. This correlates with the logs for GW1-GH – GW3-GH. At a depth of 10.9 – 13.0m on GW2-GH the log describes the rock as karstified. The weathered rock overlies moderately – slightly-fresh Limestone with model resistivity values of 260 – 3451 Ohm-m and Vp velocities of 2500 – 4203m/s. The depth to weathered limestone across the site varies form 3.7 - >16.0m BGL.

4. RECOMMENDATIONS

The geophysical report should be reviewed after the completion of any further direct investigation.

5. REFERENCES

Bell F.G., 1993;
'Engineering Geology', Blackwell Scientific Press.

Geological Survey of Ireland (GSI) website:
'www.GSI.ie'

Geotomo Software, 2006;
'RES2DINV Users Manual', Malaysia.

Hagedoorn, J.G., 1959;
'The plus - minus method of interpreting seismic refraction sections', Geophysical Prospecting, 7, 158 - 182.

Palmer, D., 1980;
'The Generalized Reciprocal Method of seismic refraction interpretation', SEG.

Redpath, B.B., 1973;
'Seismic refraction exploration for engineering site investigations', NTIS, U.S. Dept. of Commerce

Soske, J.L., 1959;
'The blind zone problem in engineering geophysics', Geophysics, 24, pp 359-365.

KGS, 2000;
' Surfseis Users Manual', Kansas Geological Survey.

Park, C.B., Miller, R.D., and Xia, J., 1998;
'Ground roll as a tool to image near-surface anomaly:SEG Expanded Extracts, 68th Annual Meeting, New Orleans, Louisiana, 874-877'.

Park, C.B., Miller, R.D., and Xia, J., 1999;
'Multi-channel analysis of surface waves (MASW)': Geophysics, May-June issue.

6. APPENDIX A: DRAWINGS

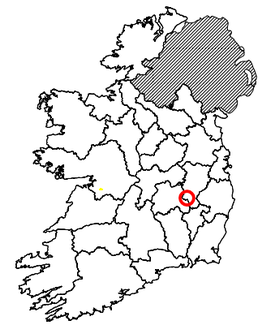
The information derived from the geophysical investigation as well as correlation with the available direct investigation is presented in the following drawings:

AGL18194_01	Geophysical Investigation Locations	Scale 1:1250 @ A3
AGL18194_02	EM Ground Conductivity Map	Scale 1:1250 @ A3
AGL18194_03	Summary Interpretation	Scale 1:1250 @ A3
AGL18194_R1	ERT R1 & Seismic S1 Results & Interpretation	Scale 1:500 @ A4
AGL18194_R2	ERT R2 Results & Interpretation	Scale 1:500 @ A4
AGL18194_R3	ERT R3 Results & Interpretation	Scale 1:500 @ A4
AGL18194_R4	ERT R4 & Seismic S2 Results & Interpretation	Scale 1:500 @ A4
AGL18194_R5	ERT R5 & Seismic S3 Results & Interpretation	Scale 1:500 @ A4

FIGURE 1: GEOPHYSICAL INVESTIGATION LOCATIONS

SCALE 1:1250

INDEX MAP:



LEGEND:

- Site
- EM conductivity reading
- R1 — 2D resistivity profile
- S1 — Seismic refraction profile
- GW1A-PT — Client supplied groundwater, trial pit & leachate locations
- TPA-PT / L2A-PT
- TP1 — Historic Trial Pits from GSI digital viewer

The information displayed here is to be used in conjunction with Report AGL18194_01 Report on the Geophysical Investigation at Green Hills APEX Geoservices Ltd. 24/06/2019.

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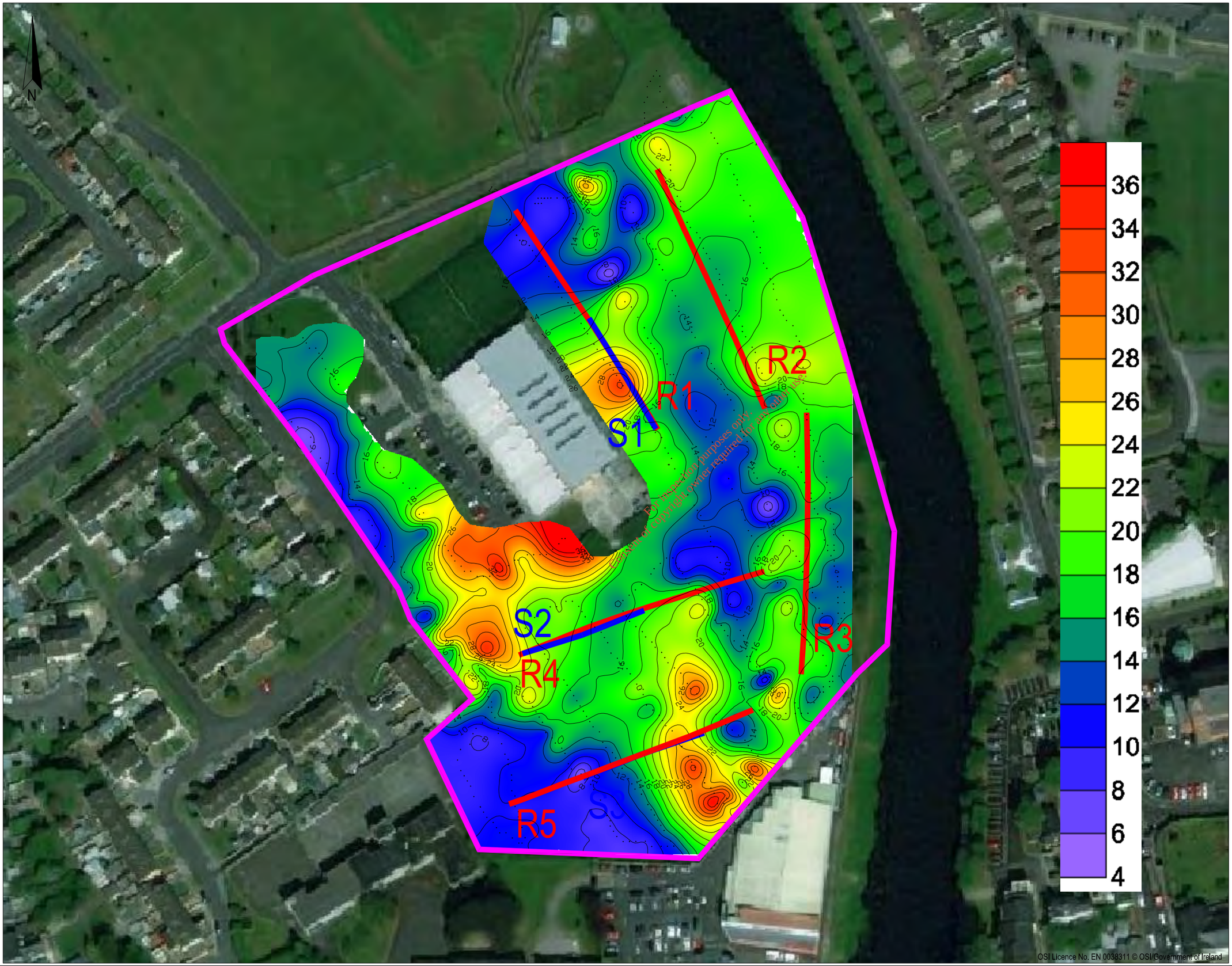
PROJECT:	GREEN HILLS GEOPHYSICAL INVESTIGATION
CLIENT.:	MALONE O'REGAN
DRAWING NO:	AGL18194_01
SCALE:	AS INDICATED @ A3
DATE:	11/06/2019

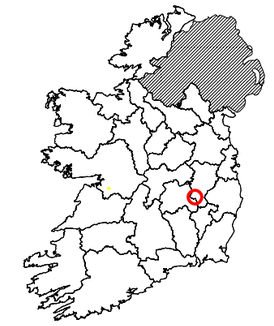
Version:	Date:	Drawn By:	Checked:
No.1	07/11/2018	KG	TL
No.2	11/06/2019	FP	TL
No.3	24/06/2019	FP	TL

FIGURE 1: GROUND CONDUCTIVITY (mS/m)

SCALE 1:1250



INDEX MAP:



LEGEND:

- Site
- 2D resistivity profile
- Seismic refraction profile

The information displayed here is to be used in conjunction with Report AGL18194_01 Report on the Geophysical Investigation at Green Hills APEX Geoservices Ltd. 24/06/2019.

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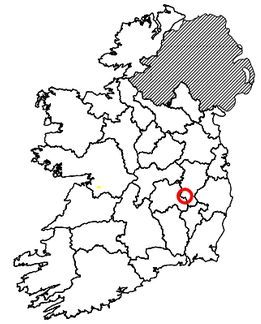
PROJECT:	GREEN HILLS GEOPHYSICAL INVESTIGATION
CLIENT.:	MALONE O'REGAN
DRAWING NO:	AGL18194_02
SCALE:	AS INDICATED @ A3
DATE:	11/06/2019

Version:	Date:	Drawn By:	Checked:
No.1	07/11/2018	KG	TL
No.2	11/06/2019	FP	TL
No.3	24/06/2019	FP	TL

FIGURE 1: PROPOSED INTRUSIVE LOCATIONS

SCALE 1:1250

INDEX MAP:



LEGEND:

- Site
- MADE GROUND/WASTE
- TOPSOIL

The information displayed here is to be used in conjunction with Report AGL18194_01 Report on the Geophysical Investigation at Green Hills APEX Geoservices Ltd. 24/06/2019.

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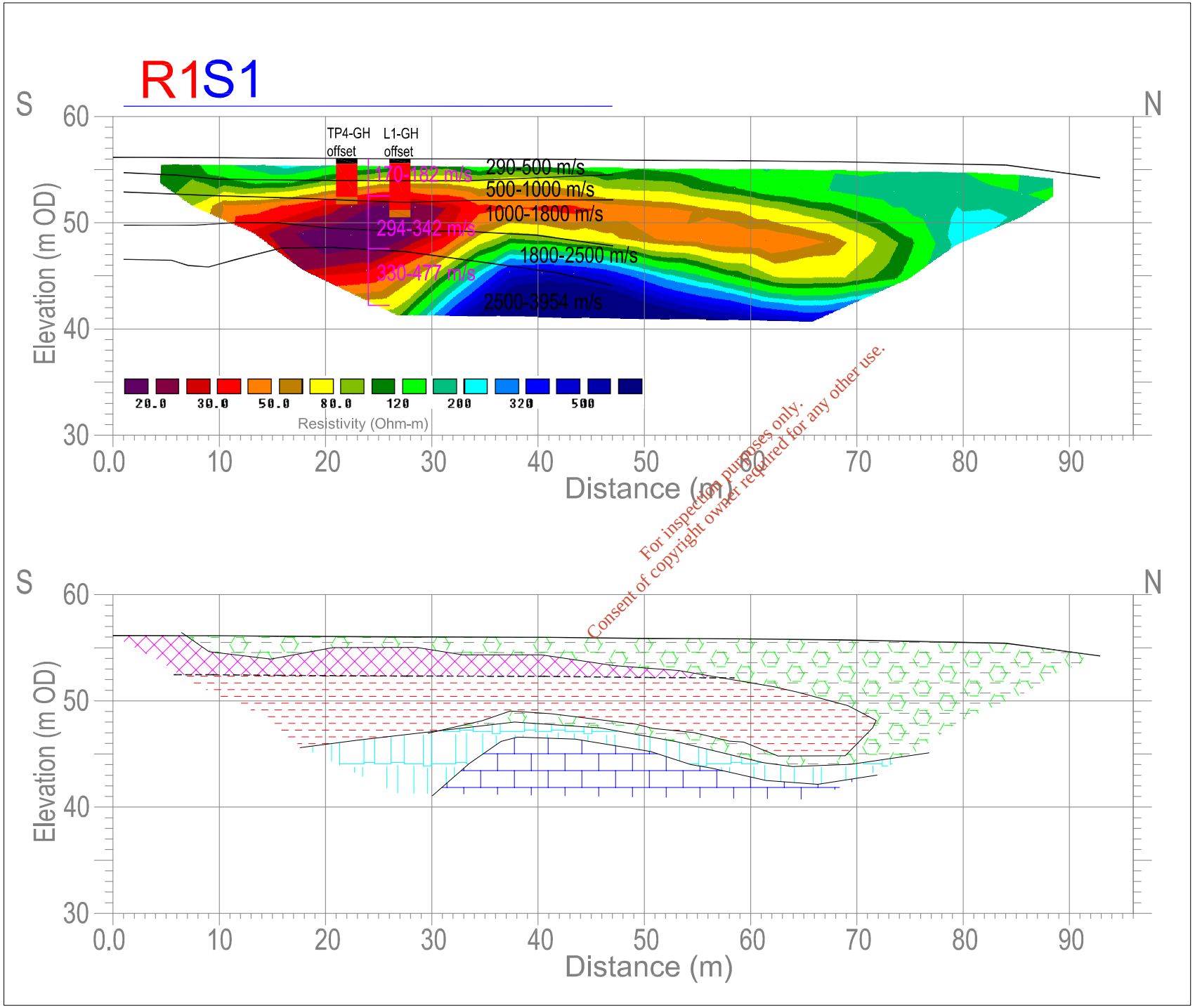
PROJECT:	GREEN HILLS GEOPHYSICAL INVESTIGATION
CLIENT.:	MALONE O'REGAN
DRAWING NO:	AGL18194_03
SCALE:	AS INDICATED @ A3
DATE:	11/06/2019

Version:	Date:	Drawn By:	Checked:
No.1	07/11/2018	KG	TL
No.2	11/06/2019	FP	TL
No.3	24/06/2019	FP	TL

FIGURE 1: ERT R1 & SEISMIC S1 - RESULTS AND INTERPRETATION

SCALE 1:500



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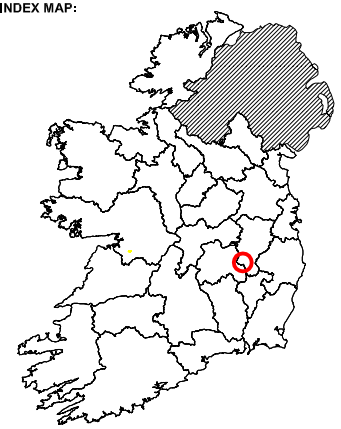

LEGEND:

- MADE GROUND / WASTE
- Silty CLAY
- Sandy gravelly CLAY
- Highly - Moderately weathered LIMESTONE
- Moderately to slightly weathered - Fresh LIMESTONE
- Interpreted base of MADE GROUND / WASTE
- Seismic refraction layer with interpreted P-wave / S-wave velocity (1294-1288 m/s, 122-178 m/s)
- Topsoil(made), Topsoil, Made Ground, Clay, Gravel

The information displayed here is to be used in conjunction with Report AGL18194_01 Report on the Geophysical Investigation at Green Hills APEX Geoservices Ltd. 24/06/2019.

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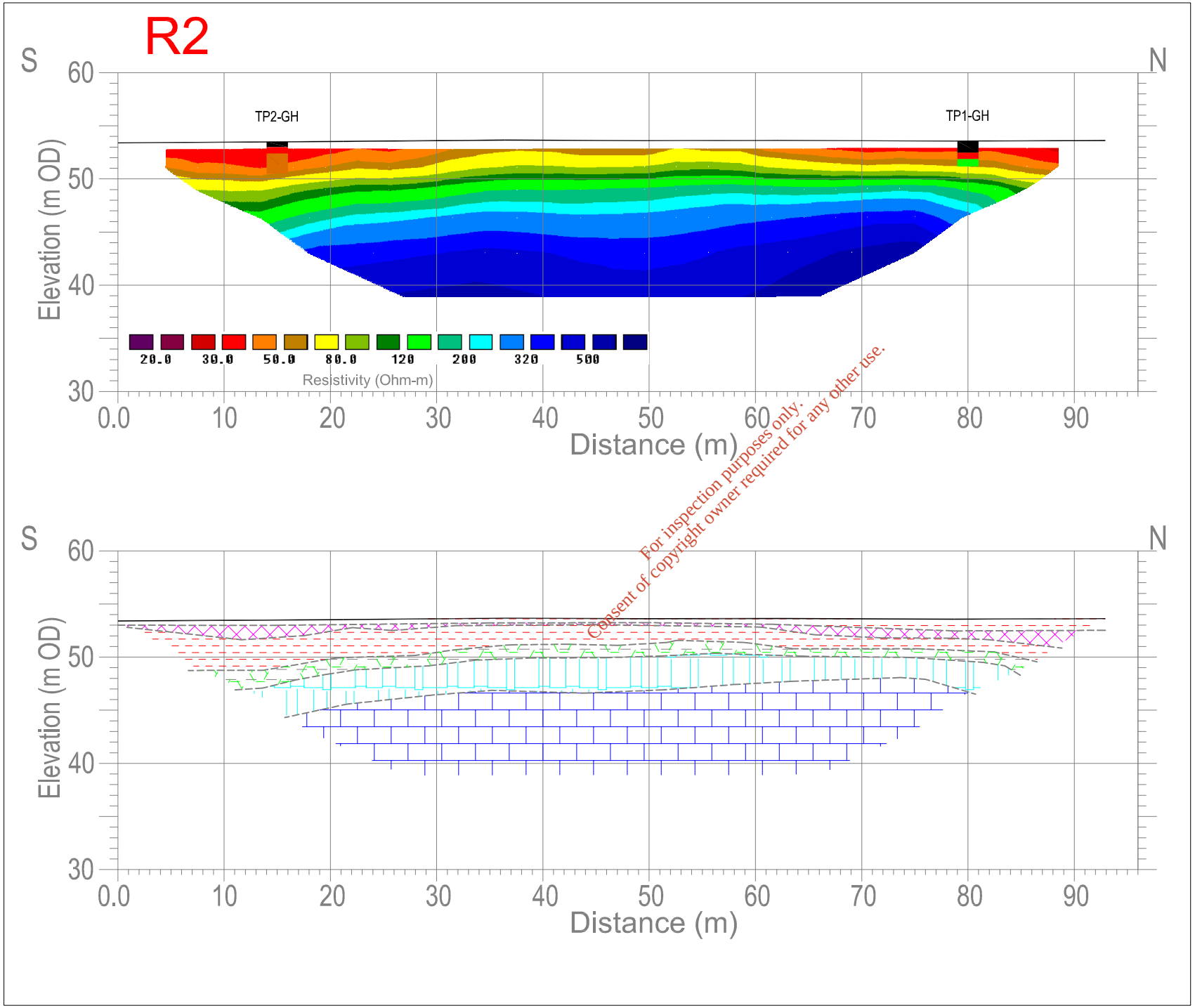
PROJECT:	GREEN HILLS GEOPHYSICAL INVESTIGATION
CLIENT:	MALONE O'REGAN
DRAWING NO:	AGL18194_R1
SCALE:	AS INDICATED @ A4
DATE:	11/06/2019

Version:	Date:	Drawn By:	Checked:
No.1	07/11/2018	KG	TL
No.2	11/06/2019	FP	TL
No.3	24/06/2019	FP	TL

FIGURE 1: ERT R2 & SEISMIC S2 - RESULTS AND INTERPRETATION

SCALE 1:500



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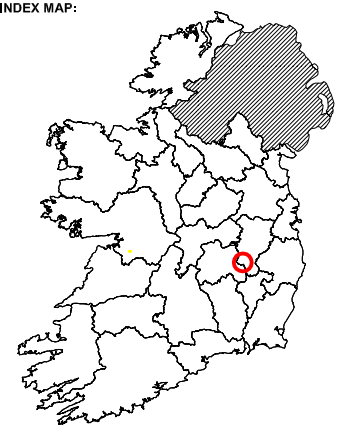

LEGEND:

- MADE GROUND / WASTE
- Silty CLAY
- Sandy gravelly CLAY
- Highly - Moderately weathered LIMESTONE
- Moderately to slightly weathered - Fresh LIMESTONE
- Interpreted base of MADE GROUND / WASTE
- Seismic refraction layer with interpreted P-wave / S-wave velocity (1254-1288 m/s, 722-178 m/s)
- Topsoil(made), Topsoil, Made Ground, Clay, Gravel

The information displayed here is to be used in conjunction with Report AGL18194_01 Report on the Geophysical Investigation at Green Hills APEX Geoservices Ltd. 24/06/2019.

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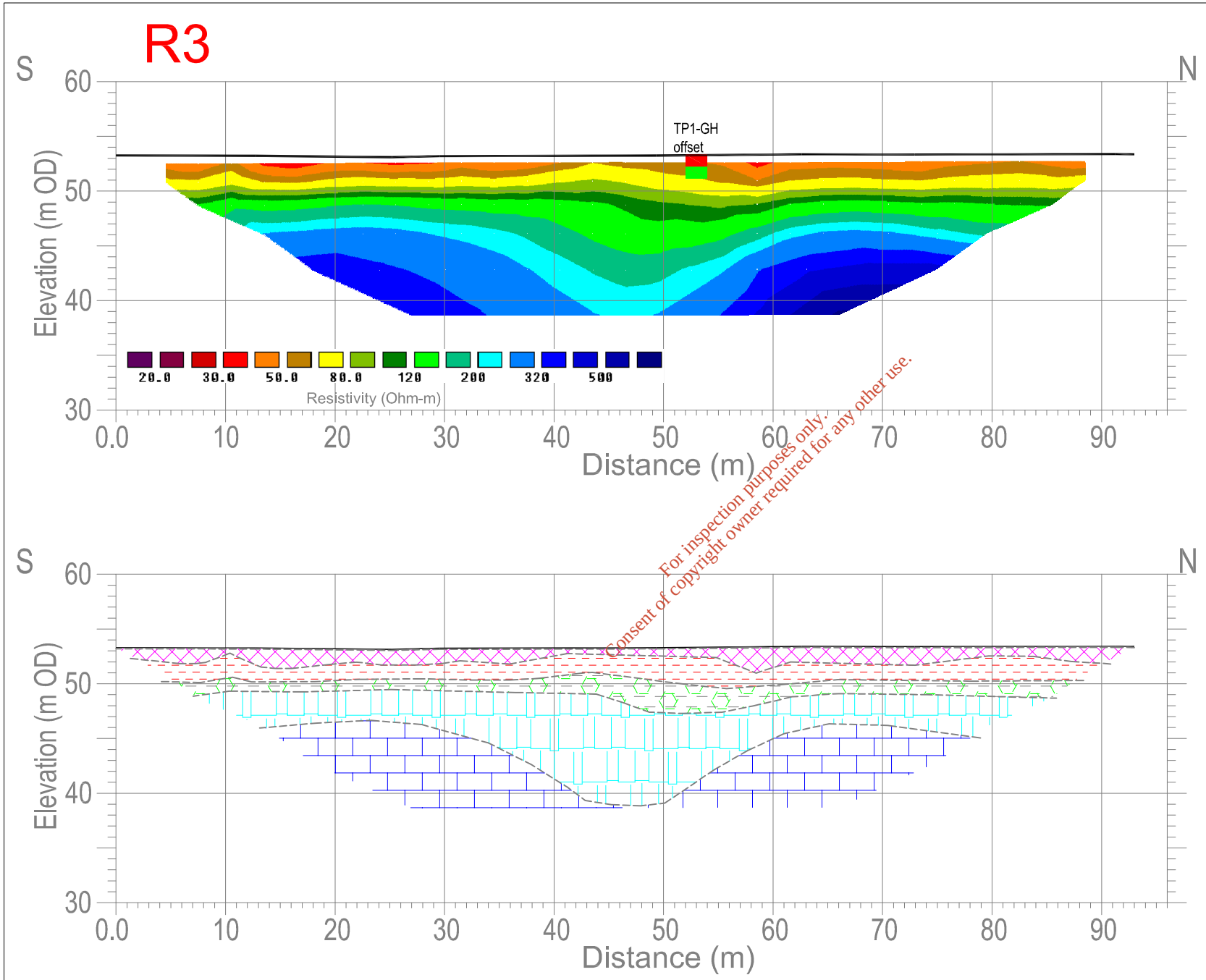
PROJECT:	GREEN HILLS GEOPHYSICAL INVESTIGATION
CLIENT:	MALONE O'REGAN
DRAWING NO:	AGL18194_R2
SCALE:	AS INDICATED @ A4
DATE:	11/06/2019

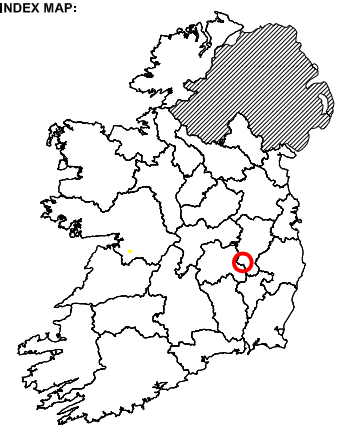
Version:	Date:	Drawn By:	Checked:
No.1	07/11/2018	KG	TL
No.2	11/06/2019	FP	TL
No.3	24/06/2019	FP	TL

FIGURE 1: ERT R3 - RESULTS AND INTERPRETATION

SCALE 1:1000



INDEX MAP:



LEGEND:

- MADE GROUND / WASTE
- Silty CLAY
- Sandy gravelly CLAY
- Highly - Moderately weathered LIMESTONE
- Moderately to slightly weathered - Fresh LIMESTONE
- Interpreted base of MADE GROUND / WASTE
- Seismic refraction layer with interpreted P-wave / S-wave velocity (1254-1288 m/s, 122-178 m/s)
- Topsoil(made), Topsoil, Made Ground, Clay, Gravel

The information displayed here is to be used in conjunction with Report AGL18194_01 Report on the Geophysical Investigation at Green Hills APEX Geoservices Ltd. 24/06/2019.

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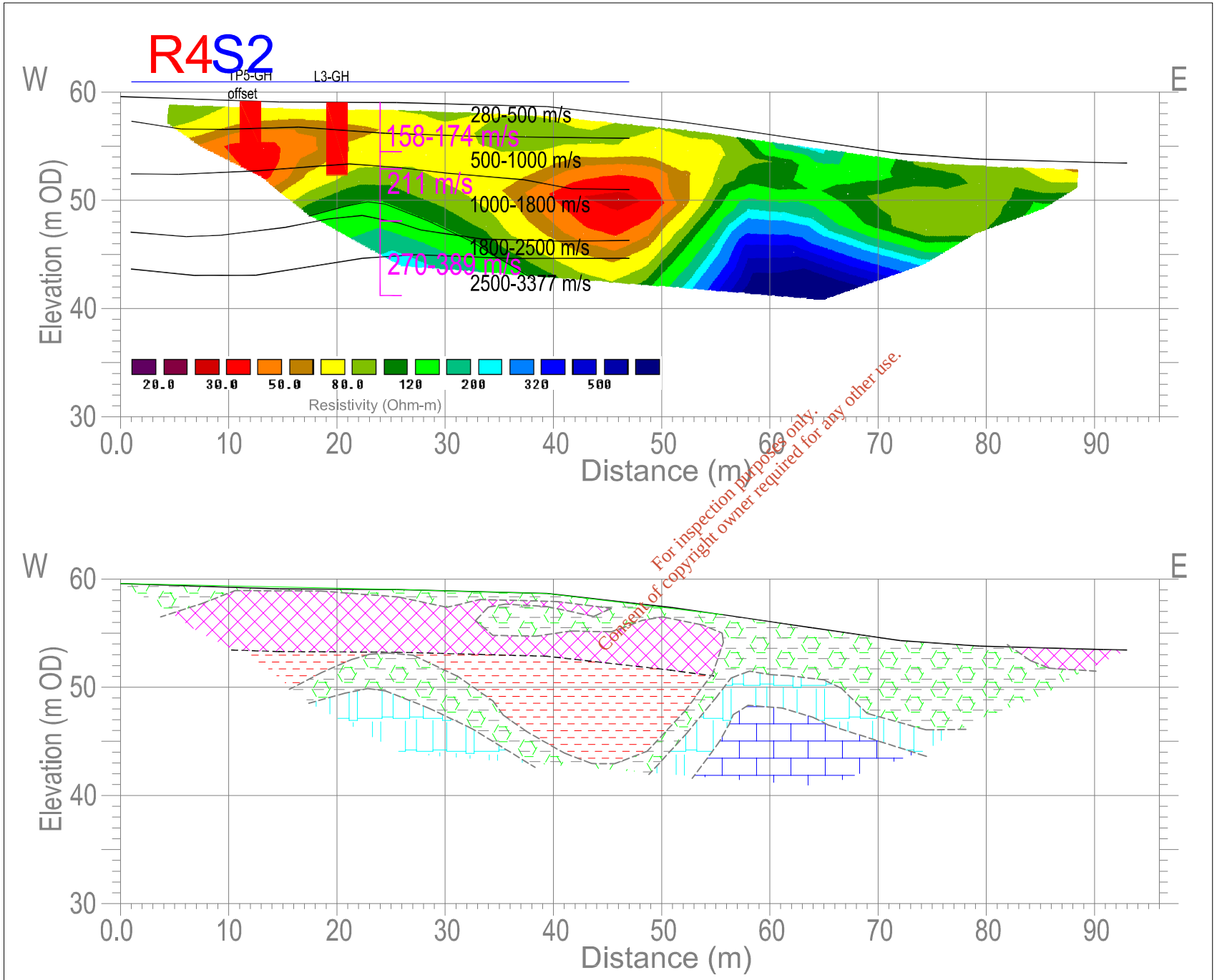
PROJECT:	GREEN HILLS GEOPHYSICAL INVESTIGATION
CLIENT:	MALONE O'REGAN
DRAWING NO:	AGL18194_R3
SCALE:	AS INDICATED @ A4
DATE:	11/06/2019

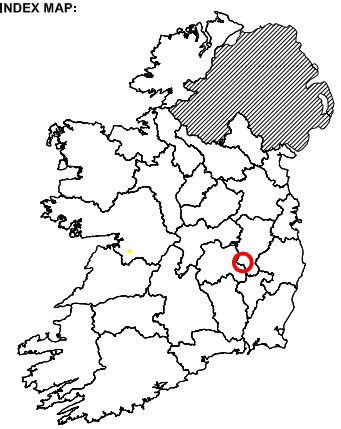
Version:	Date:	Drawn By:	Checked:
No.1	07/11/2018	KG	TL
No.2	11/06/2019	FP	TL
No.3	24/06/2019	FP	TL

FIGURE 1: ERT R4 - RESULTS AND INTERPRETATION

SCALE 1:1000



INDEX MAP:



LEGEND:

- MADE GROUND / WASTE
- Silty CLAY
- Sandy gravelly CLAY
- Highly - Moderately weathered LIMESTONE
- Moderately to slightly weathered - Fresh LIMESTONE
- Interpreted base of MADE GROUND / WASTE
- Seismic refraction layer with interpreted P-wave / S-wave velocity (1254-1288 m/s, 122-178 m/s)
- Topsoil(made), Topsoil, Made Ground, Clay, Gravel

The information displayed here is to be used in conjunction with Report AGL18194_01 Report on the Geophysical Investigation at Green Hills APEX Geoservices Ltd. 24/06/2019.

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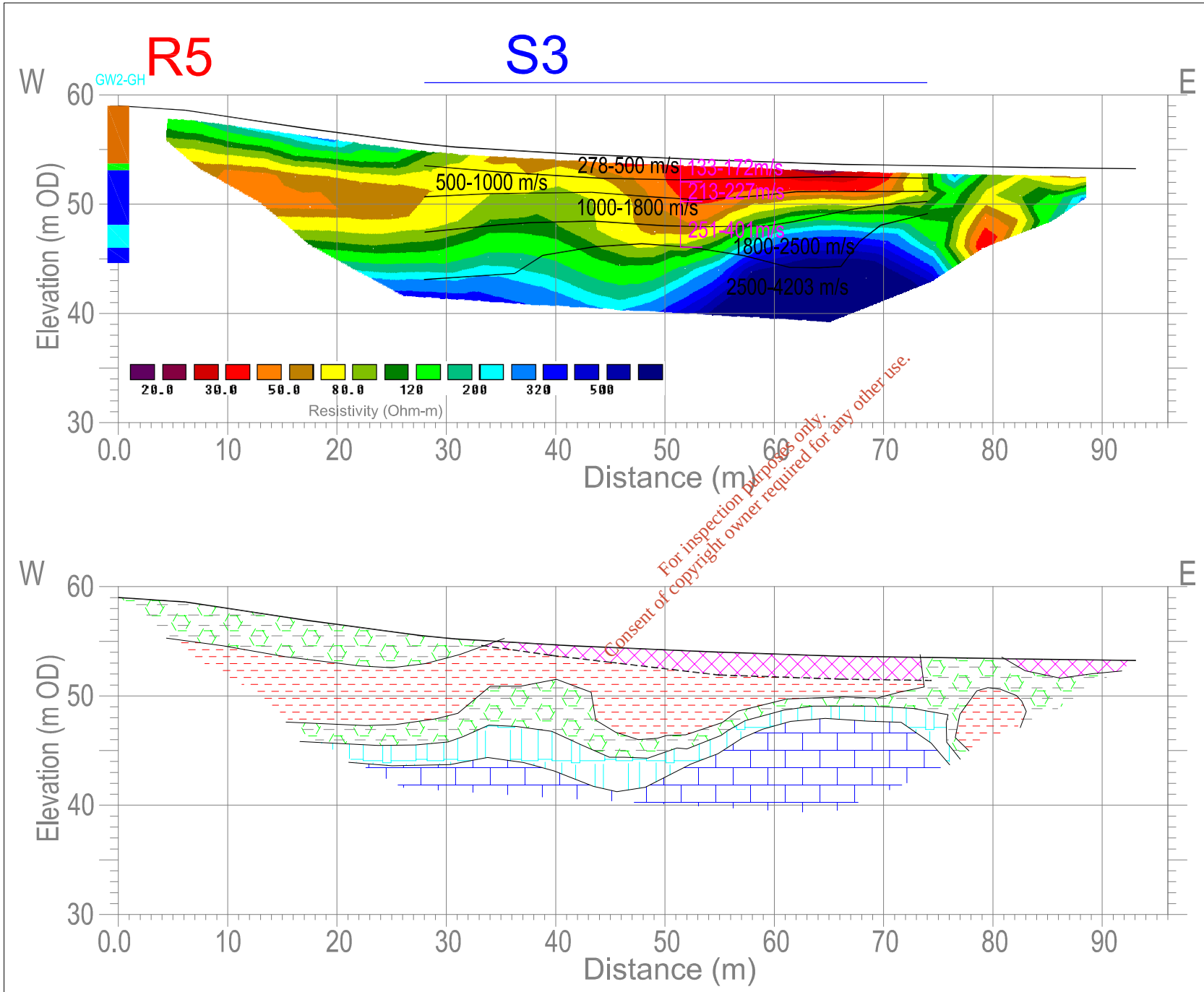
PROJECT:	GREEN HILLS GEOPHYSICAL INVESTIGATION
CLIENT:	MALONE O'REGAN
DRAWING NO:	AGL18194_R4
SCALE:	AS INDICATED @ A4
DATE:	11/06/2019

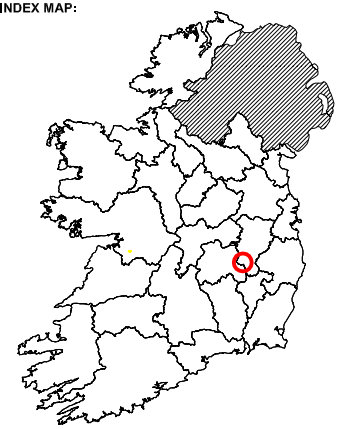
Version:	Date:	Drawn By:	Checked:
No.1	07/11/2018	KG	TL
No.2	11/06/2019	FP	TL
No.3	24/06/2019	FP	TL

FIGURE 1: ERT R5 & SEISMIC S3 - RESULTS AND INTERPRETATION

SCALE 1:1000



INDEX MAP:



LEGEND:

- MADE GROUND / WASTE
- Silty CLAY
- Sandy gravelly CLAY
- Highly - Moderately weathered LIMESTONE
- Moderately to slightly weathered - Fresh LIMESTONE
- Interpreted base of MADE GROUND / WASTE
- Seismic refraction layer with interpreted P-wave / S-wave velocity (1254-1288 m/s, 123-176 m/s)
- Topsoil(made), Topsoil, Made Ground, Clay, Gravel

The information displayed here is to be used in conjunction with Report AGL18194_01 Report on the Geophysical Investigation at Green Hills APEX Geoservices Ltd. 24/06/2019.

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PROJECT:	GREEN HILLS GEOPHYSICAL INVESTIGATION
CLIENT:	MALONE O'REGAN
DRAWING NO:	AGL18194_R5
SCALE:	AS INDICATED @ A4
DATE:	11/06/2019

Version:	Date:	Drawn By:	Checked:
No.1	07/11/2018	KG	TL
No.2	11/06/2019	FP	TL
No.3	24/06/2019	FP	TL

7. APPENDIX B: DETAILED GEOPHYSICAL METHODOLOGY

A combination of a number of geophysical techniques was used to provide the high quality interpretation and reduce any ambiguities, which may otherwise exist.

7.1 EM ground conductivity mapping

7.1.1 Principles

This method operates on the principle of inducing currents in conductive substrata and measuring the resultant secondary electro-magnetic field. The strength of this secondary EM field is calibrated to give apparent ground conductivity in milliSiemens/metre (mS/m). Readings over material such as organic waste and peat give high conductivity values while readings over dry materials with low clay mineral content such as gravels, limestone or quartzite give low readings.

The EM ground conductivity survey technique determines the apparent conductivity of the ground material from 0-6m bgl depending on the dipole mode used.

7.1.2 Data collection

The EM equipment used was a GF CMD-4 conductivity meter equipped with data logger. This instrument features a real time graphic display of the previous 20 measurement points to monitor data quality and results. Conductivity and in-phase values were recorded across the site. Local conditions and variations were recorded.

7.1.3 Data processing

The conductivity and in-phase field readings were downloaded, contoured and plotted using the SURFER 12 program (Golden Software, 2015). Assignation of material types and possible anomaly sources was carried out, with cross-reference to other data.

7.1.4 Relocation

All data were referenced using a GPS system and all positions are given in Irish Tranverse Mercator coordinates.

7.2 Electrical Resistivity Tomography (ERT)

Electrical Resistivity Tomography was carried out to provide information on lateral variations in the overburden material as well as on the underlying overburden and bedrock.

7.2.1 Principles

This surveying technique makes use of the Wenner resistivity array. The 2D-resistivity profiling method records a large number of resistivity readings in order to map lateral and vertical changes in material types. The 2D-resistivity profiling method involves the use of 64 electrodes connected to a resistivity meter, using computer software to control the process of data collection and storage.

7.2.2 Data Collection

Profiles were recorded using a Tigre resistivity meter, imaging software, two 32 takeout multicore cables and up to 64 stainless steel electrodes. Saline solution was used at the electrode/ground interface in order to gain a good electrical contact required for the technique to work effectively. The recorded data were processed and viewed immediately after surveying.

7.2.3 Data Processing

The field readings were stored in computer files and inverted using the RES2DINV package (Campus Geophysical Instruments, 1997) with up to 5 iterations of the measured data carried out for each profile to obtain a 2D-Depth model of the resistivities.

The inverted 2D-Resistivity models and corresponding interpreted geology are displayed on the accompanying drawings alongside the processed seismic sections. Distance is indicated along the horizontal axis of the profiles. Profiles have been contoured using the same contour intervals and colour codes.

7.3 Seismic refraction profiling

7.3.1 Principles

This method measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities.

Seismic profiling measures the p-wave velocity (Vp) of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher Vp velocities while soft, loose or fractured materials have lower Vp velocities. Readings are taken using geophones connected via multi-core cable to a seismograph.

7.3.2 Data Collection

A Geode high resolution 24 channel digital seismograph, 24 10HZ vertical geophones and a 10 kg hammer were used to provide first break information, with a 24 take-out cable (2m spacing). Equipment was carried was operated by a two-person crew.

Readings are taken using geophones connected via multi-core cable to a seismograph. The depth of resolution of soil/bedrock boundaries is determined by the length of the seismic spread, typically the depth of resolution is about one third the length of the profile.(eg. 69m profile ~23m depth, 46m profile ~ 15m depth)

Shots from seven different positions were taken (2 x off-end, 2 x end, 3 x middle) to ensure optimum coverage of all refractors. All profiles were surveyed to Irish National Grid using a ProXR dGPS system.

7.3.3 Data Processing

The recorded data was processed and interpreted using ray-tracing along with time term inversion and tomographic inversion methods, to acquire depths to boundaries and the P-wave velocities of these layers, using the SeisImager/2D programme from Geometrics.

SeisImager/2D interprets seismic refraction data as a laterally varying layered earth structure. The programme includes three methods for data analysis, time-term inversion, the reciprocal method and tomography.

The tomography method creates an initial velocity model, then traces rays through the model, comparing the calculated and measured traveltimes. The model is then modified and the process repeated to minimise the difference between the calculated and measured times.

Approximate errors for Vp velocities are estimated to be +/- 10%. Errors for the calculated layer thicknesses are of the order of +/-20%. Possible errors due to the "hidden layer" and "velocity inversion" effects may also occur (Soske, 1959).

7.4 Multichannel Analysis of Surface Waves (MASW)

MASW profiling was carried out to provide shear wave velocity profiles with depth.

7.4.1 Principles

The Multi-channel Analysis of Surface Waves (MASW) (Park et al., 1998, 1999) utilizes Surface waves (Rayleigh waves) to determine the elastic properties of the shallow subsurface (<15m). Surface waves carry up to two/thirds of the seismic energy but are usually considered as noise in conventional body wave reflection and refraction seismic surveys.

The penetration depth of surface waves changes with wavelength, i.e. longer wavelengths penetrate deeper. When the elastic properties of near surface materials vary with depth, surface waves then become dispersive, i.e. propagation velocity changes with frequency. The propagation (or phase) velocity is determined by the average elastic property of the medium within the penetration depth. Therefore the dispersive nature of surface waves may be used to investigate changes in elastic properties of the shallow subsurface.

The MASW method employs the multi-channel recording and processing techniques (Sheriff and Geldart, 1982) that have similarities to those used in a seismic reflection survey and which allow better waveform analysis and noise elimination. To produce a shear wave velocity (Vs) profile and a stiffness profile of the subsurface using Surface waves the following basic procedure is followed:

(i)A point source (eg. a sledgehammer) is used to generate vertical ground motions,

(ii)The ground motions are measured using low frequency geophones, which are disposed along a straight line directed toward the source,

(iii)the ground motions are recorded using either a conventional seismograph, oscilloscope or spectrum analyzer,

(iv)a dispersion curve is produced from a spectral analysis of the data showing the variation of Surface wave velocity with wavelength,

(v)the dispersion curve in inverted using a modeling and least squares minimization process to produce a subsurface profile of the variation of Surface wave and shear wave velocity with depth.

7.4.2 Data Collection

A Geode high resolution 24 channel digital seismograph, 24 10HZ vertical geophones and a 10 kg hammer were used, with a 24 take-out cable (2m spacing). Equipment was carried was operated by a two-person crew.

7.4.3 Data Processing

MASW processing was carried out using the SURFSEIS processing package developed by Kansas Geological Survey (KGS, 2010). SURFSEIS is designed to generate a shear wave (Vs) velocity profile.

SURFSEIS data processing involves three steps:

(i) Preparation of the acquired multichannel record. This involves converting data file into the processing format.

(ii) Production of a dispersion curve from a spectral analysis of the data showing the variation of Raleigh wave phase velocity with wavelength. Confidence in the dispersion curve can be estimated through a measure of signal to noise ratio (S/N), which is obtained from a coherency analysis. Noise includes both body waves and higher mode surface waves. To obtain an accurate dispersion curve the spectral content and phase velocity characteristics are examined through an overtone analysis of the data.

(iii) Inversion of the dispersion curve is then carried out to produce a subsurface profile of the variation of shear wave velocity with depth.

7.5 Spatial relocation

All the geophysical investigation locations were acquired using Trimble Geo 7X high-accuracy GNSS handheld using the settings listed below. This system allows collecting GPS data with sub-meter accuracy.

Coordinate zone:	ITM (Republic of Ireland)
Datum:	Ordnance
Coordinate units:	Meters
Altitude units:	Meters
Survey altitude reference:	MSL
Geoid model:	Republic of Ireland

8. APPENDIX C: SEISMIC REFRACTION PLATES

For seismic refraction profile S1, S2 and S3 the tomographic inversions are shown below. The locations of the profiles are shown in **Appendix A: Drawings**.

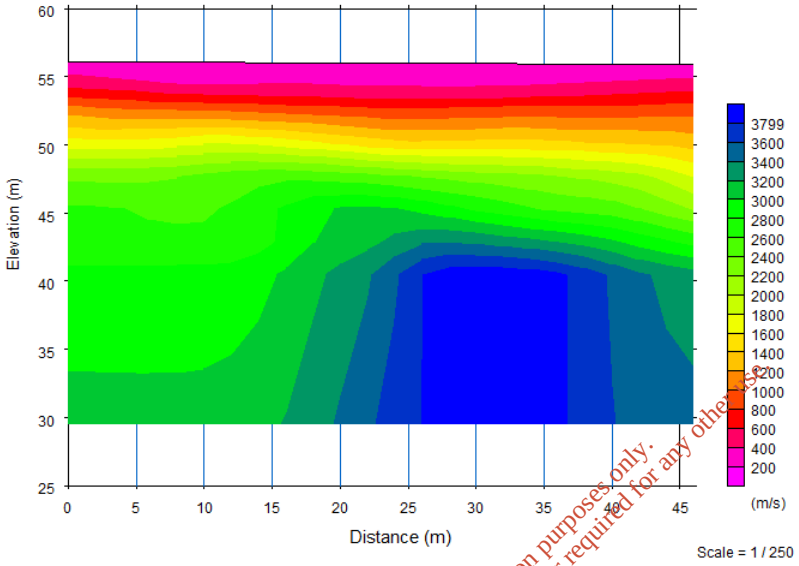

Figure 8.1: Tomographic inversion for seismic refraction spreads S1.

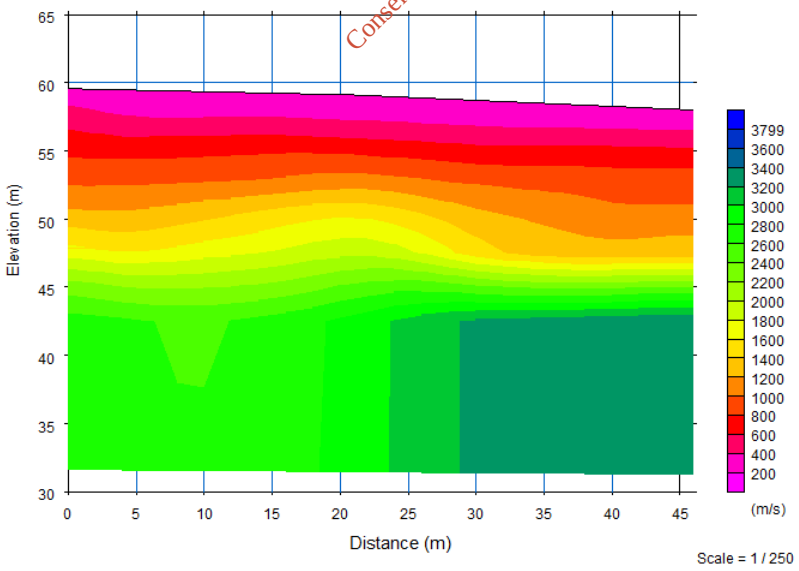

Figure 8.2: Tomographic inversion for seismic refraction spreads S2.

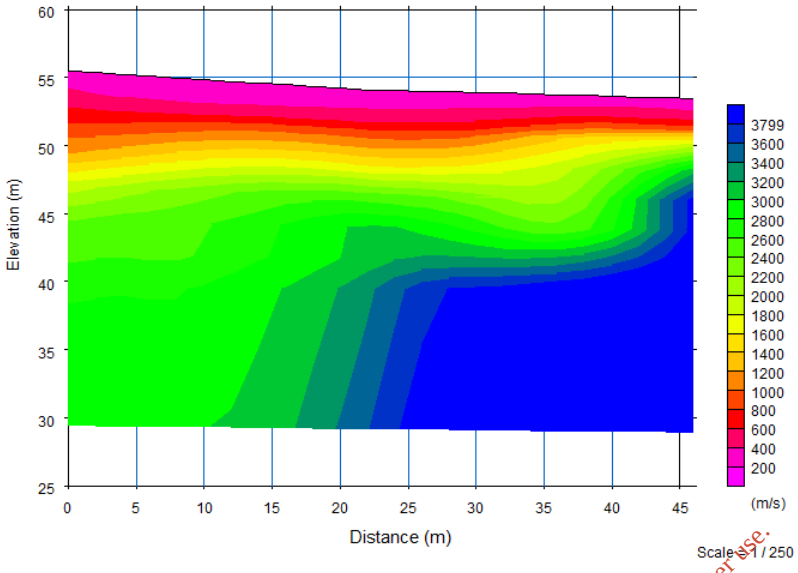

Figure 8.3: Tomographic inversion for seismic refraction spreads S3.

APPENDIX D

TRIAL PIT LOG

Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V32Y

Project Number: E1506

Client: Kildare County Council

Project Title: E1506-Kildare Legacy Landfills

Site Location: Greenhills, Athy, Co. Kildare

TRIAL PIT NO: TP1-GH

SUBSURFACE CONDITIONS					SAMPLE	
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)
0		MADE GROUND. Brown, gravelly, CLAY. Dry. No odour.				
1		MADE GROUND. Dark brown, CLAY and rare plastic. Slight hydrocarbon odour. No odour. Dry.				
2		SAND AND GRAVEL. Light grey, sand and gravel with cobbles. Wet. No odour. At 1.8mbgl inflow of water.				
			EOH at 2.4mbgl due to natural ground			
3						
4						
5						
6						

Excavation Date: 16/01/2019
Excavation Method: 13 tonne excavator
Excavated By: Dunne Ltd.

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 668058.2
Northing: 694329.3

Water Strike:
Strike: ▽ **Level:** ▼

Revision: FINAL **Page** 1 of 1

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Trial Pit - TP1

TRIAL PIT LOG

Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V32Y

Project Number: E1506

Client: Kildare County Council

Project Title: E1506-Kildare Legacy Landfills

Site Location: Greenhills, Athy, Co. Kildare

TRIAL PIT NO: TP2-GH

SUBSURFACE CONDITIONS

SAMPLE

Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)
0		MADE GROUND. Brown, gravelly, CLAY and rare plastic. Dry. No odour.				
1		MADE GROUND. Dark brown, CLAY and rare metal. Slight hydrocarbon odour. Dry.				
2		CLAY. Light grey, very sandy, CLAY with gravels and cobbles Wet - Inflow of water at approx. 2.5mbgl. No odour.				
3			EOH at 3.0mbgl due to natural ground			
4						
5						
6						

Excavation Date: 16/01/2019
Excavation Method: 13 tonne excavator
Excavated By: Dunne Ltd.

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 668086.9
Northing: 694270.4

Water Strike:
Strike: ▽ **Level:** ▼

Revision: FINAL **Page** 1 of 1

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Trial Pit – TP2

TRIAL PIT LOG

Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V32Y

Project Number: E1506

Client: Kildare County Council

Project Title: E1506-Kildare Legacy Landfills

Site Location: Greenhills, Athy, Co. Kildare

TRIAL PIT NO: TP3-GH

SUBSURFACE CONDITIONS					SAMPLE	
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)
0		MADE GROUND. Brown, CLAY with gravels and rare red bricks. Dry. No odour.			0.5-1.1mbgl	
1		MADE GROUND. Dark brown / black CLAY with gravels and rare red bricks. No odour. Dry.				
2		SAND AND GRAVEL. Light grey, SAND and GRAVEL with cobbles. Wet. No odour.	EOH at 2.2mbgl due to natural ground			
3						
4						
5						
6						

Excavation Date: 16/01/2019
Excavation Method: 13 tonne excavator
Excavated By: Dunne Ltd.

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 668097.1
Northing: 694215.1

Water Strike:
Strike: ▽ **Level:** ▼

Revision: FINAL **Page** 1 of 1

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Trial Pit – TP3

TRIAL PIT LOG

Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V32Y

Project Number: E1506

Client: Kildare County Council

Project Title: E1506-Kildare Legacy Landfills

Site Location: Greenhills, Athy, Co. Kildare

TRIAL PIT NO: TP4-GH

SUBSURFACE CONDITIONS					SAMPLE	
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)
0		MADE GROUND. Brown, gravelly, CLAY with cobbles and terram (weed control geotextile). Dry. No odour.				
		MADE GROUND. Brown, gravelly, CLAY with cobbles some plastic, metal and red bricks. Dry. Slight hydrocarbon odour.			1.0-2.0mbgl	
1						
2						
3						
4		CLAY Light grey, CLAY with some sand and gravels. Dry at first - wet after (water seeping in slowly). No odour.	EOH at 4.3mbgl due to natural ground			
5						
6						

Excavation Date: 16/01/2019
Excavation Method: 13 tonne excavator
Excavated By: Dunne Ltd.

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 668035.3
Northing: 694265.4

Water Strike:
Strike: ▽ **Level:** ▼

Revision: FINAL **Page** 1 of 1

DISCLAIMER: This log is for environmental purposes only.

Trial Pit – TP4

TRIAL PIT LOG

Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V32Y

Project Number: E1506

Client: Kildare County Council

Project Title: E1506-Kildare Legacy Landfills

Site Location: Greenhills, Athy, Co. Kildare

TRIAL PIT NO: TP5-GH

SUBSURFACE CONDITIONS					SAMPLE	
Depth (mbgl)	SYMBOL	DESCRIPTION	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)
0		MADE GROUND. Brown, gravelly, CLAY and rare plastic, wood, cloths and terram. Dry. No odour.				
1		MADE GROUND. Brown, gravelly, CLAY and rare red bricks, plastic, wood, cloths and a piece of hard black plastic. Dry. No odour.				
2		MADE GROUND. Dark grey, gravelly, CLAY with cobbles and occasional wood, plastic. No odour. Wet.			2.0-2.5mbgl	
3						
4			EOH at 4.4mbgl due to natural ground			
5						
6						

Excavation Date: 16/01/2019
Excavation Method: 13 tonne excavator
Excavated By: Dunne Ltd.

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 668018.1
Northing: 694165.5

Water Strike:
Strike: ▽ **Level:** ▼

Revision: FINAL **Page** 1 of 1

DISCLAIMER: This log is for environmental purposes only.

Trial Pit – TP5

APPENDIX E

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL
Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V4K6

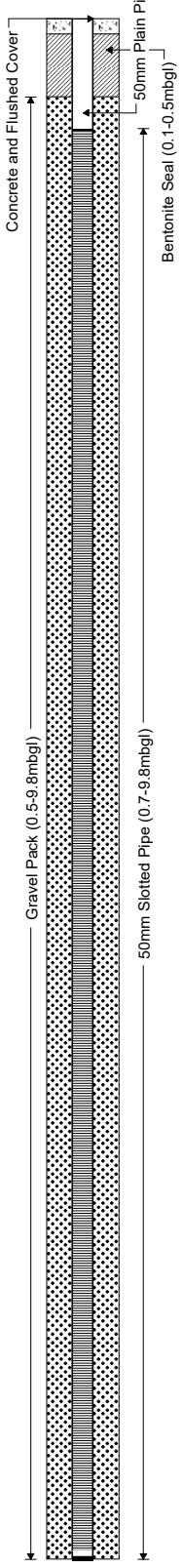
Project Number: E1506 | **Client:** Kildare County Council

Project Title: E1506-Kildare Legacy Landfills | **Site Location:** Greenhills, Athy, Co. Kildare

BOREHOLE NO: GW1-GH

Depth (mbgl)	SYMBOL	DESCRIPTION	Elev (mAOD)	COMMENTS	WATER (mbgl)	SAMPLE Depth (mbgl)	SAMPLE PID (ppm)
0			0.0				
		CLAY Dark to very brown, CLAY with gravels and some roots.Occasional coarse gravel with depth. Earthy odour. Dry.	0.0	No evidence of contamination (0.0-9.8mbgl)			
			-0.8				
1		CLAY Dark grey/brown, very slightly gravelly, CLAY. From 1.3 to 1.7mbgl getting more CLAY with occasional gravels. No odour. Dry at first - Wet after 0.85mbgl (Water Strike).	0.8		Water Strike (WS) (0.85mbgl)		
			-1.7				
2		GRAVEL Black/beige, slightly clayey, sandy (fine to coarse), rounded to subrounded, fine to medium, GRAVEL. No odour. Wet.	1.7				
			-3.0				
3		SAND Black/beige, slightly clayey, slightly gravelly (subrounded/fine), SAND (subrounded/subangular, fine to coarse). No odour. Wet.	3.0		Water Level-08/04/19 (3.80mbgl)		
4			-4.5				
		GRAVEL Black/beige, very sandy, GRAVEL with some proportion of clay. From 5.2, Increasing proportion of gravel (subrounded, fine to medium) with depth - slightly clayey, sandy, GRAVEL to slightly sandy, GRAVEL. No odour. Wet.	4.5				
5							
6			-6.7				
		GRAVEL Black/beige, subrounded, fine to medium, GRAVEL. Increasing proportion of clay with depth from 7.5mbgl. Slight foul odour. Wet.	6.7				
7			-7.5				
		GRAVEL Slightly clayey, slightly sandy, GRAVEL (fine to medium). Slight foul odour. Wet.	7.5				
			-7.9				
8		WEATHERED BEDROCK Black, subangular, fine to medium, LIMESTONE, some iron and calcite pieces. Slight foul odour. Wet. Possible Fracture at 9.1mbgl. Possible Fracture at 9.7mbgl.	7.9				
9					WS (9.7mbgl) WS (9.1mbgl)		
			-9.8				
10			9.8	EOH at 9.8mbgl			

INSTALLATION DETAILS



Drill Date: 08/04/2019
Drill Method: Air Rotary
Drilled By: Causeway Geotech Ltd

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 268122.689
Northing: 194318.345

Water Strike: (WS)
Strike: **Level:**

Revision: Final **Page:** 1 of 1

DISCLAIMER: This log is for environmental purposes only.

BOREHOLE LOG

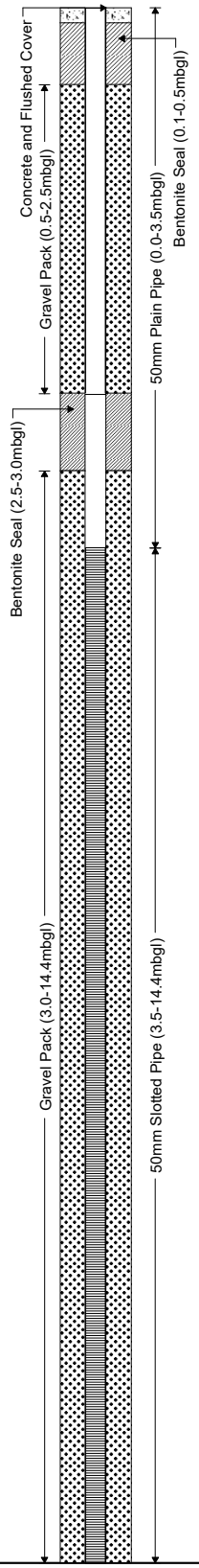
MALONE O'REGAN ENVIRONMENTAL
Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V4K6

Project Number: E1506 | **Client:** Kildare County Council

Project Title: E1506-Kildare Legacy Landfills | **Site Location:** Greenhills, Athy, Co. Kildare

BOREHOLE NO: GW2-GH

Depth (mbgl)	SYMBOL	DESCRIPTION	Elev (mAOD)	COMMENTS	WATER (mbgl)	SAMPLE Depth (mbgl)	SAMPLE PID (ppm)	INSTALLATION DETAILS
0			0.0					
		CLAY Brown, slightly gravelly, CLAY with frequent cobbles and roots. Earthy odour. Dry.	0.0 -0.3 0.3	No evidence of contamination (0.0-14.4mbgl)				
1		CLAY Dark brown, slightly sandy, CLAY with gravel and occasional cobbles. Earthy odour. Dry.	-1.4					
		CLAY Black/dark brown, slightly gravelly, CLAY. Earthy odour. Dry.	1.4 -1.7 1.7					
2		SILTY CLAY Light brown, SILTY/CLAY No odour. Moist at 2.5mbgl.						
3		CLAY Light brown, gravelly, CLAY. Gravel is black, subrounded to subangular. Increasing the proportion of gravel with depth - clayey, GRAVEL. From 3.6mbgl, increasing proportion of clay with depth - Black, slightly clayey, slightly sandy (fine to coarse), GRAVEL (rounded/subrounded, fine to medium). No odour. Dry at first. Water Strike at 5.2mbgl.	-3.0 3.0		WL (09/04/2019)-4.9mbgl WS (5.3mbgl) WS (6.3mbgl)			
4								
5			-5.3					
		GRAVEL Black, clayey, GRAVEL (subangular/subrounded, fine to medium) No odour. Dry from 5.7mbgl.	5.3 -5.9					
6		WEATHERED BEDROCK Black, slightly clayey, LIMESTONE. From 6.8 to 7.1 approx. - slight foul odour. At 8.0mbgl - rotten (eggy) odour. From 8.2mbgl - slight foul odour. Wet from 6.3mbgl (Water Strike) / Dry from 7.1mbgl. Possible fracture at 9.0mbgl - wet.	5.9					
7								
8								
9					WS (9.0mbgl)			
10								



Drill Date: 08-09/04/2019
Drill Method: Air Rotary
Drilled By: Causeway Geotech Ltd

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 268070.675
Northing: 194064.633

Water Strike: (WS)
Strike: **Level:**

Revision: Final **Page:** 1 of 2

DISCLAIMER: This log is for environmental purposes only.

BOREHOLE LOG

MALONE O'REGAN ENVIRONMENTAL
Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V4K6

Project Number: E1506 | **Client:** Kildare County Council

Project Title: E1506-Kildare Legacy Landfills | **Site Location:** Greenhills, Athy, Co. Kildare

BOREHOLE NO: GW2-GH

SUBSURFACE CONDITIONS						SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	Elev (mAOD)	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
			-10.9		WS (10.9mbgl)			
11		KARSTIFIED BEDROCK Black/grey, karstified LIMESTONE. No odour. Fracture at 10.9mbgl.	10.9					
12								
13			-13.0					
		COMPETENT BEDROCK Black, LIMESTONE with some calcite and iron pieces. No odour. Wet.	13.0					
14			-14.4	EOH at 14.4mbgl				
			14.4					
15								
16								
17								
18								
19								
20								

Drill Date: 08-09/04/2019
Drill Method: Air Rotary
Drilled By: Causeway Geotech Ltd

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 268070.675
Northing: 194064.633

Water Strike: (WS)
Strike: **Level:**

Revision: Final **Page:** 2 of 2

DISCLAIMER: This log is for environmental purposes only.

BOREHOLE LOG

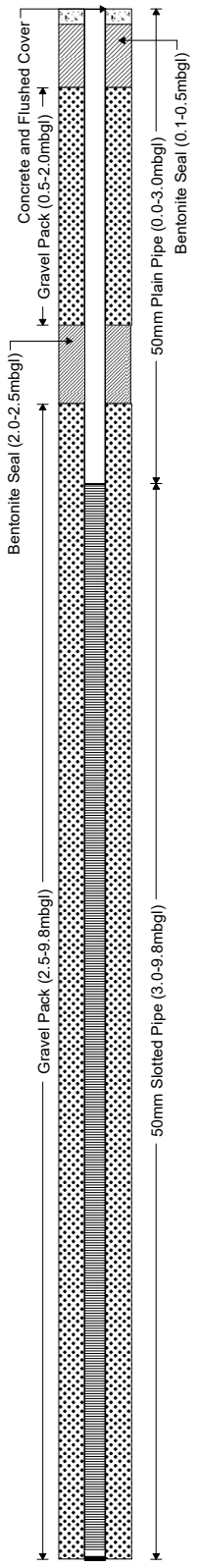
MALONE O'REGAN ENVIRONMENTAL
Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V4K6

Project Number: E1506 | **Client:** Kildare County Council

Project Title: E1506-Kildare Legacy Landfills | **Site Location:** Greenhills, Athy, Co. Kildare

BOREHOLE NO: GW3-GH

SUBSURFACE CONDITIONS					SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	Elev (mAOD)	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
0			0.0					
		CLAY Brown, CLAY with gravels. Earthy odour. Dry.	0.0	No evidence of contamination (0.0-9.8mbgl)				
			-1.0					
1		CLAY Grey, CLAY with gravels (subangular). Slight metallic odour. Dry.	1.0					
			-1.6					
		PEAT Peat Layer (brown).	1.6					
2		CLAY Brown, gravelly, CLAY. Gravel is black/grey. No odour. Dry.			WL (05/04/19)-3.25mbgl			
3					WL (05/04/19)-4.6mbgl			
			-3.8					
		CLAY Grey, slightly gravelly, CLAY. Proportion of clay increading with depth. Slight damp. No odour.	3.8					
4								
			-5.0					
5		CLAY Grey, very gravelly, slightly sandy, CLAY. Gravel is grey/beige. Moist at first. No odour.	5.0					
			-5.4					
		Water strike at 5.4mbgl.	5.4		Water Strike (5.4mbgl)			
6		POSSIBLE WEATHERED BEDROCK Beige/grey, slightly clayey, slightly sandy, LIMESTONE. Wet. No odour.						
			-6.5					
		WEATHERED BEDROCK Grey/black, slightly clayey, slightly sandy, LIMESTONE. No odour. Wet.	6.5					
7		Water strike at 9.2mbgl.			Water Strike (9.2mbgl)			
8								
9								
			-9.3					
		COMPETENT BEDROCK Black, LIMESTONE.	9.3					
			-9.8					
			9.8	EOH at 9.8mbgl				
10								



Drill Date: 04-05/04/2019
Drill Method: Air Rotary
Drilled By: Causeway Geotech Ltd

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 267988.858
Northing: 194250.829

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 1

BOREHOLE LOG

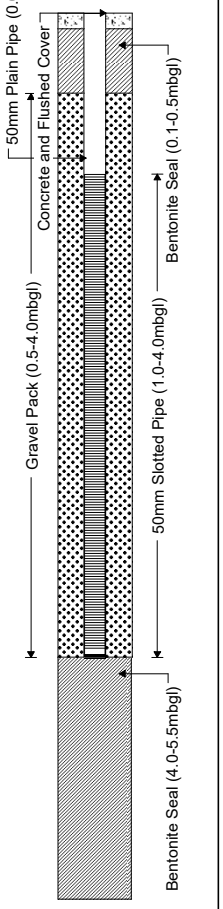
MALONE O'REGAN ENVIRONMENTAL
Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V4K6

Project Number: E1506 | **Client:** Kildare County Council

Project Title: E1506-Kildare Legacy Landfills | **Site Location:** Greenhills, Athy, Co. Kildare

BOREHOLE NO: L1-GH

SUBSURFACE CONDITIONS						SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	Elev (mAOD)	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
0			0.0					
		MADE GROUND. Brown, CLAY. Terram at 0.4mbgl. No odour. Dry.	0.0					
			-0.4					
		MADE GROUND. Brown, slightly sandy, gravelly, CLAY, with frequent cobbles and rare red bricks, metal and wood. Turning to grey, gravelly, cobbly, CLAY. Slight hydrocarbon odour with depth. Dry.	0.4					
1								
2								
			-2.3					
		MADE GROUND. Dark grey, slightly sandy, CLAY and rare coal, red bricks and wood. No odour. Dry - slightly damp with depth.	2.3					
3								
4								
			-4.8					
		CLAY. Light grey, CLAY. No odour. Wet.	4.8					
5								
			-5.5	End of Borehole at 5.5mbgl due to natural ground				
			5.5					
6								
7								
8								
9								
10								



Drill Date: 10-14/01/2019
Drill Method: Shell and Auger
Drilled By: O'Connell Byrne

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 268097.743
Northing: 194233.444

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 1

BOREHOLE LOG

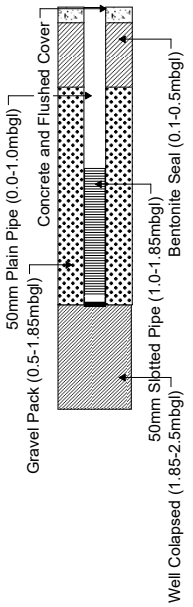
MALONE O'REGAN ENVIRONMENTAL
Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V4K6

Project Number: E1506 | **Client:** Kildare County Council

Project Title: E1506-Kildare Legacy Landfills | **Site Location:** Greenhills, Athy, Co. Kildare

BOREHOLE NO: L2-GH

SUBSURFACE CONDITIONS						SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	Elev (mAOD)	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
0			0.0					
		MADE GROUND. Brown, CLAY. Terram at 0.5mbgl. No odour. Dry.	0.0 -0.5					
1		MADE GROUND. Brown, slightly sandy, CLAY, with gravels and cobbles and rare red bricks, plastic, bitumen and concrete. Slight hydrocarbon odour. Dry at first - water at approx. 1.7mbgl.	0.5 -2.1					
2		MADE GROUND. Light grey sludge (sandy, slightly gravelly, CLAY). No odour. Wet.	2.1 -2.5					
			2.5	End of Borehole at 2.5mblg due to obstruction				
3								
4								
5								
6								
7								
8								
9								
10								



Drill Date: 14-15/01/2019
Drill Method: Shell and Auger
Drilled By: O'Connell Byrne

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 0
Northing: 0

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 1

BOREHOLE LOG

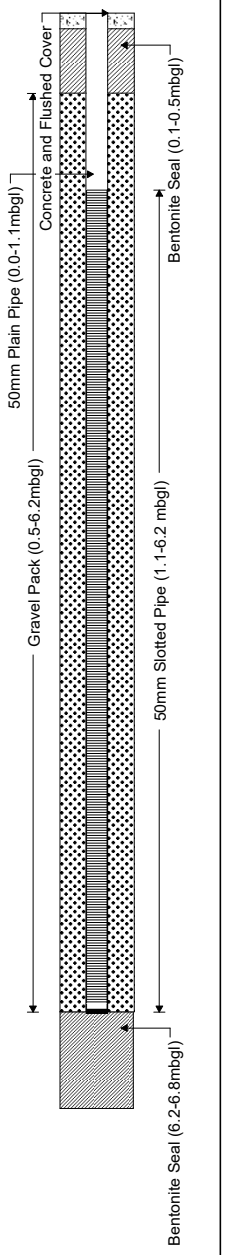
MALONE O'REGAN ENVIRONMENTAL
Ground Floor - Unit 3
Bracken Business Park
Bracken Road,
Sandyford
Dublin 18, D18 V4K6

Project Number: E1506 | **Client:** Kildare County Council

Project Title: E1506-Kildare Legacy Landfills | **Site Location:** Greenhills, Athy, Co. Kildare

BOREHOLE NO: L3-GH

SUBSURFACE CONDITIONS						SAMPLE		INSTALLATION DETAILS
Depth (mbgl)	SYMBOL	DESCRIPTION	Elev (mAOD)	COMMENTS	WATER (mbgl)	Depth (mbgl)	PID (ppm)	
0			0.0					
		MADE GROUND. Brown, CLAY with some gravels. Terram at 0.5mbgl. No odour. Dry.	0.0 -0.5					
1		MADE GROUND. Brown to light brown, CLAY, with some gravel and boulders and rare red bricks, bitumem, rubber black plastic. No odour. Dry.	0.5 -1.7					
2		MADE GROUND. Light to dark grey, gravelly, CLAY and rare/occasional red bricks, concrete, metal, broken glass, wood, styrofoam pieces and bitumem. Slight hydrocarbon odour with depth. A bit damp - inflow of water at 4.7mbgl (wet).	1.7					
3								
4								
5		MADE GROUND. Black/grey, silty, CLAY sludge with some cobbles and rare wood, red bricks, some black fibers, some pieces of tiles and cloths. Slight hydrocarbon odour - hydrocarbon sheen at 5.8mbgl. Wet.	-5.1 5.1					
6								
7		CLAY. Light grey, CLAY with gravel turning to clayey, GRAVEL. No odour. Wet.	-6.7 6.7	End of Borehole at 6.8mbgl due to natural ground				
8								
9								
10								



Drill Date: 09/01/2019
Drill Method: Shell and Auger
Drilled By: O'Connell Byrne

Logged By: NM
Checked By: TVM

Reference Datum:
Elevation: 0
Easting: 268088.833
Northing: 194137.241

Water Strike:
Strike: **Level:**

Revision: Final **Page:** 1 of 1

DISCLAIMER: This log is for environmental purposes only.

APPENDIX F

CHAIN OF CUSTODY

CLIENT: MDR	If Electronic File Required please select file format below	SAMPLER: NURIA MANZANAS	
ADDRESS: GROUNDFLOOR - UNIT 3 - PRACMEN ROAD, SANDYFORD, DUBLIN 18	EQUIS	MOBILE: 0857081300	
PROJECT MANAGER (PM): THOMAS VAINIO-MATTILA	CROSSTAB	EMAIL REPORT TO: NMANZANAS@MDR.IE	
MOBILE: 086 38 21225	CLIENT	cc REPORT TO: tvainio@mdr.ie	
PROJECT ID: E1506	AGS (please also fill in AGS SAMP_TYPE & SAMP_REF below)	INVOICE TO: (if different to report)	
SITE: ATHY (KILDARE COUNTY) GREENHILLS		QUOTE NUMBER: 14479 (0) P.O No:	

Exova Jones Environmental

Chain of Custody sheet page 1 of 1

ANALYSIS REQUIRED including SUITE names

TURNAROUND - please tick

10 DAY | 4 DAY | Other

5 DAY | 3 DAY

All waters - tick for samples to be tested shaken or settled

FOR LABORATORY USE ONLY

AVERAGE COOL BOX TEMP (if required)

SAMPLE RECIEPT CONDITION.

MATRIX:- S=Soil, GW=GroundWater, SW=SurfaceWater, L/E=Leachate/Effluent, OW=OtherWater, P=Product/Oil)

Sample ID	AGS SAMPTYPE	AGS SAMPREF	Shaken	Settled	S/GW/SW/L/E/OW/P	Date	Time	Depth in Metres	Preservation	Asbestos risk: High	Medium	Low
TP3					S	16/01/19		0-1.1m				
TP3												
TP4					S	16/01/19		1-2m				
TP5					S	16/01/19		2-2.5m				

SOILS -We are MCERTS accredited for samples predominantly made up of sand, loam and clay (no other matrices). Please request an MCERTS report if required. WATERS - we are accredited for surface and groundwaters (leachates and effluents are accredited for some tests, please see UKAS schedule). Please tick whether analysis is required on settled or shaken samples

NOTE: PLEASE SEND US OVER ONE REPORT FOR THIS SAMPLES AND ONE INVOICE AS OF ALL.

PARAMETERS TO ANALYSE AS PER QUOTATION

INVOICE TO KILDARE COUNTY COUNCIL

PO TO FOLLOW

RELINQUISHED BY:		RECIEVED BY:		METHOD of SHIPMENT
Name: NURIA MANZANAS	Date: 31/01/19	Name:	Date:	Consignment note No.
Of: MDR	Time:	Of:	Time:	Courier Company:

Health & Safety instructions including known hazards (eg suspected asbestos). Please let us know if samples are heavily contaminated, High PAHs expected, provide PID readings if available

Exova Jones Environmental
Unit 3 Deeside Point, Zone 3 Deeside Industrial Park, Deeside, CH5 2UA Tel: 0044 1244 833 780
Reg Office: Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian EH28 8PL Company Reg No: SC070429

JEL 118397

CHAIN OF CUSTODY

CLIENT: MOR	If Electronic File Required please select file format below		SAMPLER: MARTIN KEANE / NURIA HANZANAS
ADDRESS: GROUND FLOOR - UNIT 3 BRACKEN INDUSTRIAL STATE, DUBLIN 18	EQUIS		MOBILE: 0857193534
PROJECT MANAGER (PM): THOMAS (AINO) HATTILA	CROSSTAB		EMAIL REPORT TO: mkeane@uidep.ie
MOBILE:	CLIENT		cc REPORT TO: THannon@uidep.ie
PROJECT ID: e1506	AGS (please also fill in AGS SAMP_TYPE & SAMP_REF below)		INVOICE TO: (if different to report)
SITE: ATHY			QUOTE NUMBER: 14479 13 MOR P.O No:

Exova JONES ENVIRONMENTAL

Chain of Custody sheet page 1 of 1

ANALYSIS REQUIRED including SUITE names

TURNAROUND - please tick

10 DAY	✓	4 DAY		Other	
5 DAY		3 DAY			

All waters - tick for samples to be tested shaken or settled

FOR LABORATORY USE ONLY

AVERAGE COOL BOX TEMP.(If required):

SAMPLE RECIEPT CONDITION:

MATRIX:- S=Soil, GW=GroundWater, SW=SurfaceWater, L/E=Leachate/Effluent, OW=OtherWater, P=Product/Oil)

Sample ID	AGS SAMPT YPE	AGS SAMPR EF	Shaken	Settled	S/GW/SW/ L/E/OW/P	Date	Time	Depth in Metres	Preserv ation	Asbestos risk: High	Medium	Low
GW1					GW	23/04/19						
GW2					GW	"						
GW3					GW	"						
L1					L	"						
L2					L	"						
L3					L	"						
SW1					SW	"						
SW2					SW	"						

AS PER QUOTE FOR GROUNDWATER

AS PER QUOTE FOR LEACHATE

AS PER QUOTE FOR SURFACE WATER

SOILS -We are MCERTS accredited for samples predominantly made up of sand, loam and clay (no other matrices). Please request an MCERTS report if required. WATERS - we are accredited for surface and groundwaters (leachates and effluents are accredited for some tests, please see UKAS schedule). Please tick whether analysis is required on settled or shaken samples

MICRO IS BEING DELIVERED TO CIT TODAY

INCLUDE PH IN ALL SAMPLES.

SAMPLES ARE OVER TWO COOLER BOXES

RELINQUISHED BY:		RECIEVED BY:		METHOD of SHIPMENT
Name: MARTIN KEANE	Date: 23/04/19	Name:	Date:	Consignment note No:
Of: MOR	Time:	Of:	Time:	Courier Company:

Health & Safety Instructions including known hazards (eg suspected asbestos). Please let us know if samples are heavily contaminated, High PAHs expected, provide PID readings if available

Exova Jones Environmental
Unit 3 Deeside Point, Zone 3 Deeside Industrial Park, Deeside, CH5 2UA Tel: 0044 1244 833 780
Reg Office: Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian EH28 8PL Company Reg No: SC070429

JEL 131207

CHAIN OF CUSTODY

CLIENT: MOR
ADDRESS: GROUND FLOOR - UNIT 3, BRACKEN INDUSTRIAL STATE, DUBLIN 18
PROJECT MANAGER (PM): THOMAS UNNIO MATTILA
MOBILE:
PROJECT ID: E1506
SITE: ATHY

If Electronic File Required please select file format below: EQUIS / CROSSTAB / CLIENT / AGS (please also fill in AGS SAMP_TYPE & SAMP_REF below)

SAMPLER: MARTIN KEARS / NURIA MANZANARES
MOBILE: 0857193534
EMAIL REPORT TO: mkears@mor.ie
cc REPORT TO: ThomasM@mor.ie
INVOICE TO: (if different to report)
QUOTE NUMBER: P.O No:

Chain of Custody sheet page 1 of 1

TURNAROUND - please tick: 10 DAY ✓ | 4 DAY | 5 DAY | 3 DAY | Other

All waters - tick for samples to be tested shaken or settled

FOR LABORATORY USE ONLY
AVERAGE COOL BOX TEMP.(if required):
SAMPLE RECIEPT CONDITION:

MATRIX:- S=Soil, GW=GroundWater, SW=SurfaceWater, L/E=Leachate/Effluent, OW=OtherWater, P=Product/Oil)

Asbestos risk: High / Medium / Low

ANALYSIS REQUIRED including SUITE names

SOILS -We are MCERTS accredited for samples predominantly made up of sand, loam and clay (no other matrices). Please request an MCERTS report if required. WATERS - we are accredited for surface and groundwaters (leachates and effluents are accredited for some tests, please see UKAS schedule). Please tick whether analysis is required on settled or shaken samples

Sample ID	AGS SAMPTYPE	AGS SAMPREF	Shaken	Settled	S/GW/SW/L/E/OW/P	Date	Time	Depth in Metres	Preservation	Analysis required
GW1					GW					FAECAL AND TOTAL
GW2					GW					COLIFORMS ONLY
GW3					GW					
L1					L					
L3					L					

QUOTE Nº FROM EXOVA 14479HJ MOR

RELINQUISHED BY:
Name: MARTIN KEARS Date: 23/04/19
Of: MOR Time:

RECIEVED BY:
Name: Date:
Of: Time:

METHOD of SHIPMENT
Consignment note No:
Courier Company:

Health & Safety instructions including known hazards (eg suspected asbestos). Please let us know if samples are heavily contaminated, High PAHs expected, provide PID readings if available

Exova Jones Environmental
Unit 3 Deeside Point, Zone 3 Deeside Industrial Park, Deeside, CH5 2UA Tel: 0044 1244 833 780
Reg Office: Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian EH28 8PL Company Reg No: SC070429

JEL 131208

CHAIN OF CUSTODY

CLIENT: POD	If Electronic File Required please select file format below	SAMPLER: MK / NH	Exova JONES ENVIRONMENTAL
ADDRESS: GROUND FLOOR - UNIT 3 RIVERVIEW, DEESIDE, CH5 2QA	EQUIS	MOBILE: 07570831300	
PROJECT MANAGER (PM): THOMAS WILSON-HEATTLEY	CROSSTAB	EMAIL REPORT TO: mkearns@waterscape.co.uk	
MOBILE:	CLIENT	cc REPORT TO: twilson@waterscape.co.uk	
PROJECT ID: E1506	AGS (please also fill in AGS SAMP_TYPE & SAMP_REF below)	INVOICE TO: (if different to report)	Chain of Custody sheet page 1 of 1
SITE:		QUOTE NUMBER: 14479HS1402 P.O No:	

TURNAROUND - please tick: 10 DAY ✓ | 4 DAY | Other | 5 DAY | 3 DAY

All waters - tick for samples to be tested shaken or settled

FOR LABORATORY USE ONLY
AVERAGE COOL BOX TEMP (if required):
SAMPLE RECIEPT CONDITION:

MATRIX:- S=Soil, GW=GroundWater, SW=SurfaceWater, L/E=Leachate/Effluent, OW=OtherWater, P=Product/Oil)

ANALYSIS REQUIRED including SUITE names

Sample ID	AGS SAMPT YPE	AGS SAMPR EF	Shaken	Settled	S/GW/SW/ L/E/OW/P	Date	Time	Depth in Metres	Preserv ation	Asbestos risk: High	Medium	Low	ANALYSIS REQUIRED including SUITE names	SOILS -We are MCERTS accredited for samples predominantly made up of sand, loam and clay (no other matrices). Please request an MCERTS report if required. WATERS - we are accredited for surface and groundwaters (leachates and effluents are accredited for some tests, please see UKAS schedule). Please tick whether analysis is required on settled or shaken samples
GW1					GW	08/05/19							PARAMETERS TO ANALYSE AS PER GROUNDWATER QUOTATION	1 BOX (COOLER) ONLY
GW2					GW	"								
GW3					GW	"								MICRO DELIVERED TO CITY ANALYST
L1					L	"							AS PER LEACHATE QUOTATION	
L3					L	"								

RELINQUISHED BY:
Name: MARTIN KEARNS
Of: POD
Date: 08/05/19
Time:

RECIEVED BY:
Name:
Of:
Date:
Time:

METHOD of SHIPMENT
Consignment note No:
Courier Company:

Health & Safety instructions including known hazards (eg suspected asbestos). Please let us know if samples are heavily contaminated, High PAHs expected, provide PID readings if available

Exova Jones Environmental
Unit 3 Deeside Point, Zone 3 Deeside Industrial Park, Deeside, CH5 2UA Tel: 0044 1244 833 780
Reg Office: Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian EH28 8PL Company Reg No: SC070429

JEL 160561

CHAIN OF CUSTODY

CLIENT: MOR

ADDRESS: GROUND FLOOR - UNIT 3 BRACKEN IND ESTATE, D18

PROJECT MANAGER (PM): THOMAS UDINO-HEATTILA

MOBILE:

PROJECT ID: E1506

SITE:

If Electronic File Required please select file format below: EQUIS / CROSSTAB / CLIENT / AGS (please also fill in AGS SAMP_TYPE & SAMP_REF below)

SAMPLER: HK / NH

MOBILE: 085 7081300

EMAIL REPORT TO: [illegible]@[illegible].ie

cc REPORT TO: [illegible]@[illegible].ie

INVOICE TO: (if different to report)

QUOTE NUMBER: 14479 HJ MOR P.O No:

Chain of Custody sheet page 1 of 1

TURNAROUND - please tick: 10 DAY ✓ | 4 DAY | Other | 5 DAY | 3 DAY

All waters - tick for samples to be tested shaken or settled

FOR LABORATORY USE ONLY
AVERAGE COOL BOX TEMP.(if required):
SAMPLE RECIEPT CONDITION:

MATRIX:- S=Soil, GW=GroundWater, SW=SurfaceWater, L/E=Leachate/Effluent, OW=OtherWater, P=Product/Oil)

Sample ID	AGS SAMPTYPE	AGS SAMPREF	Shaken	Settled	S/GW/SW/ L/E/OW/P	Date	Time	Depth in Metres	Preservation	Asbestos risk High	Medium	Low	ANALYSIS REQUIRED including SUITE names
GW1					GW	08/05/19							↳ FROM EXOVA
GW2					GW	"							ANALYSE FOR MICRO
GW3					GW	"							(TOTAL AND FAECAL COLIFORMS).

SOILS -We are MCERTS accredited for samples predominantly made up of sand, loam and clay (no other matrices). Please request an MCERTS report if required. WATERS - we are accredited for surface and groundwaters (leachates and effluents are accredited for some tests, please see UKAS schedule). Please tick whether analysis is required on settled or shaken samples

QUOTATION No. FROM EXOVA 14479 HJ MOR

CITY ANALYST LAB.

RELINQUISHED BY: Name: MARTIN KEARNS Of: MOR Date: 08/05/19 Time:

RECIEVED BY: Name: Of: Date: Time:

METHOD of SHIPMENT: Consignment note No: Courier Company:

Health & Safety instructions including known hazards (eg suspected asbestos). Please let us know if samples are heavily contaminated, High PAHs expected, provide PID readings if available

Exova Jones Environmental
Unit 3 Deeside Point, Zone 3 Deeside Industrial Park, Deeside, CH5 2UA Tel: 0044 1244 833 780
Reg Office: Exova (UK) Ltd, Lochend Industrial Estate, Newbridge, Midlothian EH28 8PL Company Reg No: SC070429

JEL 160562

APPENDIX G

Exova Jones Environmental

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

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

Attention :	Thomas Vainio-Mattila
Date :	13th February, 2019
Your reference :	E1506
Our reference :	Test Report 19/1584 Batch 1
Location :	Athy Kildare County Greenhills
Date samples received :	1st February, 2019
Status :	Final report
Issue :	1

Three samples were received for analysis on 1st February, 2019 of which three were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Bruce Leslie
Project Co-ordinator

Client Name: Malone O'Regan
Reference: E1506
Location: Athy Kildare County Greenhills
Contact: Thomas Vainio-Mattila
JE Job No.: 19/1584

Report : Solid

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

J E Sample No.	1-3	4-6	7-9									
Sample ID	TP3	TP4	TP5									
Depth	0.50-1.10	1.00-2.00	2.00-2.50									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	16/01/2019	16/01/2019	16/01/2019									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	01/02/2019	01/02/2019	01/02/2019									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
Antimony	2	-	-								<1	mg/kg	TM30/PM15
Arsenic #	7.6	-	-								<0.5	mg/kg	TM30/PM15
Barium #	630	-	-								<1	mg/kg	TM30/PM15
Cadmium #	2.4	-	-								<0.1	mg/kg	TM30/PM15
Chromium #	86.8	-	-								<0.5	mg/kg	TM30/PM15
Copper #	21	-	-								<1	mg/kg	TM30/PM15
Lead #	28	-	-								<5	mg/kg	TM30/PM15
Mercury #	<0.1	-	-								<0.1	mg/kg	TM30/PM15
Molybdenum #	2.8	-	-								<0.1	mg/kg	TM30/PM15
Nickel #	39.6	-	-								<0.7	mg/kg	TM30/PM15
Selenium #	3	-	-								<1	mg/kg	TM30/PM15
Total Sulphate as SO4 #	971	-	-								<50	mg/kg	TM50/PM29
Water Soluble Boron #	1.3	-	-								<0.1	mg/kg	TM74/PM32
Zinc #	222	-	-								<5	mg/kg	TM30/PM15
Antimony	-	1	<1								<1	mg/kg	TM30/PM62
Arsenic	-	12.5	8.3								<0.5	mg/kg	TM30/PM62
Barium	-	71	132								<1	mg/kg	TM30/PM62
Cadmium	-	1.0	1.0								<0.1	mg/kg	TM30/PM62
Chromium	-	17.4	11.9								<0.5	mg/kg	TM30/PM62
Copper	-	28	27								<1	mg/kg	TM30/PM62
Lead	-	98	68								<5	mg/kg	TM30/PM62
Mercury	-	0.2	<0.1								<0.1	mg/kg	TM30/PM62
Molybdenum	-	1.2	1.0								<0.1	mg/kg	TM30/PM62
Nickel	-	24.4	21.7								<0.7	mg/kg	TM30/PM62
Selenium	-	<1	<1								<1	mg/kg	TM30/PM62
Total Sulphate as SO4	-	698	582								<50	mg/kg	TM50/PM29
Water Soluble Boron	-	1.0	2.0								<0.1	mg/kg	TM74/PM61
Zinc	-	140	185								<5	mg/kg	TM30/PM62

Client Name: Malone O'Regan
Reference: E1506
Location: Athy Kildare County Greenhills
Contact: Thomas Vainio-Mattila
JE Job No.: 19/1584

Report : Solid

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

J E Sample No.	1-3	4-6	7-9									
Sample ID	TP3	TP4	TP5									
Depth	0.50-1.10	1.00-2.00	2.00-2.50									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	16/01/2019	16/01/2019	16/01/2019									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	01/02/2019	01/02/2019	01/02/2019									

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	0.08								<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05								<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	0.05								<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	0.10	0.24								<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	0.13								<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.05	0.28	0.71								<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	0.23	0.62								<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	0.21	0.46								<0.06	mg/kg	TM4/PM8
Chrysene #	0.05	0.14	0.38								<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	0.34	0.82								<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	0.16	0.43								<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	0.12	0.27								<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	0.11								<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	0.10	0.26								<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	0.06								<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	1.00	2.49								<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	1.68	4.62								<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	0.24	0.59								<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	0.10	0.23								<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1								<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	100	97	103								<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30								<30	mg/kg	TM5/PM8/PM16
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2								<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4								<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
>C35-C40	<7	<7	<7								<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40	<26	<26	<26								<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10	<0.1	<0.1	<0.1								<0.1	mg/kg	TM36/PM12
>C10-C25	<10	<10	<10								<10	mg/kg	TM5/PM8/PM16
>C25-C35	<10	<10	<10								<10	mg/kg	TM5/PM8/PM16

Client Name: Malone O'Regan
Reference: E1506
Location: Athy Kildare County Greenhills
Contact: Thomas Vainio-Mattila
JE Job No.: 19/1584

Report : Solid

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

J E Sample No.	1-3	4-6	7-9									
Sample ID	TP3	TP4	TP5									
Depth	0.50-1.10	1.00-2.00	2.00-2.50									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	16/01/2019	16/01/2019	16/01/2019									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	01/02/2019	01/02/2019	01/02/2019									

Please see attached notes for all abbreviations and acronyms

				LOD/LOR	Units	Method No.
TPH CWG						
Aromatics						
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	63	<7	mg/kg	TM5/PM8/PM16
>EC35-EC40	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40	<26	<26	63	<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40)	<52	<52	63	<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 #	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC25	<10	<10	<10	<10	mg/kg	TM5/PM8/PM16
>EC25-EC35	<10	<10	50	<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5	<5	ug/kg	TM31/PM12
Benzene #	<5	<5	<5	<5	ug/kg	TM31/PM12
Toluene #	<5	<5	<5	<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	<5	<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5	<5	<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5	<5	<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	ug/kg	TM17/PM8
Phenol #	<0.01	<0.01	<0.01	<0.01	mg/kg	TM26/PM21
Natural Moisture Content	55.8	16.6	18.8	<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	35.8	14.2	15.8	<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	86.8	-	-	<0.5	mg/kg	NONE/NONE
Chromium III	-	17.4	11.9	<0.5	mg/kg	NONE/NONE
Total Cyanide #	<0.5	<0.5	<0.5	<0.5	mg/kg	TM89/PM45
Total Organic Carbon #	2.20	NDP	NDP	<0.02	%	TM21/PM24

Client Name: Malone O'Regan
Reference: E1506
Location: Athy Kildare County Greenhills
Contact: Thomas Vainio-Mattila
JE Job No.: 19/1584

Report : Solid

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

J E Sample No.	1-3	4-6	7-9								LOD/LOR	Units	Method No.
Sample ID	TP3	TP4	TP5										
Depth	0.50-1.10	1.00-2.00	2.00-2.50										
COC No / misc													
Containers	V J T	V J T	V J T										
Sample Date	16/01/2019	16/01/2019	16/01/2019										
Sample Type	Soil	Soil	Soil										
Batch Number	1	1	1										
Date of Receipt	01/02/2019	01/02/2019	01/02/2019										
Sulphide	<10	<10	<10								<10	mg/kg	TM107/PM119
Elemental Sulphur	11	-	-								<1	mg/kg	TM108/PM114
Elemental Sulphur	-	20	23								<1	mg/kg	TM108/PM8
pH #	7.65	7.94	7.89								<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1283	0.1073	0.1095									kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09									kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1506
Location: Athy Kildare County Greenhills
Contact: Thomas Vainio-Mattila
JE Job No.: 19/1584

Report : CEN 10:1 1 Batch

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

J E Sample No.	1-3	4-6	7-9									
Sample ID	TP3	TP4	TP5									
Depth	0.50-1.10	1.00-2.00	2.00-2.50									
COC No / misc												
Containers	V J T	V J T	V J T									
Sample Date	16/01/2019	16/01/2019	16/01/2019									
Sample Type	Soil	Soil	Soil									
Batch Number	1	1	1									
Date of Receipt	01/02/2019	01/02/2019	01/02/2019									

Please see attached notes for all abbreviations and acronyms

				LOD/LOR	Units	Method No.
Dissolved Antimony #	<0.002	0.003	0.006	<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	0.03	0.06	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025	0.0053	<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	0.053	<0.025	mg/kg	TM30/PM17
Dissolved Barium #	0.055	0.033	0.019	<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	0.55	0.33	0.19	<0.03	mg/kg	TM30/PM17
Dissolved Boron #	0.035	0.020	0.050	<0.012	mg/l	TM30/PM17
Dissolved Boron (A10) #	0.35	0.20	0.50	<0.12	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	<0.002	0.005	0.016	<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	0.05	0.16	<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	0.002	<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003	<0.003	<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001	<0.00001	<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001	<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01	<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3	<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	13.8	25.3	20.9	<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	138	253	209	<5	mg/kg	TM38/PM0
Chloride #	0.8	<0.3	<0.3	<0.3	mg/l	TM38/PM0
Chloride #	8	<3	<3	<3	mg/kg	TM38/PM0
Ammoniacal Nitrogen as N #	0.09	0.07	0.30	<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as N #	0.9	0.7	3.0	<0.3	mg/kg	TM38/PM0
Dissolved Organic Carbon	5	3	4	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	50	30	40	<20	mg/kg	TM60/PM0
Total Dissolved Solids #	188	194	216	<35	mg/l	TM20/PM0
Total Dissolved Solids #	1880	1940	2160	<350	mg/kg	TM20/PM0

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	84.0
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%	Eluate Volume (l)	0.8

		Landfill Waste Acceptance Criteria Limits		
JEFL Job No	**19/1584**			
Sample No	**6**			
Client Sample No	**TP4**			
Depth/Other	**1.00-2.00**	**Inert**	**Stable Non-reactive**	**Hazardous**
Sample Date	**16/01/2019**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	NDP	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg)	<30	500	-	-
PAH Sum of 6 (mg/kg)	1.00	-	-	-
PAH Sum of 17 (mg/kg)	1.68	100	-	-
Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	0.33	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.05	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	0.03	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	<3	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	253	1000	20000	50000
Total Dissolved Solids	1940	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	30	500	800	1000

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	81.9
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%	Eluate Volume (l)	0.77

		Landfill Waste Acceptance Criteria Limits		
JEFL Job No	**19/1584**			
Sample No	**9**			
Client Sample No	**TP5**			
Depth/Other	**2.00-2.50**	**Inert**	**Stable Non-reactive**	**Hazardous**
Sample Date	**16/01/2019**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	NDP	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg)	<30	500	-	-
PAH Sum of 6 (mg/kg)	2.49	-	-	-
PAH Sum of 17 (mg/kg)	4.62	100	-	-
Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	0.053	0.5	2	25
Barium	0.19	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	0.16	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	0.06	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	<3	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	209	1000	20000	50000
Total Dissolved Solids	2160	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	40	500	800	1000

Mass of sample taken (kg)	-	Dry Matter Content Ratio (%) =	70.4
Mass of dry sample (kg) =	0.09	Leachant Volume (l)	-
Particle Size <4mm =	>95%	Eluate Volume (l)	0.59

		Landfill Waste Acceptance Criteria Limits		
JEFL Job No	**19/1584**			
Sample No	**3**			
Client Sample No	**TP3**			
Depth/Other	**0.50-1.10**	**Inert**	**Stable Non-reactive**	**Hazardous**
Sample Date	**16/01/2019**			
Batch No	**1**			
Solid Waste Analysis				
Total Organic Carbon (%)	2.20	3	5	6
Sum of BTEX (mg/kg)	<0.025	6	-	-
Sum of 7 PCBs (mg/kg)	<0.035	1	-	-
Mineral Oil (mg/kg)	<30	500	-	-
PAH Sum of 6 (mg/kg)	<0.22	-	-	-
PAH Sum of 17 (mg/kg)	<0.64	100	-	-
Eluate Analysis	**10:1 concn leached**	**Limit values for compliance leaching test using BS EN 12457-2 at L/S 10 l/kg**		
	A10			
	mg/kg	**mg/kg**		
Arsenic	<0.025	0.5	2	25
Barium	0.55	20	100	300
Cadmium	<0.005	0.04	1	5
Chromium	<0.015	0.5	10	70
Copper	<0.07	2	50	100
Mercury	<0.0001	0.01	0.2	2
Molybdenum	<0.02	0.5	10	30
Nickel	<0.02	0.4	10	40
Lead	<0.05	0.5	10	50
Antimony	<0.02	0.06	0.7	5
Selenium	<0.03	0.1	0.5	7
Zinc	<0.03	4	50	200
Chloride	8	800	15000	25000
Fluoride	<3	10	150	500
Sulphate as SO4	138	1000	20000	50000
Total Dissolved Solids	1880	4000	60000	100000
Phenol	<0.1	1	-	-
Dissolved Organic Carbon	50	500	800	1000

Client Name: Malone O'Regan **Matrix : Solid**
Reference: E1506
Location: Athy Kildare County Greenhills
Contact: Thomas Vainio-Mattila

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	EPH Interpretation
19/1584	1	TP3	0.50-1.10	1-3	No interpretation possible
19/1584	1	TP4	1.00-2.00	4-6	No interpretation possible
19/1584	1	TP5	2.00-2.50	7-9	Trace of possible PAH's

Client Name: Malone O'Regan
Reference: E1506
Location: Athy Kildare County Greenhills
Contact: Thomas Vainio-Mattila

Note:

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

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/1584	1	TP3	0.50-1.10	2	06/02/2019	**General Description (Bulk Analysis)**	soil-stones
					06/02/2019	**Asbestos Fibres**	NAD
					06/02/2019	**Asbestos ACM**	NAD
					06/02/2019	**Asbestos Type**	NAD
					06/02/2019	**Asbestos Level Screen**	NAD
19/1584	1	TP4	1.00-2.00	5	06/02/2019	**General Description (Bulk Analysis)**	soil-stones
					06/02/2019	**Asbestos Fibres**	Fibre Bundles
					06/02/2019	**Asbestos ACM**	NAD
					06/02/2019	**Asbestos Type**	Chrysotile
					06/02/2019	**Asbestos Level Screen**	less than 0.1%
					13/02/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/02/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/02/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					13/02/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					13/02/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
19/1584	1	TP5	2.00-2.50	8	06/02/2019	**General Description (Bulk Analysis)**	soil-stones
					06/02/2019	**Asbestos Fibres**	Fibre Bundles
					06/02/2019	**Asbestos ACM**	NAD
					06/02/2019	**Asbestos Type**	Chrysotile
					06/02/2019	**Asbestos Level Screen**	less than 0.1%
					13/02/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/02/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/02/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					13/02/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					13/02/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)

Client Name: Malone O'Regan **Matrix : Solid**
Reference: E1506
Location: Athy Kildare County Greenhills
Contact: Thomas Vainio-Mattila

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Method No.	NDP Reason
19/1584	1	TP4	1.00-2.00	4-6	TM21/PM24	Asbestos detected in sample
19/1584	1	TP5	2.00-2.50	7-9	TM21/PM24	Asbestos detected in sample

Client Name: Malone O'Regan

Matrix : Solid

Reference: E1506

Location: Athy Kildare County Greenhills

Contact: Thomas Vainio-Mattila

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
19/1584	1	TP3	0.50-1.10	1-3	Cyanide, EPH, GRO, PAH, PCB, Phenols	Sample holding time exceeded prior to receipt
19/1584	1	TP4	1.00-2.00	4-6	Cyanide, EPH, GRO, PAH, PCB, Phenols	Sample holding time exceeded prior to receipt
19/1584	1	TP5	2.00-2.50	7-9	Cyanide, EPH, GRO, PAH, PCB, Phenols	Sample holding time exceeded prior to receipt

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.

Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/1584

SOILS

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

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

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

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

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

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

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

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

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

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

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

WATERS

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

Appendix - Methods used for WAC (2003/33/EC)

JE Job No.: 19/1584

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amounts of acid or base needed to cover the pH range

Notes:

*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.

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Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified USEPA 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) with carbon banding within the range C8-C40 GC-FID.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

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Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.	Yes		AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

JE Job No: 19/1584

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.	Yes		AD	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	Dried and ground solid sample is boiled with dilute hydrochloric acid, the resulting liquor is then analysed.			AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM32	Hot water soluble boron is extracted from dried and ground samples using a 20:1 ratio.	Yes		AD	Yes
TM74	Analysis of water soluble boron (20:1 extract) by ICP-OES.	PM61	As received solid samples are extracted with hot water in a 20:1 ratio of water to soil ready for analysis by ICP.			AR	Yes

JE Job No: 19/1584

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide and Thiocyanate analysis.	Yes		AR	Yes
TM107	Determination of Sulphide/Thiocyanate by Skalar Continuous Flow Analyser	PM119	As received solid samples are extracted with 1M NaOH by orbital shaker for Sulphide and Thiocyanate analysis.			AR	Yes
TM108	Determination of Elemental Sulphur by Reversed Phase High Performance Liquid Chromatography with Ultra Violet spectroscopy.	PM114	End over end extraction of dried and crushed soil samples for organic analysis. The solvent mix varies depending on analysis required			AD	Yes
TM108	Determination of Elemental Sulphur by Reversed Phase High Performance Liquid Chromatography with Ultra Violet spectroscopy.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM131	Quantification of Asbestos Fibres and ACM, based on HSG248 and SCA method.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AR	Yes
NONE	No Method Code	PM17	Modified method EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Exova Jones Environmental

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
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Malone O'Regan
Ground Floor - Unit 3
Bracken Business Park
Bracken Road
Sandyford
Dublin 18
D18 V4K6

Attention :	Thomas Vainio-Mattila
Date :	9th May, 2019
Your reference :	E1506
Our reference :	Test Report 19/6650 Batch 1
Location :	Athy
Date samples received :	24th April, 2019
Status :	Final report
Issue :	1

Seven samples were received for analysis on 24th April, 2019 of which seven were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Bruce Leslie
Project Co-ordinator

Client Name: Malone O'Regan
Reference: E1506
Location: Athy
Contact: Thomas Vainio-Mattila
JE Job No.: 19/6650

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-9	10-17	18-25	26-34	35-43	44-51	52-60				LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3	SW1	SW2						
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G	V H P BOD G	V H N P BOD G						
Sample Date	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019						
Sample Type	Ground Water	Ground Water	Ground Water	Leachate	Leachate	Surface Water	Surface Water						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019						
Dissolved Arsenic	-	-	-	<2.5	<2.5	-	-				<2.5	ug/l	TM30/PM14
Dissolved Arsenic #	<2.5	<2.5	<2.5	-	-	<2.5	<2.5				<2.5	ug/l	TM30/PM14
Dissolved Boron	41	37	40	108	186	20	21				<12	ug/l	TM30/PM14
Dissolved Cadmium	-	-	-	<0.5	<0.5	-	-				<0.5	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM30/PM14
Dissolved Calcium	-	-	-	293.6$_{AA}$	327.6$_{AA}$	-	-				<0.2	mg/l	TM30/PM14
Dissolved Calcium #	114.2	131.6	107.2	-	-	124.3	125.5				<0.2	mg/l	TM30/PM14
Total Dissolved Chromium	-	-	-	<1.5	<1.5	-	-				<1.5	ug/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	-	-	<1.5	<1.5				<1.5	ug/l	TM30/PM14
Dissolved Copper	-	-	-	<7	<7	-	-				<7	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	-	-	<7	<7				<7	ug/l	TM30/PM14
Total Dissolved Iron	-	-	-	<20	67	-	-				<20	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	<20	-	-	32	31				<20	ug/l	TM30/PM14
Dissolved Lead	-	-	-	<5	<5	-	-				<5	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	-	-	<5	<5				<5	ug/l	TM30/PM14
Dissolved Magnesium	-	-	-	20.7	35.6	-	-				<0.1	mg/l	TM30/PM14
Dissolved Magnesium #	17.6	16.9	18.3	-	-	11.9	11.8				<0.1	mg/l	TM30/PM14
Dissolved Manganese	-	-	-	1690	2796	-	-				<2	ug/l	TM30/PM14
Dissolved Manganese #	<2	25	<2	-	-	<2	<2				<2	ug/l	TM30/PM14
Dissolved Mercury	-	-	-	<1	<1	-	-				<1	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	-	-	<1	<1				<1	ug/l	TM30/PM14
Dissolved Nickel	-	-	-	8	6	-	-				<2	ug/l	TM30/PM14
Dissolved Nickel #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM30/PM14
Dissolved Potassium	-	-	-	11.1	19.2	-	-				<0.1	mg/l	TM30/PM14
Dissolved Potassium #	1.7	4.4	10.4	-	-	2.4	2.4				<0.1	mg/l	TM30/PM14
Dissolved Sodium	-	-	-	54.5	27.6	-	-				<0.1	mg/l	TM30/PM14
Dissolved Sodium #	11.4	11.3	17.9	-	-	12.4	12.6				<0.1	mg/l	TM30/PM14
Dissolved Zinc	-	-	-	8	13	-	-				<3	ug/l	TM30/PM14
Dissolved Zinc #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM30/PM14
Methyl Tertiary Butyl Ether	-	-	-	<0.1	<0.1	-	-				<0.1	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	-	-	<0.1	<0.1				<0.1	ug/l	TM15/PM10
Benzene	-	-	-	<0.5	<0.5	-	-				<0.5	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM15/PM10
Toluene	-	-	-	<5	<5	-	-				<5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	-	-	<5	<5				<5	ug/l	TM15/PM10
Ethylbenzene	-	-	-	<1	<1	-	-				<1	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	-	-	<1	<1				<1	ug/l	TM15/PM10
m/p-Xylene	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
o-Xylene	-	-	-	<1	<1	-	-				<1	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	-	-	<1	<1				<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	99	105	110	109	106	108	109				<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	98	102	101	104	104	105	105				<0	%	TM15/PM10

Client Name: Malone O'Regan
Reference: E1506
Location: Athy
Contact: Thomas Vainio-Mattila
JE Job No.: 19/6650

Report : Liquid

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

J E Sample No.	1-9	10-17	18-25	26-34	35-43	44-51	52-60				LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3	SW1	SW2						
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G	V H P BOD G	V H N P BOD G						
Sample Date	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019						
Sample Type	Ground Water	Ground Water	Ground Water	Leachate	Leachate	Surface Water	Surface Water						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019						
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Chlorothalonil	<2.50 SV AD	<2.50 SV AD	<2.50 SV AD	<100.00 SV AE	<187.50 SV AF	<2.50 SV AD	<2.50 SV AD				<0.01	ug/l	TM149/PM30
cis-Chlordane	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Dieldrin	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Endrin	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Heptachlor	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Hexachlorobenzene	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Isodrin	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
o,p'-DDE	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
o,p'-DDT	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
o,p'-TDE	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Pendimethalin	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Permethrin I	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Permethrin II	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Quintozene (PCNB)	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Tecnazene	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Telodrin	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
trans-Chlordane	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Triadimefon	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Triallate	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Trifluralin	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1506
Location: Athy
Contact: Thomas Vainio-Mattila
JE Job No.: 19/6650

Report : Liquid

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

J E Sample No.	1-9	10-17	18-25	26-34	35-43	44-51	52-60				LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3	SW1	SW2						
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G	V H P BOD G	V H N P BOD G						
Sample Date	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019						
Sample Type	Ground Water	Ground Water	Ground Water	Leachate	Leachate	Surface Water	Surface Water						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019						
Pesticides													
Organophosphorus Pesticides													
Azinphos ethyl	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Azinphos methyl	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Carbophenothion	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Chlorfenvinphos	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Chlorpyrifos	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Chlorpyrifos-methyl	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Diazinon	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Disulfoton	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Dimethoate	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Ethion	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Etrimphos	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Fenthion	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Malathion	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Mevinphos	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Phosalone	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Pirimiphos Methyl	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Propetamphos	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Triazophos	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1506
Location: Athy
Contact: Thomas Vainio-Mattila
JE Job No.: 19/6650

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-9	10-17	18-25	26-34	35-43	44-51	52-60				LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3	SW1	SW2						
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G	V H P BOD G	V H N P BOD G						
Sample Date	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019						
Sample Type	Ground Water	Ground Water	Ground Water	Leachate	Leachate	Surface Water	Surface Water						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019						
Acid Herbicides													
Benazolin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Bentazone	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Bromoxynil	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Clopyralid	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
4-CPA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
2,4-D	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
2,4-DB	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Dicamba	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Dichloroprop	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Diclofop	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Fenoprop	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Flamprop	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Flamprop-isopropyl	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Ioxynil	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
MCPA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
MCPB	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Mecoprop	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Picloram	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Pentachlorophenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
2,4,5-T	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
2,3,6-TBA	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Triclopyr	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM42/PM30
Atrazine	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
Simazine	<0.01 SV	<0.01 SV	<0.01 SV	<0.40 SV AB	<0.75 SV AC	<0.01 SV	<0.01 SV				<0.01	ug/l	TM149/PM30
EPH (C8-C40)	-	-	-	<10	5770	-	-				<10	ug/l	TM5/PM30
EPH (C8-C40) #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM5/PM30
C8-C40 Mineral Oil (Calculation)	<10	<10	<10	<10	3170	<10	<10				<10	ug/l	TM5/PM30

Client Name: Malone O'Regan
Reference: E1506
Location: Athy
Contact: Thomas Vainio-Mattila
JE Job No.: 19/6650

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-9	10-17	18-25	26-34	35-43	44-51	52-60				LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3	SW1	SW2						
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G	V H P BOD G	V H N P BOD G						
Sample Date	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019						
Sample Type	Ground Water	Ground Water	Ground Water	Leachate	Leachate	Surface Water	Surface Water						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019						
TPH CWG													
Aliphatics													
>C5-C6	-	-	-	<10	<10	-	-				<10	ug/l	TM36/PM12
>C5-C6 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM36/PM12
>C6-C8	-	-	-	<10	<10	-	-				<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM36/PM12
>C8-C10	-	-	-	<10	<10	-	-				<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM36/PM12
>C10-C12	-	-	-	<5	<5	-	-				<5	ug/l	TM5/PM16/PM30
>C10-C12 #	<5	<5	<5	-	-	<5	<5				<5	ug/l	TM5/PM16/PM30
>C12-C16	-	-	-	<10	<10	-	-				<10	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM5/PM16/PM30
>C16-C21	-	-	-	<10	<10	-	-				<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM5/PM16/PM30
>C21-C35	-	-	-	<10	1640	-	-				<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35	-	-	-	<10	1640	-	-				<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics C5-35 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7	-	-	-	<10	<10	-	-				<10	ug/l	TM36/PM12
>C5-EC7 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM36/PM12
>EC7-EC8	-	-	-	<10	<10	-	-				<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM36/PM12
>EC8-EC10	-	-	-	<10	<10	-	-				<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM36/PM12
>EC10-EC12	-	-	-	<5	<5	-	-				<5	ug/l	TM5/PM16/PM30
>EC10-EC12 #	<5	<5	<5	-	-	<5	<5				<5	ug/l	TM5/PM16/PM30
>EC12-EC16	-	-	-	<10	<10	-	-				<10	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM5/PM16/PM30
>EC16-EC21	-	-	-	<10	<10	-	-				<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM5/PM16/PM30
>EC21-EC35	-	-	-	<10	1160	-	-				<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35	-	-	-	<10	1160	-	-				<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aromatics C5-35 #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35)	-	-	-	<10	2800	-	-				<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM5/TM36/PM12/PM16/PM30
GRO (>C4-C8)	-	-	-	<10	13	-	-				<10	ug/l	TM36/PM12
GRO (>C4-C8) #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM36/PM12
GRO (>C8-C12)	-	-	-	<10	42	-	-				<10	ug/l	TM36/PM12
GRO (>C8-C12) #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM36/PM12
GRO (>C4-C12)	-	-	-	<10	55	-	-				<10	ug/l	TM36/PM12
GRO (>C4-C12) #	<10	<10	<10	-	-	<10	<10				<10	ug/l	TM36/PM12

Client Name: Malone O'Regan
Reference: E1506
Location: Athy
Contact: Thomas Vainio-Mattila
JE Job No.: 19/6650

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-9	10-17	18-25	26-34	35-43	44-51	52-60				LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3	SW1	SW2						
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G	V H P BOD G	V H N P BOD G						
Sample Date	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019						
Sample Type	Ground Water	Ground Water	Ground Water	Leachate	Leachate	Surface Water	Surface Water						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019						
Phenol	-	-	-	<0.01	<0.01	-	-				<0.01	mg/l	TM26/PM0
Phenol #	<0.01	<0.01	<0.01	-	-	<0.01	<0.01				<0.01	mg/l	TM26/PM0
Fluoride	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3				<0.3	mg/l	TM173/PM0
Sulphate as SO4	-	-	-	189.2	46.0	-	-				<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	26.8	33.1	75.9	-	-	34.6	35.2				<0.5	mg/l	TM38/PM0
Chloride	-	-	-	16.8	20.5	-	-				<0.3	mg/l	TM38/PM0
Chloride #	30.8	13.4	32.5	-	-	26.5	26.7				<0.3	mg/l	TM38/PM0
MRP Ortho Phosphate as P	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03				<0.03	mg/l	TM38/PM0
Total Oxidised Nitrogen as N	-	-	-	<0.2	<0.2	-	-				<0.2	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	8.0	12.0	6.5	-	-	3.5	3.5				<0.2	mg/l	TM38/PM0
Total Cyanide	-	-	-	<0.01	<0.01	-	-				<0.01	mg/l	TM89/PM0
Total Cyanide #	<0.01	<0.01	<0.01	-	-	<0.01	<0.01				<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N	-	-	-	8.22	27.77	-	-				<0.03	mg/l	TM38/PM0
Ammoniacal Nitrogen as N #	0.05	0.04	0.04	-	-	<0.03	<0.03				<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	608	4038	3712	-	-	306	290				<1	mg/l	TM75/PM0
Dibutyltin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM94/PM48
Tributyltin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM94/PM48
Triphenyltin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1				<0.1	ug/l	TM94/PM48
BOD (Settled)	-	-	-	16	21	-	-				<1	mg/l	TM58/PM0
BOD (Settled) #	-	-	-	-	-	1	1				<1	mg/l	TM58/PM0
COD (Settled)	-	-	-	57	120	-	-				<7	mg/l	TM57/PM0
COD (Settled) #	-	-	-	-	-	30	32				<7	mg/l	TM57/PM0
Dissolved Oxygen	6	7	7	5	3	9	9				<1	mg/l	TM58/PM0
Electrical Conductivity @25C	-	-	-	1449	1740	-	-				<2	uS/cm	TM76/PM0
Electrical Conductivity @25C #	688	787	733	-	-	686	688				<2	uS/cm	TM76/PM0
Faecal Coliforms*	13	<1	<1	-	-	-	-					CFU/100ml	Subcontracted
pH	-	-	-	7.24	7.26	-	-				<0.01	pH units	TM73/PM0
pH #	7.57	7.35	7.37	-	-	8.26	8.29				<0.01	pH units	TM73/PM0
Redox	330.61	335.51	308.18	304.28	71.95	159.24	175.32					mV	TM72/PM0
Total Organic Carbon #	<2	3	<2	-	-	-	-				<2	mg/l	TM60/PM0
Total Coliforms*	116.9	2.0	<1.0	-	-	-	-					CFU/100ml	Subcontracted
Total Dissolved Solids #	421	476	448	-	-	-	-				<35	mg/l	TM20/PM0
Total Suspended Solids #	-	-	-	-	-	<10	<10				<10	mg/l	TM37/PM0

Client Name: Malone O'Regan
Reference: E1506
Location: Athy
Contact: Thomas Vainio-Mattila
JE Job No.: 19/6650

SVOC Report : **Liquid**

J E Sample No.	1-9	10-17	18-25	26-34	35-43	44-51	52-60				LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3	SW1	SW2						
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G	V H P BOD G	V H N P BOD G						
Sample Date	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019						
Sample Type	Ground Water	Ground Water	Ground Water	Leachate	Leachate	Surface Water	Surface Water						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019						
SVOC MS													
Phenols													
2-Chlorophenol	-	-	-	<1	<1	-	-				<1	ug/l	TM16/PM30
2-Chlorophenol #	<1	<1	<1	-	-	<1	<1				<1	ug/l	TM16/PM30
2-Methylphenol	-	-	-	<0.5	<0.5	-	-				<0.5	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5				<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol	-	-	-	<0.5	<0.5	-	-				<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol	-	-	-	<0.5	<0.5	-	-				<0.5	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol	-	-	-	<0.5	<0.5	-	-				<0.5	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10	<10	<10	<10				<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene	-	-	-	<1	<1	-	-				<1	ug/l	TM16/PM30
2-Chloronaphthalene #	<1	<1	<1	-	-	<1	<1				<1	ug/l	TM16/PM30
2-Methylnaphthalene	-	-	-	<1	<1	-	-				<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	-	-	<1	<1				<1	ug/l	TM16/PM30
Naphthalene	-	-	-	<1	<1	-	-				<1	ug/l	TM16/PM30
Naphthalene #	<1	<1	<1	-	-	<1	<1				<1	ug/l	TM16/PM30
Acenaphthylene	-	-	-	<0.5	0.9	-	-				<0.5	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
Acenaphthene	-	-	-	<1	<1	-	-				<1	ug/l	TM16/PM30
Acenaphthene #	<1	<1	<1	-	-	<1	<1				<1	ug/l	TM16/PM30
Fluorene	-	-	-	<0.5	0.7	-	-				<0.5	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
Phenanthrene	-	-	-	0.9	4.1	-	-				<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
Anthracene	-	-	-	<0.5	1.7	-	-				<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
Fluoranthene	-	-	-	1.7	16.3	-	-				<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
Pyrene	-	-	-	1.5	14.7	-	-				<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
Benzo(a)anthracene	-	-	-	1.1	9.6	-	-				<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
Chrysene	-	-	-	1.0	10.5	-	-				<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene	-	-	-	2	21	-	-				<1	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1	<1	-	-	<1	<1				<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1	1	12	<1	<1				<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1	<1	7	<1	<1				<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene	-	-	-	<0.5	2.6	-	-				<0.5	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene	-	-	-	0.8	9.3	-	-				<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5	22	<5	<5				<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM16/PM30
Di-n-butyl phthalate	-	-	-	<1.5	<1.5	-	-				<1.5	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	-	-	<1.5	<1.5				<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM16/PM30
Diethyl phthalate	-	-	-	<1	<1	-	-				<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	-	-	<1	<1				<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1506
Location: Athy
Contact: Thomas Vainio-Mattila
JE Job No.: 19/6650

SVOC Report : **Liquid**

J E Sample No.	1-9	10-17	18-25	26-34	35-43	44-51	52-60					
Sample ID	GW1	GW2	GW3	L1	L3	SW1	SW2					
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G	V H P BOD G	V H N P BOD G					
Sample Date	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019					
Sample Type	Ground Water	Ground Water	Ground Water	Leachate	Leachate	Surface Water	Surface Water					
Batch Number	1	1	1	1	1	1	1					
Date of Receipt	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019					
SVOC MS										LOD/LOR	Units	Method No.
Other SVOCs												
1,2-Dichlorobenzene	-	-	-	<1	<1	-	-			<1	ug/l	TM16/PM30
1,2-Dichlorobenzene #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene	-	-	-	<1	<1	-	-			<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM16/PM30
1,3-Dichlorobenzene	-	-	-	<1	<1	-	-			<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM16/PM30
1,4-Dichlorobenzene	-	-	-	<1	<1	-	-			<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM16/PM30
2,4-Dinitrotoluene	-	-	-	<0.5	<0.5	-	-			<0.5	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5			<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM16/PM30
4-Bromophenylphenylether	-	-	-	<1	<1	-	-			<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM16/PM30
4-Chlorophenylphenylether	-	-	-	<1	<1	-	-			<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5			<0.5	ug/l	TM16/PM30
Azobenzene	-	-	-	<0.5	<0.5	-	-			<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5			<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane	-	-	-	<0.5	<0.5	-	-			<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5			<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether	-	-	-	<1	<1	-	-			<1	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM16/PM30
Carbazole	-	-	-	<0.5	<0.5	-	-			<0.5	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5			<0.5	ug/l	TM16/PM30
Dibenzofuran	-	-	-	<0.5	<0.5	-	-			<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5			<0.5	ug/l	TM16/PM30
Hexachlorobenzene	-	-	-	<1	<1	-	-			<1	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM16/PM30
Hexachlorobutadiene	-	-	-	<1	<1	-	-			<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1	<1	<1	<1	<1	<1			<1	ug/l	TM16/PM30
Hexachloroethane	-	-	-	<1	<1	-	-			<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM16/PM30
Isophorone	-	-	-	<0.5	<0.5	-	-			<0.5	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5			<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine	-	-	-	<0.5	<0.5	-	-			<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5			<0.5	ug/l	TM16/PM30
Nitrobenzene	-	-	-	<1	<1	-	-			<1	ug/l	TM16/PM30
Nitrobenzene #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	99	100	109	99	81	108	107			<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	119	121	125	103	103	120	119			<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1506
Location: Athy
Contact: Thomas Vainio-Mattila
JE Job No.: 19/6650

VOC Report : **Liquid**

J E Sample No.	1-9	10-17	18-25	26-34	35-43	44-51	52-60				LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3	SW1	SW2						
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G	V H P BOD G	V H N P BOD G						
Sample Date	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019						
Sample Type	Ground Water	Ground Water	Ground Water	Leachate	Leachate	Surface Water	Surface Water						
Batch Number	1	1	1	1	1	1	1						
Date of Receipt	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019						
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether	-	-	-	<0.1	<0.1	-	-				<0.1	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	-	-	<0.1	<0.1				<0.1	ug/l	TM15/PM10
Chloromethane	-	-	-	<3	<3	-	-				<3	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM15/PM10
Vinyl Chloride	-	-	-	<0.1	<0.1	-	-				<0.1	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	-	-	<0.1	<0.1				<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM15/PM10
Chloroethane	-	-	-	<3	<3	-	-				<3	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM15/PM10
Trichlorofluoromethane	-	-	-	<3	<3	-	-				<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE)	-	-	-	<3	<3	-	-				<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM15/PM10
Dichloromethane (DCM)	-	-	-	<5	<5	-	-				<5	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	-	-	<5	<5				<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene	-	-	-	<3	<3	-	-				<3	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM15/PM10
1,1-Dichloroethane	-	-	-	<3	<3	-	-				<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene	-	-	-	<3	<3	-	-				<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1	<1	<1				<1	ug/l	TM15/PM10
Bromochloromethane	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
Chloroform	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
1,1,1-Trichloroethane	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
1,1-Dichloropropene	-	-	-	<3	<3	-	-				<3	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM15/PM10
Carbon tetrachloride	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
1,2-Dichloroethane	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
Benzene	-	-	-	<0.5	<0.5	-	-				<0.5	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	-	-	<0.5	<0.5				<0.5	ug/l	TM15/PM10
Trichloroethene (TCE)	-	-	-	<3	<3	-	-				<3	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM15/PM10
1,2-Dichloropropane	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
Dibromomethane	-	-	-	<3	<3	-	-				<3	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM15/PM10
Bromodichloromethane	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
Toluene	-	-	-	<5	<5	-	-				<5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	-	-	<5	<5				<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2	<2	<2				<2	ug/l	TM15/PM10
1,1,2-Trichloroethane	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
Tetrachloroethene (PCE)	-	-	-	<3	<3	-	-				<3	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	-	-	<3	<3				<3	ug/l	TM15/PM10
1,3-Dichloropropane	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
Dibromochloromethane	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
1,2-Dibromoethane	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
Chlorobenzene	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	-	-	<2	<2				<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane	-	-	-	<2	<2	-	-				<2	ug/l	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1506
Location: Athy
Contact: Thomas Vainio-Mattila
JE Job No.: 19/6650

VOC Report : **Liquid**

J E Sample No.	1-9	10-17	18-25	26-34	35-43	44-51	52-60					
Sample ID	GW1	GW2	GW3	L1	L3	SW1	SW2					
Depth										Please see attached notes for all abbreviations and acronyms		
COC No / misc												
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G	V H P BOD G	V H N P BOD G					
Sample Date	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019	23/04/2019					
Sample Type	Ground Water	Ground Water	Ground Water	Leachate	Leachate	Surface Water	Surface Water					
Batch Number	1	1	1	1	1	1	1					
Date of Receipt	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019	24/04/2019					
VOC MS Continued												
1,1,1,2-Tetrachloroethane #	<2	<2	<2	-	-	<2	<2			<2	ug/l	TM15/PM10
Ethylbenzene	-	-	-	<1	<1	-	-			<1	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM15/PM10
m/p-Xylene	-	-	-	<2	<2	-	-			<2	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2	-	-	<2	<2			<2	ug/l	TM15/PM10
o-Xylene	-	-	-	<1	<1	-	-			<1	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	-	-	<1	<1			<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
Bromoform	-	-	-	<2	<2	-	-			<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	-	-	<2	<2			<2	ug/l	TM15/PM10
Isopropylbenzene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4	<4	<4			<4	ug/l	TM15/PM10
Bromobenzene	-	-	-	<2	<2	-	-			<2	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	-	-	<2	<2			<2	ug/l	TM15/PM10
1,2,3-Trichloropropane	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
Propylbenzene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
2-Chlorotoluene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
4-Chlorotoluene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
tert-Butylbenzene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
sec-Butylbenzene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
4-Isopropyltoluene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
1,3-Dichlorobenzene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
1,4-Dichlorobenzene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
n-Butylbenzene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
1,2-Dichlorobenzene	-	-	-	<3	<3	-	-			<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	-	-	<3	<3			<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Naphthalene	<2	<2	<2	<2	<2	<2	<2			<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3	<3	<3			<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	99	105	110	109	106	108	109			<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	98	102	101	104	104	105	105			<0	%	TM15/PM10

Client Name: Malone O'Regan
Reference: E1506
Location: Athy
Contact: Thomas Vainio-Mattila

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 19/6650						

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

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/6650

SOILS

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

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

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

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

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

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

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

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

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

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

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

WATERS

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

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

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x40 Dilution
AC	x75 Dilution
AD	x250 Dilution
AE	x10000 Dilution
AF	x18750 Dilution

JE Job No: 19/6650

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details				
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			

JE Job No: 19/6650

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified methods USEPA 160.2, EN872:2005 and SMWW 2540D. Gravimetric determination of Total Suspended Solids. Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes			

JE Job No: 19/6650

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM42	Modified US EPA method 8270. Pesticides and herbicides by GC-MS	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM57	Modified US EPA Method 410.4. Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.				
TM57	Modified US EPA Method 410.4. Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM58	APHA Standard Methods for the extraction of water and waste water (SMEWW) 5210B: Comparible with ISO 5815:1989. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand. Determination of Dissolved Oxygen using the Hach HQ30D Oxygen Meter.	PM0	No preparation is required.				
TM58	APHA Standard Methods for the extraction of water and waste water (SMEWW) 5210B: Comparible with ISO 5815:1989. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand. Determination of Dissolved Oxygen using the Hach HQ30D Oxygen Meter.	PM0	No preparation is required.	Yes			
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.	Yes			
TM72	Redox Potential is measured by HI98120 redox meter.	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			

JE Job No: 19/6650

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM76	Modified US EPA method 120.1. Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.				
TM76	Modified US EPA method 120.1. Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.				
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM94	Derivatisation and extraction of Organotins. Analysis by GC-MS	PM48	Samples are pretreated and derivatised. The derviatised organotins are then extracted using hexane.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				
Subcontracted	See attached subcontractor report for accreditation status and provider.						

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Customer

Kate Wiley

Exova Environmental UK Ltd
Rosewell House
2A (1F) Harvest Drive
Newbridge, MidLothian Scotland
EH28 8QJ United Kingdom

Certificate Of Analysis

Job Number: 19-55297
Issue Number: 1
Report Date: 29 April 2019

Site: Not Applicable
PO Number: Not Supplied
Date Samples Received: 23/04/2019

Please find attached the results for the samples received at our laboratory on 23/04/2019.

Should you have any queries regarding the report or require any further services, we would be happy to discuss your requirements. For additional information about the company please log-on to our website at the above address.

Thank you for choosing City Analysts Limited. We look forward to assisting you again.

Authorised By: Shane Reynolds
Laboratory Manager

Authorised Date: 29 April 2019

Notes:

Results relate only to the items tested.
Information on methods of analysis and performance characteristics is available on request.
Any opinions or interpretations indicated are outside the scope of our INAB accreditation.
This test report shall not be reproduced except in full or with written approval of City Analysts Limited.

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Certificate Of Analysis

Customer

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Rosewell House
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EH28 8QJ United Kingdom

Report Reference: 19-55297

Report Version: 1

Site: Not Applicable

Sample Description: GW1

Sample Type: Ground

Lab Reference Number: 436288

Date of Sampling: 23/04/2019

Date Sample Received: 23/04/2019

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1201#	23/04/2019	Coliforms	116.9	MPN/100ml	-
D/D3221#	23/04/2019	Faecal Coliforms	13	cfu/100ml	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note:
PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.
For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.
NAC & ATC - No abnormal change and acceptable to customers.
TVC - Total viable count
Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon

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Rosewell House
2A (1F) Harvest Drive
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EH28 8QJ United Kingdom

Report Reference: 19-55297

Report Version: 1

Site: Not Applicable

Sample Description: GW2

Sample Type: Ground

Lab Reference Number: 436289

Date of Sampling: 23/04/2019

Date Sample Received: 23/04/2019

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1201#	23/04/2019	Coliforms	2.0	MPN/100ml	-
D/D3221#	23/04/2019	Faecal Coliforms	< 1	cfu/100ml	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note:
PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.
For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.
NAC & ATC - No abnormal change and acceptable to customers.
TVC - Total viable count
Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon

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EH28 8QJ United Kingdom

Report Reference: 19-55297

Report Version: 1

Site: Not Applicable

Sample Description: GW3

Sample Type: Ground

Lab Reference Number: 436290

Date of Sampling: 23/04/2019

Date Sample Received: 23/04/2019

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1201#	23/04/2019	Coliforms	< 1.0	MPN/100ml	-
D/D3221#	23/04/2019	Faecal Coliforms	< 1	cfu/100ml	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note:
PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.
For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.
NAC & ATC - No abnormal change and acceptable to customers.
TVC - Total viable count
Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon

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EH28 8QJ United Kingdom

Report Reference: 19-55297

Report Version: 1

Site: Not Applicable

Sample Description: L1

Sample Type: Ground

Lab Reference Number: 436291

Date of Sampling: 23/04/2019

Date Sample Received: 23/04/2019

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1201#	23/04/2019	Coliforms	147.0	MPN/100ml	-
D/D3221#	23/04/2019	Faecal Coliforms	5	cfu/100ml	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note:
PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.
For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.
NAC & ATC - No abnormal change and acceptable to customers.
TVC - Total viable count
Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon

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Newbridge, MidLothian Scotland
EH28 8QJ United Kingdom

Report Reference: 19-55297

Report Version: 1

Site: Not Applicable

Sample Description: L3

Sample Type: Ground

Lab Reference Number: 436292

Date of Sampling: 23/04/2019

Date Sample Received: 23/04/2019

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1201#	23/04/2019	Coliforms	23.8	MPN/100ml	-
D/D3221#	23/04/2019	Faecal Coliforms	1	cfu/100ml	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note:
PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.
For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.
NAC & ATC - No abnormal change and acceptable to customers.
TVC - Total viable count
Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

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

Attention :	Thomas Vainio-Mattila
Date :	21st May, 2019
Your reference :	E1506
Our reference :	Test Report 19/7496 & Test Report 19/7606 SW1 & SW2
Location :	
Date samples received :	9th May, 2019
Status :	Final report
Issue :	1

Five samples were received for analysis on 9th May, 2019 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Phil Sommerton BSc
Senior Project Manager

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7496

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-8	9-16	17-24	25-33	34-42						LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3								
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G								
Sample Date	08/05/2019	08/05/2019	08/05/2019	08/05/2019	08/05/2019								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	1	1	1	1	1								
Date of Receipt	09/05/2019	09/05/2019	09/05/2019	09/05/2019	09/05/2019								
Dissolved Arsenic #	<2.5	<2.5	<2.5	<2.5	<2.5						<2.5	ug/l	TM30/PM14
Dissolved Boron	41	47	48	141	197						<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM30/PM14
Dissolved Calcium #	119.8	142.1	111.0	293.6 AB	353.5 AB						<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5	<1.5	<1.5	<1.5						<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7	<7	<7	<7						<7	ug/l	TM30/PM14
Total Dissolved Iron #	<20	<20	<20	<20	332						<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5	<5	<5	<5						<5	ug/l	TM30/PM14
Dissolved Magnesium #	16.8	15.1	17.9	20.0	41.2						<0.1	mg/l	TM30/PM14
Dissolved Manganese #	<2	<2	<2	3546	2425						<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1	<1	<1	<1						<1	ug/l	TM30/PM14
Dissolved Nickel #	<2	<2	<2	6	4						<2	ug/l	TM30/PM14
Dissolved Potassium #	1.7	4.4	9.6	8.7	24.7						<0.1	mg/l	TM30/PM14
Dissolved Sodium #	11.3	10.6	17.6	33.0	32.4						<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	<3	<3	6	<3						<3	ug/l	TM30/PM14
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5	<5						<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	96	95	98	100	100						<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	100	98	102	100	102						<0	%	TM15/PM10

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7496

Report : Liquid

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

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COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G								
Sample Date	08/05/2019	08/05/2019	08/05/2019	08/05/2019	08/05/2019								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	1	1	1	1	1								
Date of Receipt	09/05/2019	09/05/2019	09/05/2019	09/05/2019	09/05/2019								
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Chlorothalonil	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
cis-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Isodrin	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
o,p'-DDE	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
o,p'-DDT	<0.01	<0.01	<0.01	<0.01	0.04 SV AA						<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
o,p'-TDE	<0.01	<0.01	<0.01	<0.01	0.05 SV AA						<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01	<0.01	<0.01	0.12 SV AA						<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.01	<0.01	<0.01	<0.01	0.09 SV AA						<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01	<0.01	<0.01	0.21 SV AA						<0.01	ug/l	TM149/PM30
Pendimethalin	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Permethrin I	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Permethrin II	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Quintozene (PCNB)	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Tecnazene	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Telodrin	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
trans-Chlordane	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Triadimefon	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Triallate	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Trifluralin	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7496

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

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Sample ID	GW1	GW2	GW3	L1	L3								
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G								
Sample Date	08/05/2019	08/05/2019	08/05/2019	08/05/2019	08/05/2019								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	1	1	1	1	1								
Date of Receipt	09/05/2019	09/05/2019	09/05/2019	09/05/2019	09/05/2019								
Pesticides													
Organophosphorus Pesticides													
Azinphos ethyl	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Azinphos methyl	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Carbophenothion	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Chlorfenvinphos	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Chlorpyrifos	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Chlorpyrifos-methyl	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Dimethoate	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Etrimphos	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Fenthion	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Phosalone	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Pirimiphos Methyl	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Propetamphos	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Triazophos	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7496

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-8	9-16	17-24	25-33	34-42						LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3								
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G								
Sample Date	08/05/2019	08/05/2019	08/05/2019	08/05/2019	08/05/2019								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	1	1	1	1	1								
Date of Receipt	09/05/2019	09/05/2019	09/05/2019	09/05/2019	09/05/2019								
Acid Herbicides													
Benazolin	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Bentazone	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Bromoxynil	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Clopyralid	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
4-CPA	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
2,4-D	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
2,4-DB	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Dicamba	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Dichloroprop	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Diclofop	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Fenoprop	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Flamprop	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Flamprop-isopropyl	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Ioxynil	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
MCPA	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
MCPB	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Mecoprop	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Picloram	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Pentachlorophenol	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
2,4,5-T	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
2,3,6-TBA	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Triclopyr	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM42/PM30
Atrazine	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
Simazine	<0.01	<0.01	<0.01	<0.01	<0.02 SV AA						<0.01	ug/l	TM149/PM30
GRO (>C4-C8) #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
GRO (>C8-C12) #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
GRO (>C4-C12) #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
EPH (C8-C40) #	<10	<10	<10	900	20380						<10	ug/l	TM5/PM30
Mineral Oil (C10-C40)	<10	<10	<10	<10	13534						<10	ug/l	TM5/PM16/PM30

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7496

Report : Liquid

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Sample Date	08/05/2019	08/05/2019	08/05/2019	08/05/2019	08/05/2019								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	1	1	1	1	1								
Date of Receipt	09/05/2019	09/05/2019	09/05/2019	09/05/2019	09/05/2019								
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5	<5	<5	74						<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10	<10	<10	440						<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10	<10	<10	1110						<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10	<10	<10	9720						<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	<10	<10	<10	<10	11344						<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5	<5	<5	<5						<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10	<10	<10	160						<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10	<10	<10	790						<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10	<10	<10	6730						<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10	<10	<10	7680						<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10	<10	<10	<10	19024						<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total Phenols HPLC	<0.15	<0.15	<0.15	<0.15	<0.15						<0.15	mg/l	TM26/PM0
Fluoride	<0.3	<0.3	<0.3	<0.3	<0.3						<0.3	mg/l	TM173/PM0
Sulphate as SO4 #	51.1	36.9	75.7	212.5	<0.5						<0.5	mg/l	TM38/PM0
Chloride #	31.4	12.8	32.7	13.8	25.6						<0.3	mg/l	TM38/PM0
MRP Ortho Phosphate as P	<0.03	<0.03	<0.03	<0.03	<0.03						<0.03	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	8.1	12.4	7.2	<0.2	<0.2						<0.2	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01	<0.01	<0.01	0.02						<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	<0.03	<0.03	0.03	6.06	40.56						<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	1194	1930	2114	-	-						<1	mg/l	TM75/PM0
Dibutyltin	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM94/PM48
Tributyltin	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM94/PM48
Triphenyltin	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM94/PM48
BOD (Settled) #	-	-	-	16	24						<1	mg/l	TM58/PM0
COD (Settled) #	-	-	-	37	140						<7	mg/l	TM57/PM0
Dissolved Oxygen	6	7	6	6	2						<1	mg/l	TM58/PM0
Electrical Conductivity @25C #	708	767	719	1509	2078						<2	uS/cm	TM76/PM0

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7496

Report : Liquid

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

J E Sample No.	1-8	9-16	17-24	25-33	34-42						LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3								
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G								
Sample Date	08/05/2019	08/05/2019	08/05/2019	08/05/2019	08/05/2019								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	1	1	1	1	1								
Date of Receipt	09/05/2019	09/05/2019	09/05/2019	09/05/2019	09/05/2019								
Faecal Coliforms*	48	<1	1	-	-							CFU/100ml	Subcontracted
pH #	7.39	7.30	7.34	7.22	7.29						<0.01	pH units	TM73/PM0
Redox	165.78	186.59	198.20	9.12	-109.04							mV	TM72/PM0
Total Organic Carbon #	<2	<2	<2	-	-						<2	mg/l	TM60/PM0
Total Coliforms*	1090.0	238.2	79.8	-	-							MPN/100ml	Subcontracted
Total Dissolved Solids #	487	515	493	-	-						<35	mg/l	TM20/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7606

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	34-42	43-51									LOD/LOR	Units	Method No.
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	09/05/2019	09/05/2019											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	10/05/2019	10/05/2019											
Dissolved Arsenic #	<2.5	<2.5									<2.5	ug/l	TM30/PM14
Dissolved Boron	23	27									<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.5	<0.5									<0.5	ug/l	TM30/PM14
Dissolved Calcium #	123.9	125.5									<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<1.5	<1.5									<1.5	ug/l	TM30/PM14
Dissolved Copper #	<7	<7									<7	ug/l	TM30/PM14
Total Dissolved Iron #	57	59									<20	ug/l	TM30/PM14
Dissolved Lead #	<5	<5									<5	ug/l	TM30/PM14
Dissolved Magnesium #	11.1	11.3									<0.1	mg/l	TM30/PM14
Dissolved Manganese #	28	29									<2	ug/l	TM30/PM14
Dissolved Mercury #	<1	<1									<1	ug/l	TM30/PM14
Dissolved Nickel #	<2	<2									<2	ug/l	TM30/PM14
Dissolved Potassium #	2.2	2.3									<0.1	mg/l	TM30/PM14
Dissolved Sodium #	12.5	12.6									<0.1	mg/l	TM30/PM14
Dissolved Zinc #	<3	<3									<3	ug/l	TM30/PM14
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	111	108									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	109	106									<0	%	TM15/PM10

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7606

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	34-42	43-51									LOD/LOR	Units	Method No.
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	09/05/2019	09/05/2019											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	10/05/2019	10/05/2019											
Pesticides													
Organochlorine Pesticides													
Aldrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Alpha-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Beta-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Chlorothalonil	<2.50$_{AA}$	<2.50$_{AA}$									<0.01	ug/l	TM149/PM30
cis-Chlordane	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Delta-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Dieldrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan I	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan II	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endosulphan sulphate	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Endrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Gamma-HCH (BHC)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Heptachlor	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Heptachlor Epoxide	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Hexachlorobenzene	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Isodrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
o,p'-DDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
o,p'-DDT	<0.01	<0.01									<0.01	ug/l	TM149/PM30
o,p'-Methoxychlor	<0.01	<0.01									<0.01	ug/l	TM149/PM30
o,p'-TDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-DDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-DDT	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-Methoxychlor	<0.01	<0.01									<0.01	ug/l	TM149/PM30
p,p'-TDE	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Pendimethalin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Permethrin I	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Permethrin II	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Quintozene (PCNB)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Tecnazene	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Telodrin	<0.01	<0.01									<0.01	ug/l	TM149/PM30
trans-Chlordane	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Triadimefon	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Triallate	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Trifluralin	<0.01	<0.01									<0.01	ug/l	TM149/PM30

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7606

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	34-42	43-51									LOD/LOR	Units	Method No.
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	09/05/2019	09/05/2019											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	10/05/2019	10/05/2019											
Pesticides													
Organophosphorus Pesticides													
Azinphos ethyl	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Azinphos methyl	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Carbophenothion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Chlorfenvinphos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Chlorpyrifos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Chlorpyrifos-methyl	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Diazinon	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Dichlorvos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Disulfoton	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Dimethoate	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Ethion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Ethyl Parathion (Parathion)	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Etrimphos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Fenitrothion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Fenthion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Malathion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Methyl Parathion	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Mevinphos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Phosalone	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Pirimiphos Methyl	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Propetamphos	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Triazophos	<0.01	<0.01									<0.01	ug/l	TM149/PM30

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7606

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	34-42	43-51									LOD/LOR	Units	Method No.
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	09/05/2019	09/05/2019											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	10/05/2019	10/05/2019											
Acid Herbicides													
Benazolin	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Bentazone	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Bromoxynil	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Clopyralid	<0.1	<0.1									<0.1	ug/l	TM42/PM30
4-CPA	<0.1	<0.1									<0.1	ug/l	TM42/PM30
2,4-D	<0.1	<0.1									<0.1	ug/l	TM42/PM30
2,4-DB	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Dicamba	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Dichloroprop	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Diclofop	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Fenoprop	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Flamprop	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Flamprop-isopropyl	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Ioxynil	<0.1	<0.1									<0.1	ug/l	TM42/PM30
MCPA	<0.1	<0.1									<0.1	ug/l	TM42/PM30
MCPB	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Mecoprop	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Picloram	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Pentachlorophenol	<0.1	<0.1									<0.1	ug/l	TM42/PM30
2,4,5-T	<0.1	<0.1									<0.1	ug/l	TM42/PM30
2,3,6-TBA	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Triclopyr	<0.1	<0.1									<0.1	ug/l	TM42/PM30
Atrazine	<0.01	<0.01									<0.01	ug/l	TM149/PM30
Simazine	<0.01	<0.01									<0.01	ug/l	TM149/PM30
GRO (>C4-C8)#	<10	<10									<10	ug/l	TM36/PM12
GRO (>C8-C12)#	<10	<10									<10	ug/l	TM36/PM12
GRO (>C4-C12)#	<10	<10									<10	ug/l	TM36/PM12
EPH (C8-C40)#	<10	<10									<10	ug/l	TM5/PM30
Mineral Oil (C10-C40)	<10	<10									<10	ug/l	TM5/PM16/PM30

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7606

Report : Liquid

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

Please see attached notes for all abbreviations and acronyms

J E Sample No.	34-42	43-51									LOD/LOR	Units	Method No.
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	09/05/2019	09/05/2019											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	10/05/2019	10/05/2019											
TPH CWG													
Aliphatics													
>C5-C6 #	<10	<10									<10	ug/l	TM36/PM12
>C6-C8 #	<10	<10									<10	ug/l	TM36/PM12
>C8-C10 #	<10	<10									<10	ug/l	TM36/PM12
>C10-C12 #	<5	<5									<5	ug/l	TM5/PM16/PM30
>C12-C16 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>C16-C21 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>C21-C35 #	<10	<10									<10	ug/l	TM5/PM16/PM30
Total aliphatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
Aromatics													
>C5-EC7 #	<10	<10									<10	ug/l	TM36/PM12
>EC7-EC8 #	<10	<10									<10	ug/l	TM36/PM12
>EC8-EC10 #	<10	<10									<10	ug/l	TM36/PM12
>EC10-EC12 #	<5	<5									<5	ug/l	TM5/PM16/PM30
>EC12-EC16 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>EC16-EC21 #	<10	<10									<10	ug/l	TM5/PM16/PM30
>EC21-EC35 #	<10	<10									<10	ug/l	TM5/PM16/PM30
Total aromatics C5-35 #	<10	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
Total aliphatics and aromatics(C5-35) #	<10	<10									<10	ug/l	TM5/TM36/PM12/PM16/PM30
Phenol #	<0.01	<0.01									<0.01	mg/l	TM26/PM0
Fluoride	<0.3	<0.3									<0.3	mg/l	TM173/PM0
Sulphate as SO4 #	37.8	36.7									<0.5	mg/l	TM38/PM0
Chloride #	27.4	27.3									<0.3	mg/l	TM38/PM0
MRP Ortho Phosphate as P	<0.03	<0.03									<0.03	mg/l	TM38/PM0
Total Oxidised Nitrogen as N #	3.5	3.7									<0.2	mg/l	TM38/PM0
Total Cyanide #	<0.01	<0.01									<0.01	mg/l	TM89/PM0
Ammoniacal Nitrogen as N #	<0.03	0.03									<0.03	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	282	302									<1	mg/l	TM75/PM0
Dibutyltin	<0.1	<0.1									<0.1	ug/l	TM94/PM48
Tributyltin	<0.1	<0.1									<0.1	ug/l	TM94/PM48
Triphenyltin	<0.1	<0.1									<0.1	ug/l	TM94/PM48
BOD (Settled) #	<1	<1									<1	mg/l	TM58/PM0
COD (Settled) #	17	18									<7	mg/l	TM57/PM0
Dissolved Oxygen	10	10									<1	mg/l	TM58/PM0
Electrical Conductivity @25C #	644	653									<2	uS/cm	TM76/PM0

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7606

Report : Liquid

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

J E Sample No.	34-42	43-51									LOD/LOR	Units	Method No.
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	09/05/2019	09/05/2019											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	10/05/2019	10/05/2019											
pH #	8.27	8.26									<0.01	pH units	TM73/PM0
Redox	91.16	141.55										mV	TM72/PM0
Total Suspended Solids #	<10	<10									<10	mg/l	TM37/PM0

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7496

SVOC Report : **Liquid**

J E Sample No.	1-8	9-16	17-24	25-33	34-42						LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3								
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G								
Sample Date	08/05/2019	08/05/2019	08/05/2019	08/05/2019	08/05/2019								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	1	1	1	1	1								
Date of Receipt	09/05/2019	09/05/2019	09/05/2019	09/05/2019	09/05/2019								
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10	<10	<10	<20 AA						<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
Phenol	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
Naphthalene #	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5	<0.5	<0.5	1.1 AA						<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5	<0.5	<0.5	3.9 AA						<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5	<0.5	<0.5	1.8 AA						<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5	<0.5	0.5	17.4 AA						<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5	<0.5	0.5	15.7 AA						<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5	<0.5	<0.5	12.1 AA						<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5	<0.5	<0.5	11.0 AA						<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1	<1	<1	22 AA						<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1	<1	<1	13 AA						<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1	<1	<1	8 AA						<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5	<0.5	<0.5	2.8 AA						<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5	<0.5	<0.5	10.5 AA						<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5	<5	<5	26 AA						<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5	<1.5	<1.5	<3.0 AA						<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1	<1	<1	<2 AA						<1	ug/l	TM16/PM30

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7496

SVOC Report : **Liquid**

J E Sample No.	1-8	9-16	17-24	25-33	34-42							
Sample ID	GW1	GW2	GW3	L1	L3							
Depth												
COC No / misc												
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G							
Sample Date	08/05/2019	08/05/2019	08/05/2019	08/05/2019	08/05/2019							
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water							
Batch Number	1	1	1	1	1							
Date of Receipt	09/05/2019	09/05/2019	09/05/2019	09/05/2019	09/05/2019							
SVOC MS												
Other SVOCs												
1,2-Dichlorobenzene #	<1	<1	<1	<1	<2 AA						<1	ug/l
1,2,4-Trichlorobenzene #	<1	<1	<1	<1	<2 AA						<1	ug/l
1,3-Dichlorobenzene #	<1	<1	<1	<1	<2 AA						<1	ug/l
1,4-Dichlorobenzene #	<1	<1	<1	<1	<2 AA						<1	ug/l
2-Nitroaniline	<1	<1	<1	<1	<2 AA						<1	ug/l
2,4-Dinitrotoluene #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l
2,6-Dinitrotoluene	<1	<1	<1	<1	<2 AA						<1	ug/l
3-Nitroaniline	<1	<1	<1	<1	<2 AA						<1	ug/l
4-Bromophenylphenylether #	<1	<1	<1	<1	<2 AA						<1	ug/l
4-Chloroaniline	<1	<1	<1	<1	<2 AA						<1	ug/l
4-Chlorophenylphenylether #	<1	<1	<1	<1	<2 AA						<1	ug/l
4-Nitroaniline	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l
Azobenzene #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l
Bis(2-chloroethoxy)methane #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l
Bis(2-chloroethyl)ether #	<1	<1	<1	<1	<2 AA						<1	ug/l
Carbazole #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l
Dibenzofuran #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l
Hexachlorobenzene #	<1	<1	<1	<1	<2 AA						<1	ug/l
Hexachlorobutadiene #	<1	<1	<1	<1	<2 AA						<1	ug/l
Hexachlorocyclopentadiene	<1	<1	<1	<1	<2 AA						<1	ug/l
Hexachloroethane #	<1	<1	<1	<1	<2 AA						<1	ug/l
Isophorone #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l
N-nitrosodi-n-propylamine #	<0.5	<0.5	<0.5	<0.5	<1.0 AA						<0.5	ug/l
Nitrobenzene #	<1	<1	<1	<1	<2 AA						<1	ug/l
Surrogate Recovery 2-Fluorobiphenyl	111	81	107	98	102 AA						<0	%
Surrogate Recovery p-Terphenyl-d14	129	113	130	118	128 AA						<0	%

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7606

SVOC Report : **Liquid**

J E Sample No.	34-42	43-51											
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	09/05/2019	09/05/2019											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	10/05/2019	10/05/2019											

Please see attached notes for all abbreviations and acronyms

											LOD/LOR	Units	Method No.
SVOC MS													
Phenols													
2-Chlorophenol #	<1	<1									<1	ug/l	TM16/PM30
2-Methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2-Nitrophenol	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4-Dimethylphenol	<1	<1									<1	ug/l	TM16/PM30
2,4,5-Trichlorophenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,4,6-Trichlorophenol	<1	<1									<1	ug/l	TM16/PM30
4-Chloro-3-methylphenol #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
4-Methylphenol	<1	<1									<1	ug/l	TM16/PM30
4-Nitrophenol	<10	<10									<10	ug/l	TM16/PM30
Pentachlorophenol	<1	<1									<1	ug/l	TM16/PM30
Phenol	<1	<1									<1	ug/l	TM16/PM30
PAHs													
2-Chloronaphthalene #	<1	<1									<1	ug/l	TM16/PM30
2-Methylnaphthalene #	<1	<1									<1	ug/l	TM16/PM30
Naphthalene #	<1	<1									<1	ug/l	TM16/PM30
Acenaphthylene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Acenaphthene #	<1	<1									<1	ug/l	TM16/PM30
Fluorene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phenanthrene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Fluoranthene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Pyrene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(a)anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Chrysene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(bk)fluoranthene #	<1	<1									<1	ug/l	TM16/PM30
Benzo(a)pyrene	<1	<1									<1	ug/l	TM16/PM30
Indeno(123cd)pyrene	<1	<1									<1	ug/l	TM16/PM30
Dibenzo(ah)anthracene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Benzo(ghi)perylene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Phthalates													
Bis(2-ethylhexyl) phthalate	<5	<5									<5	ug/l	TM16/PM30
Butylbenzyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Di-n-butyl phthalate #	<1.5	<1.5									<1.5	ug/l	TM16/PM30
Di-n-Octyl phthalate	<1	<1									<1	ug/l	TM16/PM30
Diethyl phthalate #	<1	<1									<1	ug/l	TM16/PM30
Dimethyl phthalate	<1	<1									<1	ug/l	TM16/PM30

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

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7606

SVOC Report : **Liquid**

J E Sample No.	34-42	43-51											
Sample ID	SW1	SW2											
Depth											Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	09/05/2019	09/05/2019											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	10/05/2019	10/05/2019									LOD/LOR	Units	Method No.
SVOC MS													
Other SVOCs													
1,2-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,2,4-Trichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,3-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
1,4-Dichlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
2-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
2,4-Dinitrotoluene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
2,6-Dinitrotoluene	<1	<1									<1	ug/l	TM16/PM30
3-Nitroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Bromophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Chloroaniline	<1	<1									<1	ug/l	TM16/PM30
4-Chlorophenylphenylether #	<1	<1									<1	ug/l	TM16/PM30
4-Nitroaniline	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Azobenzene #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethoxy)methane #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Bis(2-chloroethyl)ether #	<1	<1									<1	ug/l	TM16/PM30
Carbazole #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Dibenzofuran #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Hexachlorobenzene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorobutadiene #	<1	<1									<1	ug/l	TM16/PM30
Hexachlorocyclopentadiene	<1	<1									<1	ug/l	TM16/PM30
Hexachloroethane #	<1	<1									<1	ug/l	TM16/PM30
Isophorone #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
N-nitrosodi-n-propylamine #	<0.5	<0.5									<0.5	ug/l	TM16/PM30
Nitrobenzene #	<1	<1									<1	ug/l	TM16/PM30
Surrogate Recovery 2-Fluorobiphenyl	101	108									<0	%	TM16/PM30
Surrogate Recovery p-Terphenyl-d14	120	126									<0	%	TM16/PM30

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7496

VOC Report : **Liquid**

J E Sample No.	1-8	9-16	17-24	25-33	34-42						LOD/LOR	Units	Method No.
Sample ID	GW1	GW2	GW3	L1	L3								
Depth													
COC No / misc													
Containers	V H N P G	V H N P G	V H N P G	V H N P BOD G	V H N P BOD G								
Sample Date	08/05/2019	08/05/2019	08/05/2019	08/05/2019	08/05/2019								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	1	1	1	1	1								
Date of Receipt	09/05/2019	09/05/2019	09/05/2019	09/05/2019	09/05/2019								
VOC MS													
Dichlorodifluoromethane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1	<0.1	<0.1	<0.1						<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
Chloroethane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5	<5	<5	<5						<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Chloroform #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Toluene #	<5	<5	<5	<5	<5						<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
o-Xylene #	<1	<1	<1	<1	<1						<1	ug/l	TM15/PM10
Styrene	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Bromoform #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4	<4	<4	<4						<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2	<2	<2	<2						<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3	<3	<3	<3						<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	96	95	98	100	100						<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	100	98	102	100	102						<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila
JE Job No.: 19/7606

VOC Report : **Liquid**

J E Sample No.	34-42	43-51									LOD/LOR	Units	Method No.
Sample ID	SW1	SW2											
Depth													
COC No / misc													
Containers	V H N P BOD G	V H N P BOD G											
Sample Date	09/05/2019	09/05/2019											
Sample Type	Surface Water	Surface Water											
Batch Number	1	1											
Date of Receipt	10/05/2019	10/05/2019											
VOC MS													
Dichlorodifluoromethane	<2	<2									<2	ug/l	TM15/PM10
Methyl Tertiary Butyl Ether #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Chloromethane #	<3	<3									<3	ug/l	TM15/PM10
Vinyl Chloride #	<0.1	<0.1									<0.1	ug/l	TM15/PM10
Bromomethane	<1	<1									<1	ug/l	TM15/PM10
Chloroethane #	<3	<3									<3	ug/l	TM15/PM10
Trichlorofluoromethane #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethene (1,1 DCE) #	<3	<3									<3	ug/l	TM15/PM10
Dichloromethane (DCM) #	<5	<5									<5	ug/l	TM15/PM10
trans-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
1,1-Dichloroethane #	<3	<3									<3	ug/l	TM15/PM10
cis-1-2-Dichloroethene #	<3	<3									<3	ug/l	TM15/PM10
2,2-Dichloropropane	<1	<1									<1	ug/l	TM15/PM10
Bromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
Chloroform #	<2	<2									<2	ug/l	TM15/PM10
1,1,1-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
1,1-Dichloropropene #	<3	<3									<3	ug/l	TM15/PM10
Carbon tetrachloride #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Benzene #	<0.5	<0.5									<0.5	ug/l	TM15/PM10
Trichloroethene (TCE) #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromomethane #	<3	<3									<3	ug/l	TM15/PM10
Bromodichloromethane #	<2	<2									<2	ug/l	TM15/PM10
cis-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
Toluene #	<5	<5									<5	ug/l	TM15/PM10
trans-1-3-Dichloropropene	<2	<2									<2	ug/l	TM15/PM10
1,1,2-Trichloroethane #	<2	<2									<2	ug/l	TM15/PM10
Tetrachloroethene (PCE) #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichloropropane #	<2	<2									<2	ug/l	TM15/PM10
Dibromochloromethane #	<2	<2									<2	ug/l	TM15/PM10
1,2-Dibromoethane #	<2	<2									<2	ug/l	TM15/PM10
Chlorobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,1,1,2-Tetrachloroethane #	<2	<2									<2	ug/l	TM15/PM10
Ethylbenzene #	<1	<1									<1	ug/l	TM15/PM10
m/p-Xylene #	<2	<2									<2	ug/l	TM15/PM10
o-Xylene #	<1	<1									<1	ug/l	TM15/PM10
Styrene	<2	<2									<2	ug/l	TM15/PM10
Bromoform #	<2	<2									<2	ug/l	TM15/PM10
Isopropylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,1,2,2-Tetrachloroethane	<4	<4									<4	ug/l	TM15/PM10
Bromobenzene #	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichloropropane #	<3	<3									<3	ug/l	TM15/PM10
Propylbenzene #	<3	<3									<3	ug/l	TM15/PM10
2-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3,5-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Chlorotoluene #	<3	<3									<3	ug/l	TM15/PM10
tert-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2,4-Trimethylbenzene #	<3	<3									<3	ug/l	TM15/PM10
sec-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
4-Isopropyltoluene #	<3	<3									<3	ug/l	TM15/PM10
1,3-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,4-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
n-Butylbenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dichlorobenzene #	<3	<3									<3	ug/l	TM15/PM10
1,2-Dibromo-3-chloropropane	<2	<2									<2	ug/l	TM15/PM10
1,2,4-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Hexachlorobutadiene	<3	<3									<3	ug/l	TM15/PM10
Naphthalene	<2	<2									<2	ug/l	TM15/PM10
1,2,3-Trichlorobenzene	<3	<3									<3	ug/l	TM15/PM10
Surrogate Recovery Toluene D8	111	108									<0	%	TM15/PM10
Surrogate Recovery 4-Bromofluorobenzene	109	106									<0	%	TM15/PM10

Please see attached notes for all abbreviations and acronyms

Client Name: Malone O'Regan
Reference: E1506
Location:
Contact: Thomas Vainio-Mattila

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 19/7496 & 19/7606 SW1 & SW2						

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

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/7496 & 19/7606 SW1 & SW2

SOILS

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

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

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

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

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

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

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

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

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

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

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

WATERS

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

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

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

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

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

SURROGATES

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

DILUTIONS

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

BLANKS

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

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

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

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x2 Dilution
AB	x5 Dilution

JE Job No: 19/7496 & 19/7606 SW1 & SW2

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16/PM30	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE/Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM5/TM36	please refer to TM5 and TM36 for method details	PM12/PM16/PM30	please refer to PM16/PM30 and PM12 for method details	Yes			
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.				
TM15	Modified USEPA 8260. Quantitative Determination of Volatile Organic Compounds (VOCs) by Headspace GC-MS.	PM10	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM16	Modified USEPA 8270. Quantitative determination of Semi-Volatile Organic compounds (SVOCs) by GC-MS.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.				

JE Job No: 19/7496

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes			
TM42	Modified US EPA method 8270. Pesticides and herbicides by GC-MS	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM57	Modified US EPA Method 410.4. Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM58	APHA Standard Methods for the extraction of water and waste water (SMEWW) 5210B. Comparible with ISO 5815:1989. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand. Determination of Dissolved Oxygen using the Hach HQ30D Oxygen Meter.	PM0	No preparation is required.				
TM58	APHA Standard Methods for the extraction of water and waste water (SMEWW) 5210B. Comparible with ISO 5815:1989. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand. Determination of Dissolved Oxygen using the Hach HQ30D Oxygen Meter.	PM0	No preparation is required.	Yes			
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.	Yes			

JE Job No: 19/7496

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM72	Redox Potential is measured by HI98120 redox meter.	PM0	No preparation is required.				
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM76	Modified US EPA method 120.1. Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM0	No preparation is required.	Yes			
TM94	Derivatisation and extraction of Organotins. Analysis by GC-MS	PM48	Samples are pretreated and derivatised. The derviatised organotins are then extracted using hexane.				
TM149	Determination of Pesticides by Large Volume Injection on GC Triple Quad MS, based upon USEPA method 8270	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				
Subcontracted	See attached subcontractor report for accreditation status and provider.						

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Customer

Kate Wiley

Exova Environmental UK Ltd
Rosewell House
2A (1F) Harvest Drive
Newbridge, MidLothian Scotland
EH28 8QJ United Kingdom

Certificate Of Analysis

Job Number: 19-55840
Issue Number: 1
Report Date: 15 May 2019

Site: Not Applicable
PO Number: Not Supplied
Date Samples Received: 08/05/2019

Please find attached the results for the samples received at our laboratory on 08/05/2019.

Should you have any queries regarding the report or require any further services, we would be happy to discuss your requirements. For additional information about the company please log-on to our website at the above address.

Thank you for choosing City Analysts Limited. We look forward to assisting you again.

Authorised By: Shane Reynolds
Laboratory Manager

Authorised Date: 15 May 2019

Notes:

Results relate only to the items tested.
Information on methods of analysis and performance characteristics is available on request.
Any opinions or interpretations indicated are outside the scope of our INAB accreditation.
This test report shall not be reproduced except in full or with written approval of City Analysts Limited.

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Certificate Of Analysis

Customer

Kate Wiley

Exova Environmental UK Ltd
Rosewell House
2A (1F) Harvest Drive
Newbridge, MidLothian Scotland
EH28 8QJ United Kingdom

Report Reference: 19-55840

Report Version: 1

Site: Not Applicable

Sample Description: GW1

Sample Type: Ground

Lab Reference Number: 438036

Date of Sampling: 08/05/2019

Date Sample Received: 08/05/2019

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1201#	08/05/2019	Coliforms	1090.0	MPN/100ml	-
D/D3221#	08/05/2019	Faecal Coliforms	48	cfu/100ml	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note:
PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.
For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.
NAC & ATC - No abnormal change and acceptable to customers.
TVC - Total viable count
Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon

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Certificate Of Analysis

Customer

Kate Wiley

Exova Environmental UK Ltd
Rosewell House
2A (1F) Harvest Drive
Newbridge, MidLothian Scotland
EH28 8QJ United Kingdom

Report Reference: 19-55840

Report Version: 1

Site: Not Applicable

Sample Description: GW2

Sample Type: Ground

Lab Reference Number: 438037

Date of Sampling: 08/05/2019

Date Sample Received: 08/05/2019

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1201#	08/05/2019	Coliforms	238.2	MPN/100ml	-
D/D3221#	08/05/2019	Faecal Coliforms	< 1	cfu/100ml	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note:
PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.
For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.
NAC & ATC - No abnormal change and acceptable to customers.
TVC - Total viable count
Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon

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Newbridge, MidLothian Scotland
EH28 8QJ United Kingdom

Report Reference: 19-55840

Report Version: 1

Site: Not Applicable

Sample Description: GW3

Sample Type: Ground

Lab Reference Number: 438038

Date of Sampling: 08/05/2019

Date Sample Received: 08/05/2019

Site / Method Ref.	Analysis Start Date	Parameter	Result	Units	PV Value (Drinking Water Only)
D/D1201#	08/05/2019	Coliforms	79.8	MPN/100ml	-
D/D3221#	08/05/2019	Faecal Coliforms	1	cfu/100ml	-

= INAB Accredited, U = UKAS Accredited, * = Subcontracted

Note:
PV Value is the parametric value, taken from European Communities, (Drinking Water) Regulations, 2014. S.I. No. 122 of 2014 and relates only to drinking water samples.
For queries on results, please contact us within two weeks of the report date to ensure that we can accommodate your query as samples cannot be stored indefinitely.
NAC & ATC - No abnormal change and acceptable to customers.
TVC - Total viable count
Site D = Analysed at City Analysts Dublin. Site S = Analysed at City Analysts Shannon

APPENDIX H

LABORATORY REPORT

4043

Contract Number: PSL19/2619

Report Date: 04 June 2019

Client's Reference: 19-0225A

Client Name: Causeway Geotech
8 Drumahiskey Road
Ballymoney
Co.Antrim
BT53 7QL

For the attention of: Stephen Watson

Contract Title: Groundwater Monitoring Wells - K Leisure, Greenhills, Athy

Date Received: 26/4/2019
Date Commenced: 26/4/2019
Date Completed: 4/6/2019

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)
A Watkins (Director)
R Berriman (Quality Manager)

S Royle (Laboratory Manager)
S Eyre (Senior Technician)
L Knight (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
GW04	1	U	0.00	0.45	Brown slightly sandy gravelly CLAY.

UKAS TESTING 4043	PSL Professional Soils Laboratory	Groundwater Monitoring Wells - K Leisure, Greenhills, Athy	Contract No: PSL19/2619 Client Ref: 19-0225A

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
GW04	1	U	0.00	0.45	13							

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Groundwater Monitoring Wells - K Leisure, Greenhills, Athy

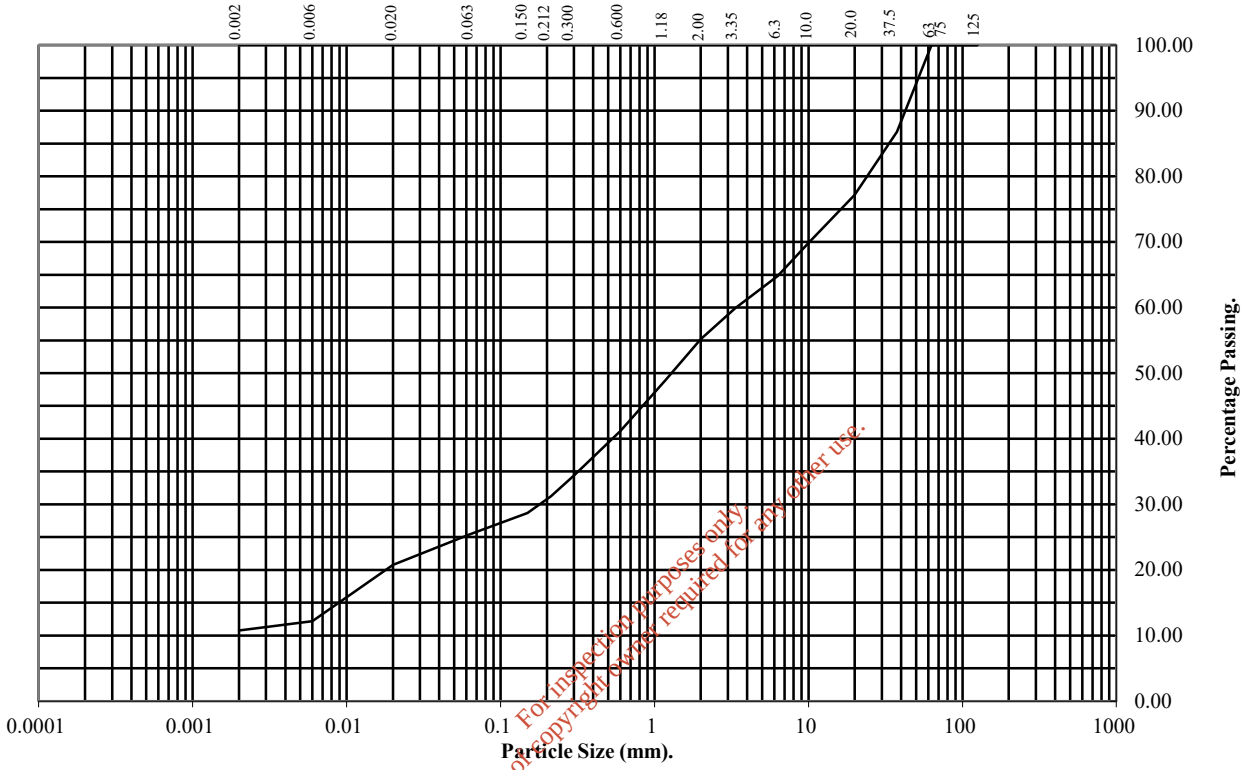
Contract No:
PSL19/2619
Client Ref:
19-0225A

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number:	**GW04**	**Top Depth (m):**	**0.00**
Sample Number:	**1**	**Base Depth(m):**	**0.45**
Sample Type:	**U**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	87
20	77
10	70
6.3	65
3.35	60
2	55
1.18	49
0.6	41
0.3	34
0.212	31
0.15	29
0.063	25

Particle Diameter	Percentage Passing
0.02	21
0.006	12
0.002	11

Soil Fraction	Total Percentage
Cobbles	0
Gravel	45
Sand	30
Silt	14
Clay	11

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Groundwater Monitoring Wells - K Leisure, Greenhills, Athy**	**Contract No:** PSL19/2619 **Client Ref:** 19-0225A

PERMEABILITY IN A TRIAXIAL CELL

BS 1377 : Part 6 : 1990: Clause 6

Hole Number:	**GW04**	**Top Depth (m) :**	**0.00**
Sample Number:	**1**	**Base Depth (m) :**	**0.45**
Sample Type:	**U**	**Lift Number:**	
Date		**Grid Reference:**	

Description of Specimen
See summary of soil descriptions.
Remarks
Remoulded to original density of U70 sample

Initial Specimen Conditions		
Height	mm	102.00
Diameter	mm	101.50
Area	mm^2	8091.37
Volume	cm^3	825.32
Mass	g	1734
Dry Mass	g	1530
Bulk Density	Mg/m^3	2.10
Dry Density	Mg/m^3	1.85
Moisture Content	%	13
Voids Ratio	-	0.429
Specific Gravity	Mg/m^3	2.65
(assumed/measured)	-	assumed

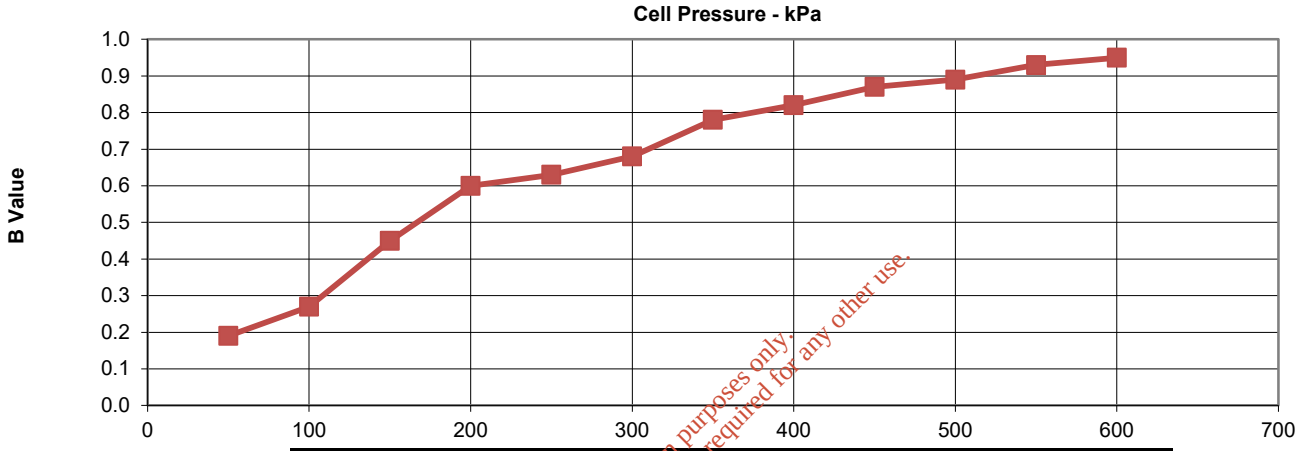
Final Specimen Conditions		
Moisture Content	%	16
Bulk Density	Mg/m^3	2.15
Dry Density	Mg/m^3	1.85

Test Setup		
Date Started		17/05/2019
Date Finished		31/05/2019
Top Drain Used		Y
Base Drain Used		Y
Method of Saturation		By back pressure
Direction Of Flow		Vertically Downwards
Saturation Time	Days	4
Consolidation Time	Days	1
Permeability Time	Days	1

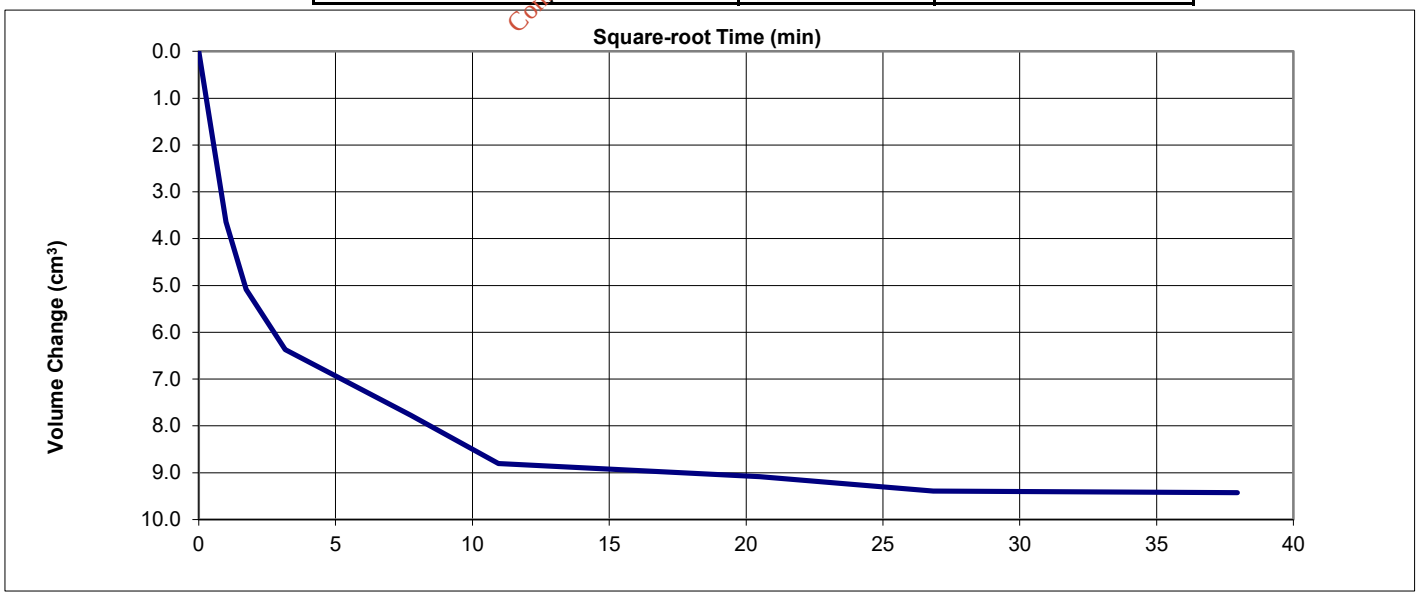
PERMEABILITY IN A TRIAXIAL CELL

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details		
Hole Number		GW04
Sample Depth	m	0.00
Sample No,		1
Grid Reference		
Lift Number		
Saturation		
Cell Pressure Incr.	kPa	50
Back Pressure Incr.	kPa	50
Differential Pressure	kPa	10
Final Cell Pressure	kPa	600
Final B Value	-	0.95



Consolidation		
Effective Pressure	kPa	100
Cell Pressure	kPa	700
Back Pressure	kPa	600
Final PWP	kPa	601
PWP dissipation	%	99



UKAS TESTING 4043

PSL Professional Soils Laboratory

Groundwater Monitoring Wells-K Leisure, Greenhills, Athy

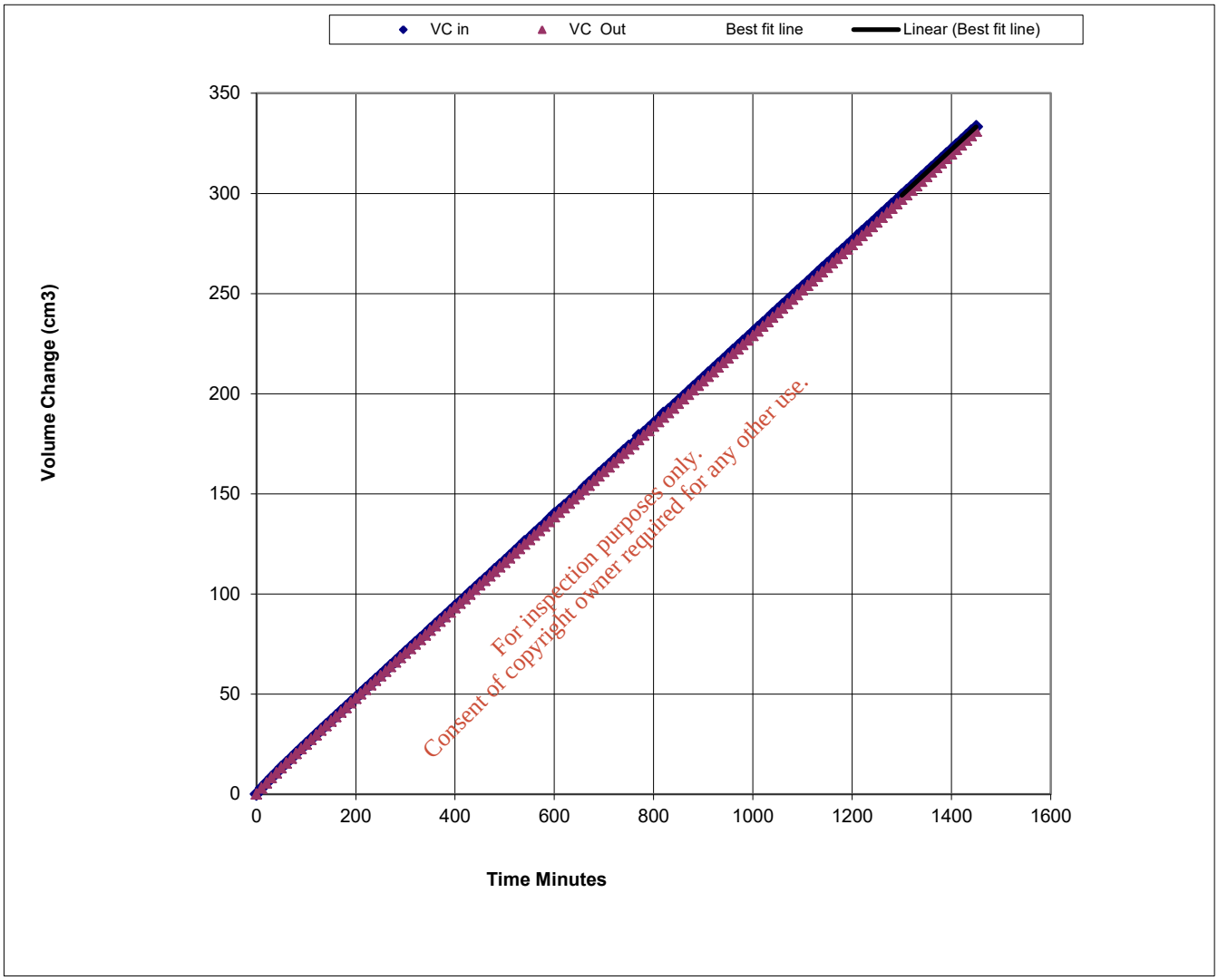
Contract No.
PSL19/2619
Client Ref
19-0225A

PERMEABILITY IN A TRIAXIAL CELL

BS 1377 : Part 6 : 1990 Clause 6

Specimen Details		
Hole Number		GW04
Sample Depth	m	0.00
Sample No.		1
Grid Reference		
Lift Number		

Permeability Stage



Permeability Stage		
Cell Pressure	kPa	700
Mean Effective Stress	kPa	100
Back Pressure Diff.	kPa	20
Mean Rate of Flow	ml/min	0.2281
Average Temperature	'C	22
Vertical Permeability Kv	m/s	2.3E-08

UKAS TESTING 4043

PSL Professional Soils Laboratory

Groundwater Monitoring Wells-K Leisure, Greenhills, Athy

Contract No.
PSL19/2619
Client Ref
19-0225A

APPENDIX I

October 2019

Appropriate Assessment
Stage 1 Screening Report

Site at Greenhills

Kildare County Council

Athy, Co. Kildare

MALONE O'REGAN ENVIRONMENTAL

MALONE O'REGAN

Form ES - 04

MALONE O'REGAN ENVIRONMENTAL

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Title: Appropriate Assessment Stage 1 Screening Report, Site at Greenhills, Kildare County Council, Athy, Co. Kildare

Job Number: E1506

Prepared By: Amelia Keane **Signed:** Amelia Keane

Checked By: Kathryn Broderick **Signed:** K. Broderick

Approved By: Dyfrig Hubble **Signed:**

Revision Record

Issue No.	Date	Description	Remark	Prepared	Checked	Approved
01	18/11/19	AA Screening Report	FINAL	AK	KB	DH

Appropriate Assessment Stage 1 Screening Report

Site at Greenhills

Kildare County Council

Athy, Co. Kildare

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1 INTRODUCTION

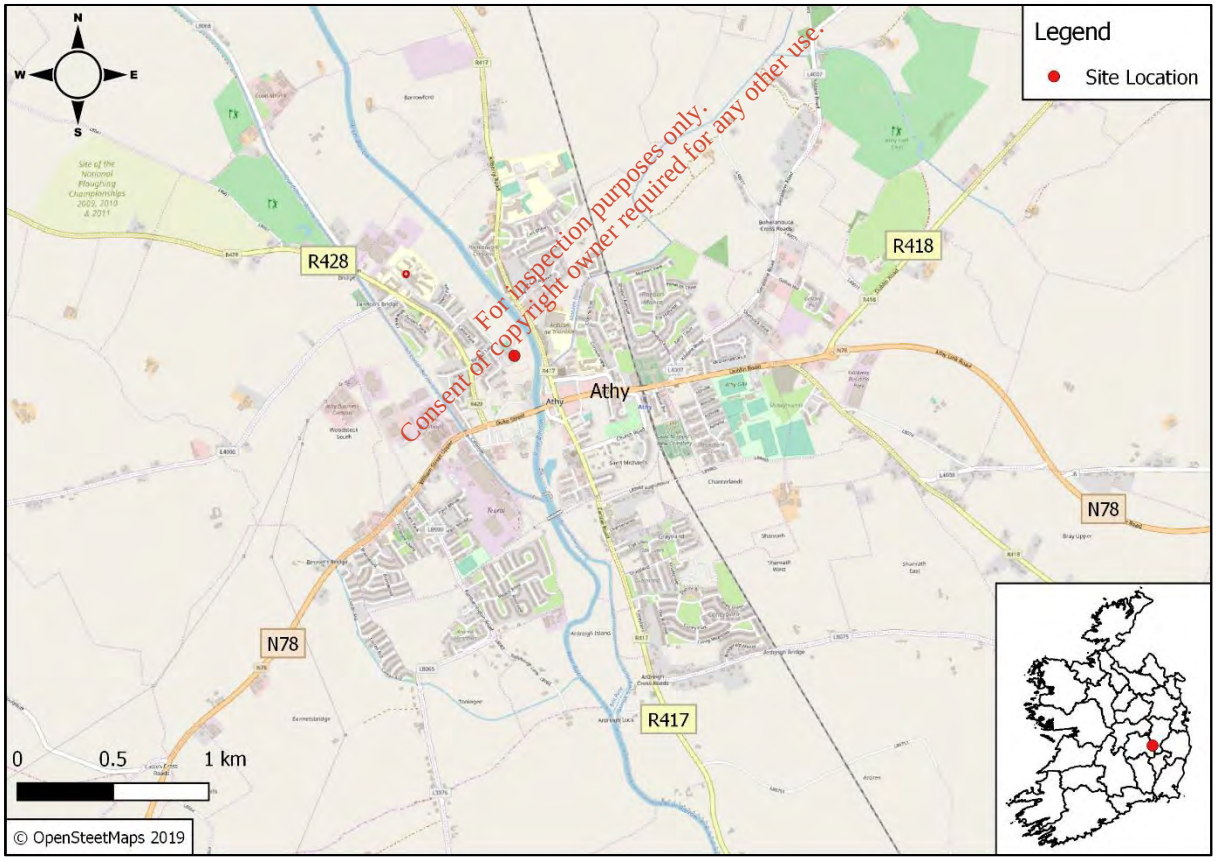
1.1 Background

This Appropriate Assessment Screening Report has been prepared by Malone O'Regan Environmental (MOR) on behalf of Kildare County Council (KCC) to assess the potential impacts, if any, of imported fill materials that had been deposited at a location in the legacy landfill at Greenhills, Co. Kildare (the Site), (OS Ref: S 67956 94425), on nearby sites with European conservation designations (i.e. Natura 2000 sites).

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

In 2019 MOR undertook an Environmental Risk Assessment, which included Tier 1 Risk Screening and preliminary conceptual site model, Tier 2 Site Investigations and Testing, Tier 3 Refinement of Conceptual Site Model (CSM) and Quantitative Risk Assessment (QRA), for the Site on behalf of KCC for submission to the Environmental Protection Agency (EPA). The aim of the assessment was to assess if the imported materials deposited within the Site cause an adverse impact to the groundwater, the surface water and the receiving environment within and adjacent to the Site.

Figure 1-1: Site Location



The purpose of this assessment was to determine the appropriateness, or otherwise, of the Site in the context of the conservation objectives of European conservation designations (i.e. Natura 2000 sites).

This report also considers the need and or appropriateness, or otherwise, of the recommendations in the Environmental Risk Assessment in the context of the conservation objectives of the Natura 2000 sites.

1.2 Regulatory Context

This Appropriate Assessment Screening Report was prepared in compliance with the following legislation:

Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna better known as 'The Habitats Directive' which provides the framework for legal protection for habitats and species of European importance. Articles 3 to 9 provide the legislative means to protect habitats and species of community interest through the establishment and conservation of an EU-wide network of sites known as Natura 2000 sites. These are Special Areas of Conservation (SACs) designated under the Habitats Directive and Special Protection Areas (SPAs) designated under the Conservation of Wild Birds Directive (79/409/EEC as amended 2009/149/EC)) (better known as 'The Birds Directive').

Article 6(3) and 6(4) of the Habitats Directive set out the decision-making tests for plans and projects likely to affect Natura 2000 sites (Annex 1.1). Article 6(3) establishes the requirement for Appropriate Assessment (now termed Natura Impact Statement):

> *"Any plan or project not directly connected with or necessary to the management of the [Natura 2000] site but likely to have a significant effect thereon, either individually or in combination with other plans and projects, shall be subjected to appropriate assessment of its implications for the site in view of the site's conservation objectives. In light of the conclusions of the assessment of the implication for the site and subject to the provisions of paragraph 4, the competent national authorities shall agree to the plan or project only after having ascertained that it will not adversely affect the integrity of the site concerned and, if appropriate, after having obtained the opinion of the general public."*

The Habitats Directive promotes a hierarchy of avoidance, mitigation and compensatory measures. First, the project should aim to avoid any negative impacts on European sites by identifying possible impacts early in the planning stage, and designing the project in order to avoid such impacts. Second, mitigation measures should be applied, if necessary, during the AA process to the point, where no adverse impacts on the site(s) remain. If the project is still likely to result in adverse effects, and no further practicable mitigation is possible, it is rejected. If no alternative solutions are identified and the project is required for imperative reasons of overriding public interest (IROPI test) under Article 6(4) of the Habitats Directive, then compensation measures are required for any remaining adverse effects.

1.3 Stages of Appropriate Assessment

This Appropriate Assessment Screening Report has been undertaken in accordance with the European Commission Methodological Guidance on the provision of Article 6(3) and 6(4) of the 'Habitats' Directive 92/43/EEC (EC 2001) and the European Commission Guidance 'Managing Natura 2000 Sites.' The Guidance for Planning Authorities published by the Department of Environment, Heritage and Local Government (DOEHLG, December 2009) was also adhered to.

There are four distinct stages to undertaking an AA as outlined in current EU and DOEHLG guidance:

1. Appropriate Assessment Screening;
2. Appropriate Assessment;
3. Assessment of Alternatives in cases where significant impact cannot be prevented; and,
4. Where no alternatives exist, an Assessment of Compensatory Issues in the case of projects or plans which can be considered to be necessary for Imperative Reasons of Overriding Public Interest (IROPI).

This Report comprises a Stage 1 Screening Report, which seeks to determine whether the subject site will, on its own or in combination with other plans / projects, have a significant effect on Natura 2000 sites within a defined radius of the subject site.

2 SCREENING FOR APPROPRIATE ASSESSMENT

Screening determines whether Appropriate Assessment is necessary by examining:

1. Whether a plan or project can be excluded from AA requirements because it is directly connected with, or necessary to, the management of a Natura 2000 site; and,
2. Whether the project will have a potentially significant effect on a Natura 2000 site, either alone or in combination with other projects or plans, in view of the site's conservation objectives.

Screening involves the following:

i) Description of a plan or project;

ii) Identification of relevant Natura 2000 sites, and compilation of information on their qualifying interests and conservation objectives;

iii) Assessment of likely effects – direct, indirect and cumulative – undertaken on the basis of available information as a desk study or field survey or primary research as necessary; and,

iv) Screening Statement with conclusions.

2.1 Desk Based Studies

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

- The National Parks and Wildlife Service (NPWS) website was consulted with regard to the most up to date detail on conservation objectives for the Natura 2000 sites relevant to this assessment (National Parks and Wildlife Service, 2019);
- The National Biodiversity Data Centre website was consulted with regard to species distributions (National Biodiversity Data Centre, 2019);
- The EPA Envision website was consulted to obtain details about watercourses in the vicinity of the Site (http://gis.epa.ie/Envision/) (EPA, 2019); and,
- The EPA Catchments website was also consulted to obtain details about watercourses in the vicinity of the Site (https://www.catchments.ie/maps/) (EPA Catchments, 2019).

3 DESCRIPTION OF THE PROJECT

3.1 Site Context and Description

The Site is located in the centre of Athy town, County Kildare, along the national road N78, within the Townlands of Athy and Townparks (Narragh and Reban West By) refer to Figure 1-1. The area of the Site is approximately 4.09ha and is currently occupied by a public amenity building (leisure centre), which is surrounded by green areas.

There are a number of residential properties along the western boundary of the Site, the closest one at ca.15m. A shopping centre and visitor's car park adjoins the south-eastern boundary of the Site. The River Barrow adjoins the eastern boundary of the Site, followed by a school and a number of residential properties. A green field with a number of football pitches are located to the north of the Site.

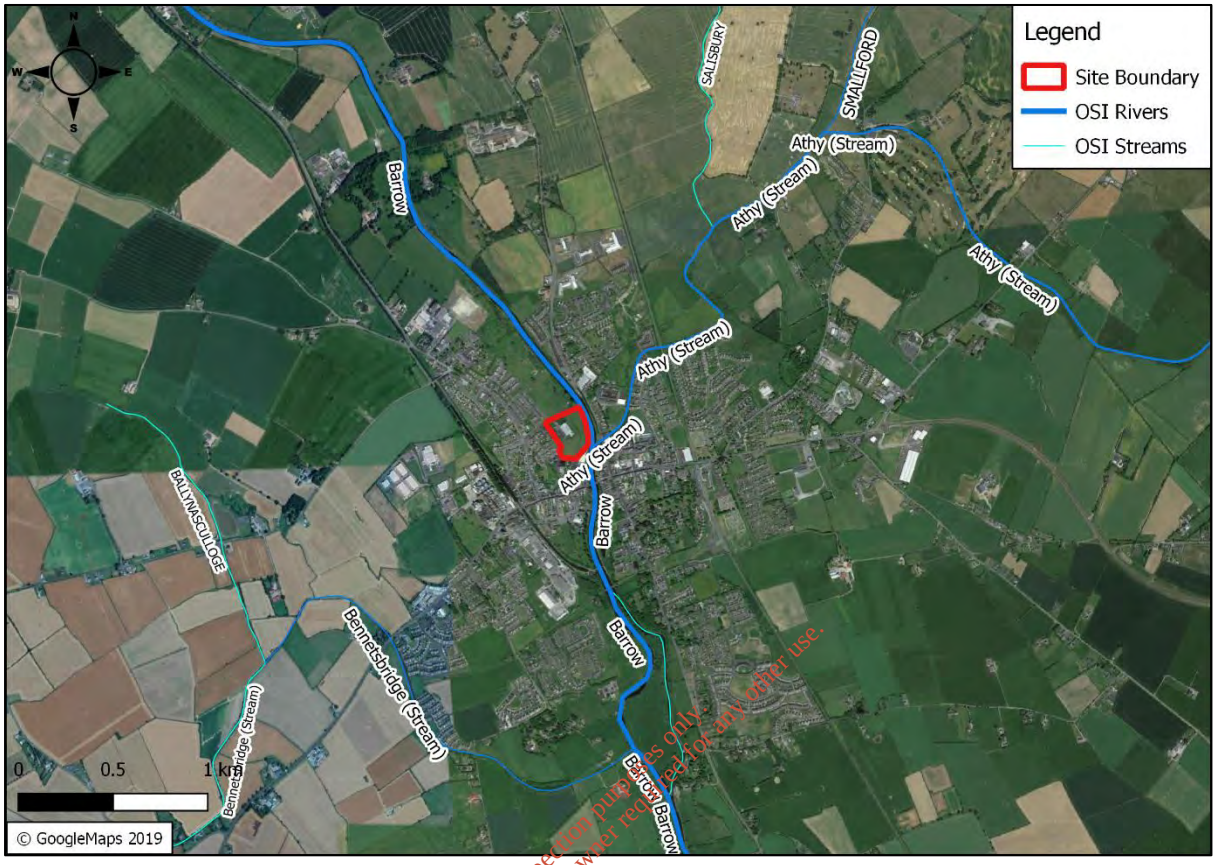
A trial well drilled in 1899, a public supply well (KCC) drilled in 2001 and an infiltration gallery (public supply (Co. Co.) drilled in 1899 are located ca.25m, 28m and 45m respectively north of the Site. Another public supply well (KCC) drilled in 1977 is located ca.252m north / north-west of the Site.

There are two watercourses of note within the vicinity of the Site; the River Barrow and the Athy Stream, both located within the Barrow_SC_070 sub-catchment. The river barrow is the closest hydrological feature, located directly adjacent to the eastern boundary of the Site and flows in a southerly direction.

The Athy Stream is a tributary of the River Barrow and is located ca.40m east of the Site, where it drains into the River Barrow. Watercourses in the vicinity of the Site are presented in Figure 3-1.

The water quality and risk of the section of the River Barrow adjacent to the Site is '*unassigned*' (EPA Catchments, 2019). However, ca.3km north of the Site, the water quality status of the River Barrow is '*good*' and is considered *'not at risk,'* and ca.1.5km to the south, water quality status of the River Barrow is '*moderate*' and is considered '*at risk'* (EPA Catchments, 2019). Similarly, the water quality and risk of the Athy Stream, which drains into the River Barrow 40m east of the Site, is also considered '*unassigned*' (EPA Catchments, 2019).

Figure 3-1: Watercourses in the vicinity of the Site



3.2 Description of the Environmental Risk Assessment

MOR was appointed by KCC to undertake an Environmental Risk Assessment based on an exploratory site investigation of Greenhills, Co. Kildare, in accordance with the EPA's published Code of Practice: *Environmental Risk Assessment for Unregulated Waste Disposal Sites (2007)* published in December 2008, hereafter referred to as the 'CoP' (where applicable).

As part of the Environmental Risk Assessment there is a requirement to complete an AA to determine potential impacts, if any, of the Greenhills Site, on nearby Natura 2000 sites. The report also considers the need and or appropriateness, or otherwise, of the recommendations made in the Environmental Risk Assessment in the context of the conservation objectives of the Natura 2000 sites.

Before the site investigations began, a geophysical survey and a topographical survey were conducted to assess subsurface and surface conditions of the Site. Once site conditions were established, trial pits, leachate and gas boreholes and groundwater boreholes were installed. All of the monitoring / sampling locations were situated more than 20m away from the River Barrow's edge in amenity grassland with a flat topography (See Figure 3-1). Therefore, these site assessment works had no impact to the River Barrow.

3.3 Trial Pit Excavations

Trial pitting excavations at five locations were carried out on the 16th of January 2019 to characterise the imported fill materials (Figure 3-2, TP1 to TP5). The objective of the trial pitting was to assess the lateral extent and composition of the imported material. In this regard any visual or olfactory evidence of contamination was recorded including photographic evidence. A MOR environmental consultant was on site during all of the trial pit excavations.

The excavation of the trial pits to a maximum depth of approximately 4.4mbgl was undertaken using a 13-tonne tracked excavator. Each trial pit was logged in accordance with the BS 5930:2015 standards. Locations for the trial pits were selected based on initial discussions with KCC, findings of the desk-based studies, the site walkover and the results of the geophysical survey. Each trial pit was re-instated to as close to its original condition as possible. There were two different recorded profiles at the Site:

- Profile 1 – Trial pits along the River Barrow (TP1, TP2 and TP3); and,
- Profile 2 – Trial pits located on the raised areas along the eastern and southern parts of the leisure centre (TP4 and TP5).

3.4 Leachate and Gas Boreholes

A shell and auger rig was mobilised to the Site from the 3rd to the 8th of January 2019 to install shallow leachate/gas boreholes (Figure 3-2, L1 to L3). The three combined leachate and gas monitoring wells were installed within the imported material to depths ranging between 2.5 to 6.7mbgl. During the installation works the MOR consultant noted any field evidence of contamination throughout the soil/lithological profile to ensure that a conduit was not provided to the underlying aquifer.

3.5 Groundwater Boreholes

Three groundwater monitoring wells were installed between the 4th to the 9th of April 2019 to a maximum depth of 14.4mbgl using an air rotary drill rig (Figure 3-2, GW1 to GW3). The wells were installed in order to characterise groundwater quality upgradient and downgradient of the imported fill materials.

Figure 3-2: Sampling Pit Locations

3.6 Findings of the Environmental Risk Assessment

The Environmental Risk Assessment concluded the following:

- Overall the Environmental Risk Assessment completed in 2019, concluded that the Site has been well characterised. This assumption was based on the different investigations undertaken at the Site between January to April 2019.

Based on the evaluation of all available data in accordance with recognised best practice criteria, the following was concluded:

- According to KCC's files the Site was used as a refuse depot from approximately 1st January 1980 to 31st December 1985;
- The Site is located within a sensitive receiving environment due to the proximity of key receptors including the River Barrow and River Nore SAC adjacent to the Site (eastern boundary) and the high-extreme vulnerability rating assigned based on the Source of Inner Protection (SI) within the Site. It is noted that the GSI mapping assigned a moderate vulnerability rating;
- The hydrogeological setting of the Site comprises a regionally important sand and gravel aquifer underlain by the Milford Formation which is a regionally important karstified bedrock aquifer;
- Groundwater flow direction in the underlying aquifer is interpreted to be generally to the east / north-east towards the River Barrow;
- The preliminary CSM identified the source associated with the Site;
    - *The imported material underneath the Site.*

  The potential pathways were identified as follows;
    - *Shallow Sand and Gravel aquifer, bedrock aquifer and subsoils.*

  The key environmental receptors were identified as follows;
    - *The groundwater (sand & gravel and bedrock aquifers) beneath the Site, the surface water (River Barrow), residential properties in the vicinity of the Site and a number of public water supply wells and ecologically protected sites within the 10km radius.*
- In general, the imported material comprises clay, gravelly clay and sandy clay with rare C&D material with a thickness of c. 0.0-6.7mbgl, which overlies a natural clay / sand and gravel layer. According to the geophysical survey, municipal waste with minor organic material mixed with C&D material and clay were also identified on site. The bedrock was interpreted as weathered limestone over competent limestone bedrock;
- The capping material encountered during the site investigations was identified as brown gravelly clay/brown clay with a thickness of 0.5 to 1.1m. According to the geotechnical results the capping material was classified as brown slightly sandy gravelly clay with a permeability of $2.3x10^{-8}$ m/s. The low permeability of the capping material overlying the imported material would impede rainfall infiltration and therefore reduce the generation of leachate;
- The soil laboratory results of three (3 No.) of the trial pits did not record any exceedances in any of the parameters analysed. There was a visually identification only of asbestos fibres at TP4 and TP5, which were further quantified at concentrations <0.001%, confirming that the imported material present on site, with the current use of the Site, poses a low risk of contamination to the underlying strata (natural ground);

- The leachate results confirm that there were some exceedances of some of the parameters analysed. However, due to the natural layer (clay) beneath the Site and the fact that the groundwater and surface water results did not report exceedances on that parameters, it was concluded that the leachate would not pose a risk to any identified receptors;
- The groundwater results confirm that the imported material has not negatively impacted upon the underlying aquifer. There were elevated concentrations of coliforms detected in groundwater but these are highly unlikely to be from the imported material as microbiological pathogens (i.e. coliforms) can only survive up to 400 days in groundwater, and therefore, are unlikely to survive the 35 to 40 years since the imported material was deposited;
- The surface water results confirm that the imported materials have not negatively impacted upon the River Barrow, the risk to surface water is therefore considered to be low;
- This assessment did not identify any impacts from the imported materials on the ecological receptors on-site or within the surrounding vicinity;
- Elevated Methane (CH_4) was detected at leachate/gas locations L1 and L3. Methane was not detected at groundwater monitoring locations external to the imported materials GW1 to GW3 during any sampling event. Given the very low flow concentrations of methane and the surface VOC monitoring survey measured within and outside the Site, the detected gas concentrations are not considered to represent a risk to any identified receptors (on and off-site);
- In strict accordance with this Code of Practice and taking cognisance of the intrusive site investigation and the updated conceptual site model, the site would be classified as a Moderate risk site. However, during the data assessment, it was concluded that the pathways to the receptors were broken and therefore the pollutant linkages no longer exist; and,
- According to the Environmental Risk Assessment carried out for the Site, it is concluded that the imported materials have not resulted in any impacts on the identified human receptors or environmental receptors.

3.7 Environmental Risk Assessment Recommendations

The Environmental Risk Assessment considers that the Site has been well characterised at this juncture given the comprehensive investigations undertaken. Based on the evaluation of the current data set in accordance with recognised best practice criteria, it is considered that there is enough evidence to conclude that the unregulated historic landfill does not present a potential environmental risk to underlying aquifer or potential receptors and therefore, in strict accordance with the CoP, no further actions are required.

4 IDENTIFICATION OF NATURA 2000 SITES

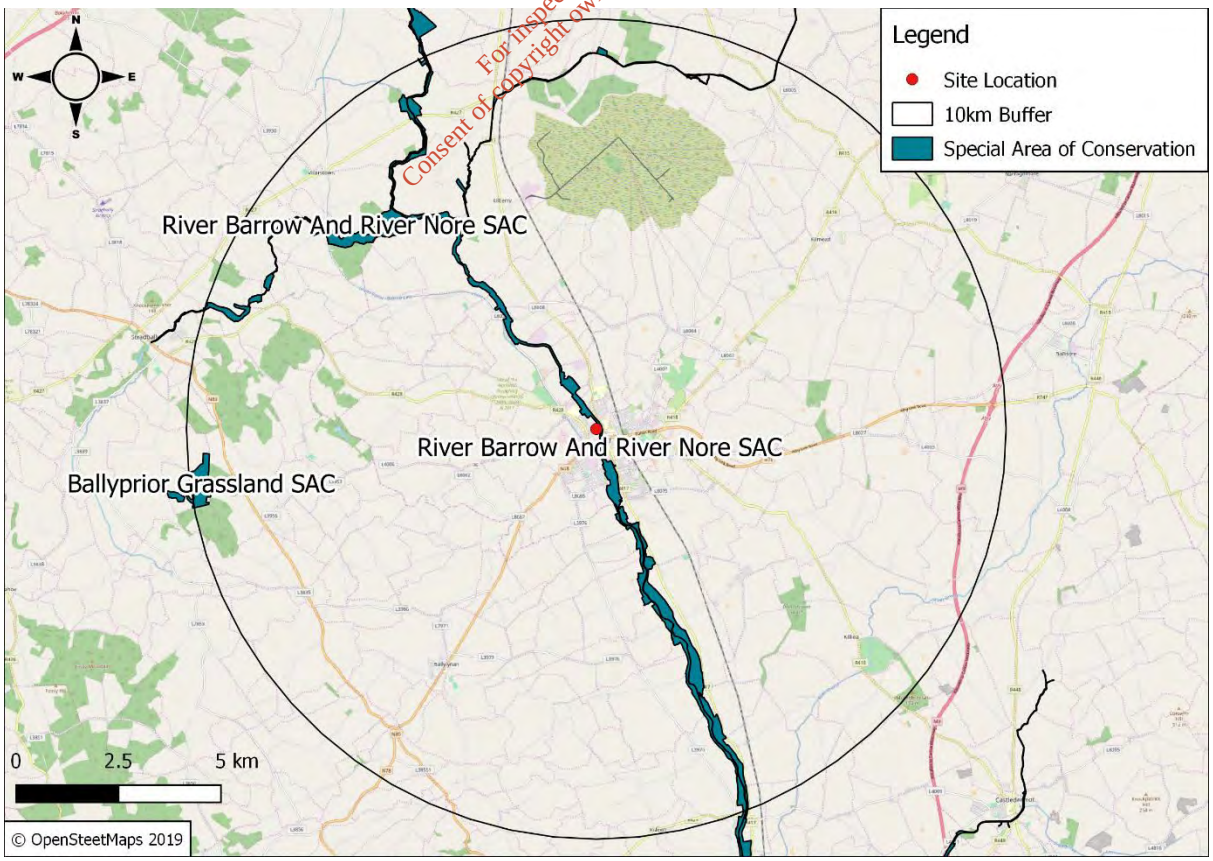
In accordance with the European Commission Methodological Guidance (European Commission, 2002) a list of European sites that can be potentially affected by the Historic Landfill has been compiled. Guidance for Planning Authorities prepared by the Department of Environment Heritage and Local Government (DoEHLG, 2009) states that defining the likely zone of impact for the screening and the approach used will depend on the nature, size, location and the likely effects of the project. The key variables determining whether or not a particular Natura 2000 site is likely to be negatively affected by a project are: the physical distance from the project to the site; the sensitivities of the ecological receptors; and, the potential for in-combination effects. Adopting the precautionary principle, all Special Areas of Conservation (SACs) and Special Protection Areas (SPAs) sites within a 10km radius of the Site have been considered.

Two Natura 2000 designated sites were identified within 10km of the Site (Table 4-1, Figure 4-1).

Table 4-1: Natura 2000 Designated Sites within 10km of the Site

Site Name	Site Code	Distance (km)	Direction
Special Areas of Conservation			
River Barrow and River Nore SAC	002162	-	-
Ballyprior Grassland SAC	002256	9.4	W

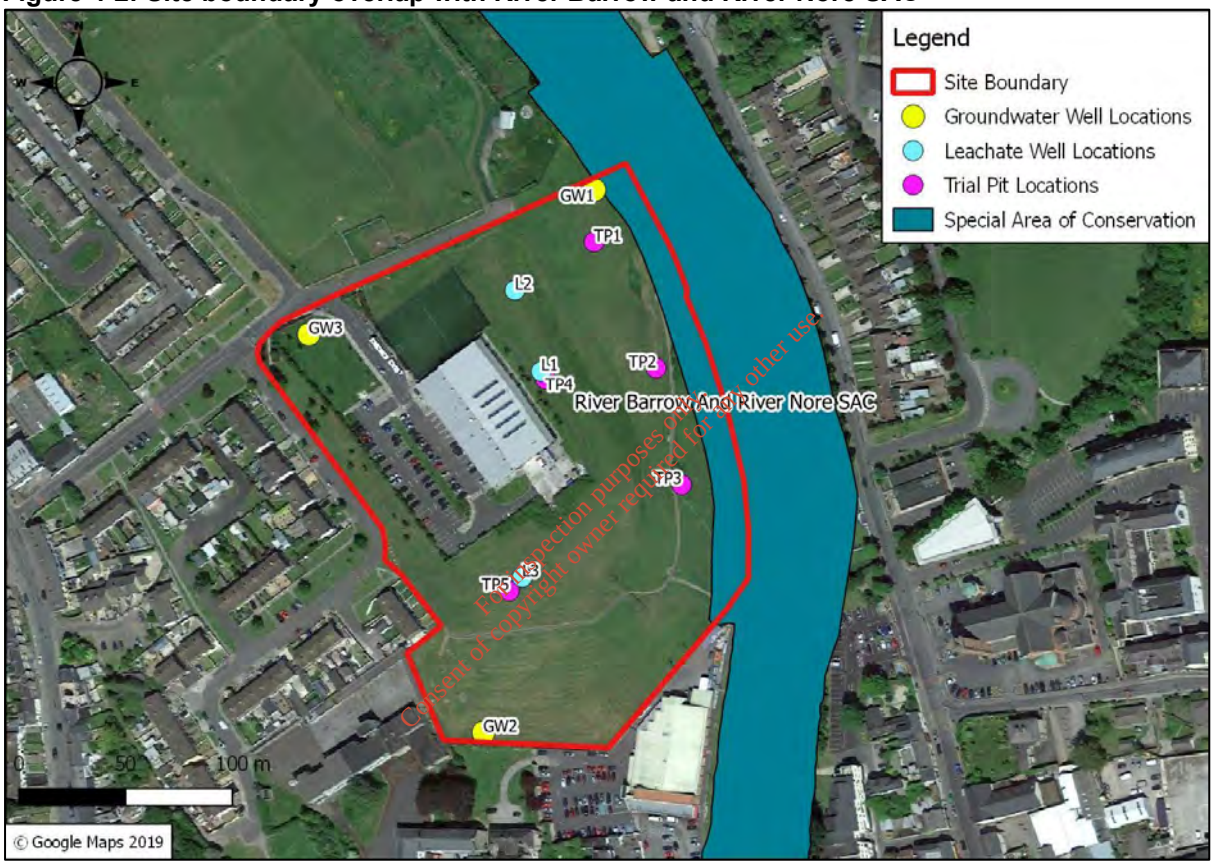
Figure 4-1: Designated Sites located further within 10km of Site Location



Given the distances separating the Site to the Ballyprior Grassland SAC (>9km) and the lack of hydraulic connectivity (Refer to Section 3.1 and Figure 3-1) and absence of impact pathways, it is considered highly unlikely that the Site would have any direct or indirect effects on Ballyprior Grassland SAC or their designated features of interest. As a result, Ballyprior Grassland SAC has been screened out and will not be considered further as part of this assessment.

However, the Site is located within the River Barrow and River Nore SAC, which flows in a southerly direction directly through the eastern boundary of the Site (see Figure 4-2). Therefore, the River Barrow and River Nore SAC was screened in for further assessment.

Figure 4-2: Site boundary overlap with River Barrow and River Nore SAC



4.1 River Barrow and River Nore SAC (Site Code 002162)

The River Barrow and River Nore SAC consists of the freshwater stretches of the Barrow and Nore River catchments extending from the Slieve Bloom Mountains to the estuary and tidal elements in Creadan Head, Waterford.

Species rich habitats (Annex I of the EU Habitats Directive) including estuaries, alluvial forests, petrifying springs, and intertidal mudflats and sandflats can be found within this SAC (see Table 4-2).

This SAC is of considerable conservation significance for multiple reasons:

- Ornithological importance: This SAC supports Kingfisher, a nationally important bird population listed in Annex I of the EU Birds Directive. One SPA (River Nore), designated under the EU Birds Directive, is also located within the SAC; and,
- This SAC supports multiple species listed on Annex II of the EU Habitats Directive, including Otter, River Lamprey and Salmon (see Table 4-3).

Land use within the SAC is primarily agricultural, principally grazing and silage production. Fishing is also a main tourist attraction along stretches of the main rivers and their tributaries. Other recreational activities such as boating, golfing and walking also occur within the SAC. The main threats to the SAC and current damaging activities include high inputs of nutrients into the river system from agricultural run-off and sewage plants, along with over-grazing, invasion of non-native species and land reclamation (NPWS, 2011).

Table 4-2: Qualifying Annex I Habitats for the River Barrow and River Nore SAC

Qualifying Habitats (*denotes Priority Habitat)	Code	Site Specific Conservation Objective
Estuaries	1130	Maintain favourable conservation condition
Mudflats and Sandflats not covered by seawater at low tide	1140	Maintain favourable conservation condition
Salicornia and other annuals colonizing mud and sand	1310	Maintain favourable conservation condition
Atlantic salt meadows (*Glauco-Puccinellietalia maritimae)*	1330	Restore favourable conservation condition
Mediterranean salt meadows (*Juncetlaia maritimi)*	1410	Restore favourable conservation condition
Water courses of plain to montane levels with *the Ranunculion fluitantis* and *Callitricho - Batrachion* vegetation	3260	Maintain favourable conservation condition
European dry heaths	4030	Maintain favourable conservation condition
Hydrophilous tall herb fringe communities of plains and of the montane to alpine levels	6430	Maintain favourable conservation condition
Petrifying springs with tufa formation (Cratoneurion)*	7220	Maintain favourable conservation condition
Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles	91A0	Restore favourable conservation condition
Alluvial forests with *Alnus glutinosa and Fraxinus excelsior* (*Alno-Padion, Alnion incanae, Salicioncalbae*)*	91E0	Restore favourable conservation condition

Table 4-3: Qualifying Annex II Species for the River Barrow and River Nore SAC

Qualifying Species	Species Name	Code
Mammals listed on Annex II of the Habitats Directive	Otter *(Lutra lutra)*	1355
Molluscs listed on Annex II of the Habitats Directive	Freshwater pearl mussel (*Margaritifera margaritifera*)	1029

Qualifying Species	Species Name	Code
	Nore Freshwater pearl mussel (*Margaritifera durrovensis*)	1990
	Desmoulin's whorl snail (*Vertigo moulinsiana)*	1016
Crustaceans listed on Annex II of the Habitats Directive	White-clawed crayfish (*Austropotamobis pallipes)*	1092
Fish listed on Annex II of the Habitats Directive	Salmon (*Salmo salar)*	1106
	Sea Lamprey (*Petromyzon marinus*)	1095
	Brook Lamprey (*Lampetra planeri*)	1096
	River Lamprey *(Lampetra fluviatilis)*	1099
	Twaite Shad *(Alosa fallax)*	1103
Flora listed on Annex II of the Habitats Directive	Killarney Fern (*Trichomanes speciosum)*	1421

4.2 Conservation Objectives

European and national legislation places a collective obligation on Ireland and its citizens to maintain at favourable conservation status areas designated as candidate Special Areas of Conservation. The Government and its agencies are responsible for the implementation and enforcement of regulations that will ensure the ecological integrity of these sites.

According to the EU Habitats Directive, favourable conservation status of a habitat is achieved when:

- Its natural range, and area it covers within that range, is stable or increasing;
- The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future; and,
- The conservation status of its typical species is favourable as defined below.

The favourable conservation status of a species is achieved when:

- Population data on the species concerned indicate that it is maintaining itself;
- The natural range of the species is neither being reduced or likely to be reduced for the foreseeable future; and,
- There is, and will probably continue to be, a sufficiently large habitat to maintain its populations on a long-term basis.

The full report for the conservation objectives for the River Barrow and River Nore SAC[1] can be found on the NPWS website.

[1] https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002162.pdf

5 IDENTIFICATION AND ASSESSMENT OF POTENTIAL IMPACTS

Only features that have the potential to cause adverse effects on the conservation objectives of the identified Natura 2000 sites were considered. A number of factors were examined at this stage and dismissed due to the very low risk associated with them. The key area of potential concern is in relation to potential adverse effects on the SAC are from the impairment of water quality resulting from the landfill site.

5.1 Potential Impairment of Water Quality

In accordance with the EPA CoP risk prioritisation calculations prepared as part of the Environmental Risk Assessment, the Site has been classified as Class B - MODERATE risk. However, the Environmental Risk Assessment did not identify any significant levels of emissions of pollutions to either groundwater or surface water from the site.

The water quality at the sampling points in the River Barrow located above and below the Site remained unchanged. There was no significant change in any of the parameters measured at these locations. It can therefore be stated that in its current state of the historic landfill at the Site is not contributing to a detrition in water quality within the River Barrow. In the absence of any impact on the water quality within this waterbody, it can also be stated that the historic landfill is not currently causing any loss or disturbance as a result of emissions from the site to either habitats or species for which the Natura 2000 sites are designated.

5.2 Analysis of 'In-Combination' Effects

The Habitats Directive requires competent authorities to undertake an appropriate assessment of any plan or project which is likely to have a significant effect alone or in-combination with other plans and projects.

The assessment has considered the possibility for impacts on River Barrow and River Nore SAC. While it can be objectively demonstrated that the historic landfill and the proposed recommendations will not have any adverse effects, direct or indirect, on the conservation objectives of these designated European sites, such as the Scowland Water Treatment Plant, agricultural practices, industrial practices, residential properties, transport infrastructure and commercial and leisure activities occurring along the River Barrow have the potential to affect the conservation objectives of the River Barrow and River Nore SAC.

The conclusions of this assessment are that the historic landfill site in its current state will not, either alone or in combination with other activities and project, will not have any adverse effects on the River Barrow and River Nore SAC.

6 SCREENING CONCLUSIONS AND STATEMENT

The screening process has examined the information available for the historic landfill site and the findings of the Risk Assessment report for the site and considered the potential for the site to cause impacts on Natura 2000 sites and qualifying features of interest within a 10km radius of the Site located at Greenhills, Athy, Co Kildare.

Taking into consideration the findings of the Risk Assessment, it has been concluded that that the historic landfill is currently not resulting in the direct loss or disturbance of any Annex I habitats or Annex II species for which the SAC is designated. Furthermore, it is considered that the implementation of further monitoring works at the site will also not have any significant impact on the SAC. The proposed monitoring of surface water and groundwater at the site will also provide an early indication to any changes at the site that could potential result in impacts to designated sites.

Taking into account all of the matters discussed, it can be concluded that the historic landfill site or the proposed monitoring works, alone or in-combination with other projects, will not adversely affect the integrity and conservation status of any of the Natura 2000 sites of their qualifying features of interest.

Accordingly, progression to Stage 2 of the Appropriate Assessment process (i.e. preparation of a Natura Impact Statement) is not considered necessary as this stage.

Should the findings of the further monitoring identify any harmful impacts from the Site or the need for the implantation of remediation works be identified, then further consideration to potential impacts on Natura 2000 sites will be required and the AA will require updating to determine potential impacts.

7 REFERENCES

DoEHLG. (2009). *Appropriate Assessment of Plans and Projects in Ireland, Guidance for Planning Authorities.* Department of Environment, Heritage and Local Government .

EPA. (2019). *EPA Map Viewer*. Retrieved from EPA Maps: http://gis.epa.ie/Envision

EPA Catchments. (2019, May). Retrieved from Catchments.ie: https://www.catchments.ie/maps/

European Commission. (2002). *Assessment of plans and projects significantly affecting Natura 2000 sites. Methodological guidance on the provisions of articles 6(3) and (4) of the Habitats Directive 92/43/EEC.* Luxembourg: Office for official publications of the European Communities .

National Biodiveristy Data Centre. (2019, May). *National Biodiveristy Live Maps*. Retrieved from National Biodiveristy Data Centre: http://maps.biodiversityireland.ie/

National Parks and Wildlife Service. (2019, May). *National Parks and Wildlife Service*. Retrieved from National Parks and Wildlife Service: https://www.npws.ie

NPWS. (2011). *River Barrow and River Nore SAC.* National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.