



CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE &
PLANNING

AHASCRA HISTORIC LANDFILL - H0194-01

RESPONSE TO REQUEST FOR INFORMATION

Prepared for: Kerry County Council



Comhairle Contae Chiarraí
Kerry County Council

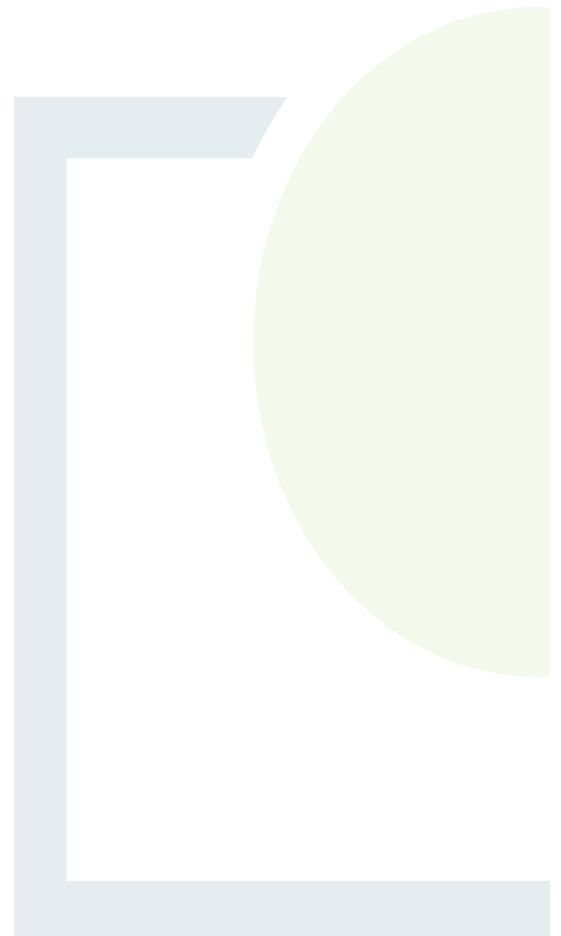
Date: December 2022

J5 Plaza, North Park Business Park,
North Road, Dublin 11, D11 PXT0, Ireland

T: +353 1 658 3500 | E: info@ftco.ie

CORK | DUBLIN | CARLOW

www.fehilytimoney.ie



RESPONSE TO REQUEST FOR INFORMATION

REVISION CONTROL TABLE, CLIENT, KEYWORDS AND ABSTRACT User is responsible for Checking the Revision Status of This Document

Rev. No.	Description of Changes	Prepared by:	Checked by:	Approved by:	Date:
1	Final	BF/AMW	CJC	CJC	22/12/2022

Client: Kerry County Council

Keywords: Regulation 7, historical landfill, environmental risk assessment.

Abstract: Fehily Timoney and Company (FT) on behalf of Kerry County Council (KCC) submitted an application to the Environmental Protection Agency (EPA) for a certificate of authorisation (CoA) for the Ahascra Historic Landfill. The EPA determined the application did not comply with Regulation 7(2) of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations, 2008. The EPA requested that Kerry County Council (KCC), in accordance with Regulation 7(4) supply the information listed in Appendix 1. This report provides responses to the queries raised.

TABLE OF CONTENTS

1. INTRODUCTION	1
1.1 Introduction.....	1
2. REQUEST FOR INFORMATION	2
2.1 Item 1.....	2
2.1.1 Request for Information.....	2
2.1.2 Response	2
2.2 Item 2.....	2
2.2.1 Request for Information.....	2
2.2.2 Response	2
2.3 Item 3.....	2
2.3.1 Request for Information.....	2
2.3.2 Response	2
2.4 Item 4.....	3
2.4.1 Request for Information.....	3
2.4.2 Response.....	3
2.5 Item 5.....	3
2.5.1 Request for Information.....	3
2.5.2 Response	3
2.6 Item 6.....	3
2.6.1 Request for Information.....	3
2.6.2 Response.....	3
2.7 Item 7.....	4
2.7.1 Request for Information.....	4
2.7.2 Response	4
2.8 Item 8.....	4
2.8.1 Request for Information.....	4
2.8.2 Response	4
2.9 Item 9.....	4
2.9.1 Request for Information.....	4
2.9.2 Response	5

2.10	Item 10.....	6
2.10.1	Request for Information.....	6
2.10.2	Response	6
2.11	Item 11.....	7
2.11.1	Request for Information.....	7
2.11.2	Response	7
2.12	Item 12.....	7
2.12.1	Request for Information.....	7
2.12.2	Response	7
2.13	Item 13.....	11
2.13.1	Request for Information.....	11
2.13.2	Response	11
2.14	Item 14.....	13
2.14.1	Request for Information.....	13
2.14.2	Response	14

LIST OF APPENDICES

Appendix 1	Regulation 7 Notice
Appendix 2	A Letter from the Qualified Body to the Qualified Person
Appendix 3	Updated Geophysical Survey Report
Appendix 4	Updated Drawing No. P1766-0101-0003
Appendix 5	Updated Site Walkover Checklist
Appendix 6	Updated Photographic Log
Appendix 7	Geotechnical Report 2022
Appendix 8	Environmental Monitoring Results 2022
Appendix 9	Drawing Requested Under Point 14

LIST OF FIGURES

Page

Figure 2-1: Surface Water Sampling Locations.....	10
---	----

LIST OF TABLES

Table 2-1: Leachate Sampling Results November 2022	5
Table 2-2: Surface Sampling Results November 2022	8
Table 2-3: Groundwater Sampling Results November 2022.....	11



1. INTRODUCTION

1.1 Introduction

Fehily Timoney and Company (FT) on behalf of Kerry County Council (KCC) submitted an application to the Environmental Protection Agency (EPA) for a Certificate of Authorisation (CoA) for the Ahascra Historic Landfill.

The EPA reviewed the CoA application and determined the application did not comply with Regulation 7(2) of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations, 2008. The EPA requested that KCC, in accordance with Regulation 7(4) supply the information listed in Appendix 1.

This report provides responses to the queries raised.



2. REQUEST FOR INFORMATION

This section outlines the 14 no. items (including an updated Non-Technical Summary) requested by the EPA and the responses to respective items.

2.1 Item 1

2.1.1 Request for Information

It is noted that no site boundary is shown for the landfill on the GIS map at <https://gis.epa.ie/EPAMaps/>. Please amend the Section 22 Register to reflect the site boundary for the closed landfill.

2.1.2 Response

KCC has amended the Section 22 Register to reflect the site boundary for the closed landfill.

2.2 Item 2

2.2.1 Request for Information

Provide a letter from the Qualified Body to the Qualified Person, as required under Section 2.3 of the EPA Code of Practice – Environmental Risk Assessment for Unregulated Waste Disposal Sites.

2.2.2 Response

A letter from the Qualified Body (Engineers Ireland) to the Qualified Person (Chris Cronin) confirming the Qualified Person has been assessed as a person who is qualified, trained and experienced to the standard set out in Section 2.3 of Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites (EPA, 2007) is attached in Appendix 2.

2.3 Item 3

2.3.1 Request for Information

The Section 22 Register Number given in Section C.2 of the Application is S22-02664 however, Section 2.0 of the Tier 1 Assessment gives the following number S22-02656. State the correct Section 22 Register Number for the site.

2.3.2 Response

The correct Section 22 Register Number is S22-02664.



2.4 Item 4

2.4.1 Request for Information

The findings of the geophysical survey indicate that industrial waste was deposited in the landfill. State the nature of this waste. Additionally, state whether hazardous waste was deposited within the landfill. Classify any such waste in accordance with the “EPA Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-hazardous”.

2.4.2 Response

Minerex Geophysics Ltd confirmed the waste indicated in the Geophysical Survey Report is best described as commercial and industrial (C&I) type waste i.e. skip waste or similar.

The Geophysical Survey Report has been updated to reflect this, see Appendix 3 of this report.

2.5 Item 5

2.5.1 Request for Information

Section 5.1.1 of the Tier 3 Assessment states that the site is used for cattle grazing. Sections 2.2.1 and 3.1.2 of the Tier 2 Assessment indicate that parts of the site are used as an agricultural storage area and a gravel compound. State whether the site will continue to be used for the same purposes post remediation works.

2.5.2 Response

The site will continue to be used for the same purposes, cattle grazing, agricultural storage, and gravel compound post remediation works.

2.6 Item 6

2.6.1 Request for Information

Re-submit the Drawing No. P1766-0101-0003 of the Tier 3 Assessment to show reference labels for the six boreholes referred to as ‘existing borehole to be retained & sealed for gas monitoring’. Additionally, state what monitoring was carried out at these boreholes and provide the associated monitoring results.

2.6.2 Response

Drawing No. P1766-0101-0003 has been corrected to show the reference labels for the six boreholes (OLD-BH-01 to OLD-BH-06). It has been included for clarity as Appendix 4 of this report.



No level monitoring of leachate or gas quality monitoring has been carried out at existing boreholes OLD-BH-01 to OLD-BH-06 as they are passive gas vents, as described in the Site Walkover Checklist of the Tier 1 (Appendix 1 of the Tier 2 Assessment) and Section 1.1 of the Tier 2 Assessment.

Existing boreholes OLD-BH-01 to OLD-BH-06 will be modified to accommodate gas monitoring as part of the proposed remediation works, as per Drawing No. P1766-0101-0003.

2.7 Item 7

2.7.1 Request for Information

State the full date for the walkover checklist in the Tier 2 Assessment.

2.7.2 Response

The site walkover was undertaken on 14th February 2019, please see Appendix 5 for updated checklist.

2.8 Item 8

2.8.1 Request for Information

It is noted that Photo No. 5 dated 23/10/19 and Photo No. 7 dated 23/10/19 of the Photographic log for the site are different photos but are both annotated 'surface water (SW01) located north-east of old landfill. Ponded water'. Also, Photo No. 6 and Photo 8, dated 23/10/19, are different but both are annotated 'Surface water (SW02) located south-east of old landfill. Ponded water'. Please re-submit the photos with correct annotations.

2.8.2 Response

Photos No. 5 and No. 6 were included by mistake and refer to a different site.

The photographic log has been corrected and included in Appendix 6 of this report.

2.9 Item 9

2.9.1 Request for Information

It is noted that no leachate monitoring was carried out within the waste body. Accordingly, please carry out leachate monitoring using appropriate boreholes within the waste body.



2.9.2 Response

Additional site investigations works were completed on 29th of September 2022 by Causeway Geotechnical Ltd. in support of this RFI response.

The following works were completed:

- Two boreholes by rotary drilling (BH03 and LH01); and
- standpipe installation in two boreholes (BH03 and LH01).

A full copy of the geotechnical report is included in Appendix 7.

One leachate borehole (LH01) was installed within waste body and leachate monitoring was undertaken on 22nd November 2022.

A summary of the results is included in Table 2.1 below. Only parameters that are above the limit of detection were included. Complete results of the leachate monitoring are included in Appendix 8.

Table 2-1: Leachate Sampling Results November 2022

Test	Units	LH01
Carbon		
Organic Carbon, Total	mg/l	65.4
Inorganics		
Ammoniacal Nitrogen as N	mg/l	34.2
Oxygen, dissolved	mg/l	3.85
pH	pH Units	6.76
Chloride	mg/l	53.2
COD, unfiltered	mg/l	489
Conductivity @ 20 deg.C	mS/cm	1.51
BOD, unfiltered	mg/l	21.7
Sulphate (soluble) as S	mg/l	16.5
Filtered (Dissolved) Metals		
Silicon (diss.filt)	mg/l	7.69
Arsenic (diss.filt)	µg/l	0.908
Barium (diss.filt)	µg/l	101
Boron (diss.filt)	µg/l	230
Chromium (diss.filt)	µg/l	1.42
Cobalt (diss.filt)	µg/l	1.6
Copper (diss.filt)	µg/l	0.72



Test	Units	LH01
Manganese (diss.filt)	µg/l	980
Nickel (diss.filt)	µg/l	2.72
Phosphorus (diss.filt)	µg/l	37.7
Titanium (diss.filt)	µg/l	24.2
Uranium (diss.filt)	µg/l	0.524
Zinc (diss.filt)	µg/l	9.29
Sodium (Dis.Filt)	mg/l	29
Magnesium (Dis.Filt)	mg/l	22
Potassium (Dis.Filt)	mg/l	16.7
Calcium (Dis.Filt)	mg/l	259
Iron (Dis.Filt)	mg/l	30.5
Mineral Oil / Oils & Greases		
Mineral oil >C10 C40 (aq)	µg/l	180
Volatile Organic Compounds (VOCs)		
Chlorobenzene	µg/l	3.64
m,p-Xylene	µg/l	1.18
1,2,4-Trimethylbenzene	µg/l	2.39
1,4-Dichlorobenzene	µg/l	1.99
Naphthalene	µg/l	1.74

The leachate monitoring results show elevated concentrations of pollutants commonly encountered within MSW landfill leachate i.e. ammoniacal nitrogen, chloride and COD. The results shown are considered typical of MSW landfill leachate.

2.10 Item 10

2.10.1 Request for Information

State the reason for proposing only one passive gas vent for the site, as indicated in Drawing No. P1766-0101-0003 of the Tier 3 Assessment.

2.10.2 Response

The location for the proposed gas vent is at a high point on the site, where barometric pressures are expected to be low in windy conditions. The gas collection system for the design flows expected from the high pressure (inside cap) to low pressure (outside cap) and does not require additional vent locations.



2.11 Item 11

2.11.1 Request for Information

Section 5.1.9 of the Tier 3 Assessment refers to the 'management of leachate breakouts or condensate' using gravel soakaways or similar approved. Clarify if it is considered that the proposed landfill cap will prevent leachate breakouts or condensate. If not, clarify if a leachate collection system has been considered to manage leachate breakouts or condensate?

2.11.2 Response

FT confirms that no leachate will be discharged to ground using gravel soakaways.

The proposed remediation design as outlined in the Tier 3 report is an engineered cap that comprises 200 mm topsoil, over 800 mm subsoil over a subsurface geocomposite over a LLDPE barrier, over a gas collection geocomposite over waste.

The proposed design solution will prevent rainfall infiltration, decrease leachate generation and subsequent contamination of surface and ground waters.

2.12 Item 12

2.12.1 Request for Information

It is noted that surface water monitoring was carried out on 16th July 2019 and 3rd September 2019 at two locations SW01 and SW02 on the surface water peatland drainage channel located along the eastern site boundary, as shown in Figure 4.2 'Surface Water Sampling Locations' of the Tier 2 Assessment. Considering that groundwater beneath the site flows towards the north/ north-west, and that both monitoring locations are upstream of the waste body, it is noted that surface water monitoring carried out may not reflect the potential impact of the landfill on surface water. Accordingly, please repeat surface water monitoring at the existing locations SW01 and SW02 and at one additional location downstream of the waste body. Include the monitoring locations in the Drawing required under Point 14.

2.12.2 Response

Surface water monitoring was carried out on 22nd November 2022 at SW01, SW02 and SW03, as per Figure 2-1.

A summary of the results from the monitoring event is outlined in Table 2.2, only parameters that were above the limit of detection were included. The laboratory reports are presented in Appendix 8.



Table 2-2: Surface Sampling Results November 2022

Test	Units	AA-EQS Inland surface waters	MAC-EQS Inland surface waters	SW01	SW02	SW03
Carbon						
Organic Carbon, Total	mg/l			46.9	36.3	58.1
Inorganics						
Ammoniacal Nitrogen as N	mg/l	0.065	0.14	<0.2	<0.2	1.33
Oxygen, dissolved	mg/l			9.16	9.48	9.06
pH	pH Units			6.98	5.34	6.68
Chloride	mg/l			43.8	34.6	48.2
COD, unfiltered	mg/l			121	155	164
Conductivity @ 20 deg.C	mS/cm			0.264	0.124	0.309
Suspended solids, Total	mg/l			9.8	<4	4.67
Total Oxidised Nitrogen as N	mg/l			<0.1	<0.1	1.79
Filtered (Dissolved) Metals						
Mercury (diss.filt)	µg/l		0.07	0.0108	0.0185	0.0143
Arsenic (diss.filt)	µg/l	25		0.84	0.598	2.71
Barium (diss.filt)	µg/l			11.5	2.66	9.82
Boron (diss.filt)	µg/l			16.1	<10	27.9
Copper (diss.filt)	µg/l	30		1.05	8.48	1.74
Lead (diss.filt)	µg/l	1.2	14	0.345	2.76	0.396
Manganese (diss.filt)	µg/l			115	50	44.5
Nickel (diss.filt)	µg/l	4	34	1.06	0.835	1.22
Phosphorus (diss.filt)	µg/l			89.5	30.4	95.6
Zinc (diss.filt)	µg/l	100		10.5	67.4	22.5
Sodium (Dis.Filt)	mg/l			17.7	11.2	19.3
Magnesium (Dis.Filt)	mg/l			5	1.96	6.49
Potassium (Dis.Filt)	mg/l			2.81	5.24	3.95
Calcium (Dis.Filt)	mg/l			29.1	5.91	32.1
Iron (Dis.Filt)	mg/l			1.44	1.23	0.835

Notes:

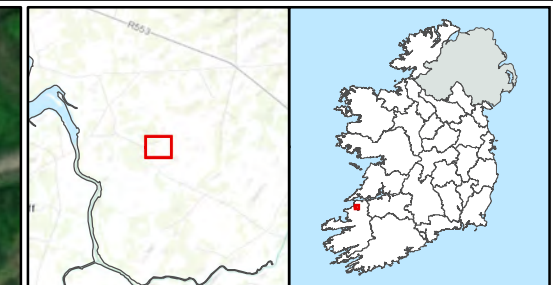
1. Environmental Quality Standard (EQS) as per European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I No. 272 of 2009). Refers to Annual-Average (AA) EQS for relevant parameters.
2. Maximum Admissible Concentration (MAC), as classified by European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I No. 272 of 2009).

* Items shaded in orange are in exceedance of the 2009 AA-EQS Regulations

* Items shaded in blue are in exceedance of the 2009 MAC-EQS Regulations

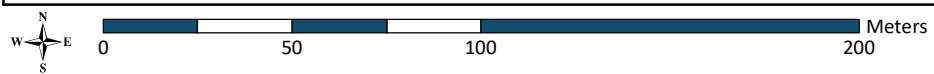


The results of the surface water monitoring for SW1 to SW3 show 2 no. exceedances for the EQS threshold values. SW3 exceeds the threshold value for Ammoniacal Nitrogen, which may be indicative of leachate migration from the landfill to surface water downstream; and SW2 exceeds the threshold value for Lead, which may indicate the presence of a pathway from the landfill to the surface water peatland drainage channel located along the eastern site boundary.



- Site Boundary
- Surface Water Sampling Locations
- Existing Surface Water Drain

TITLE:	
Surface Water Sampling Locations	
PROJECT:	
Ahascra Historic Landfill - Regulation 7 RFI	
FIGURE NO: 2-1	
CLIENT: Kerry County Council	
SCALE: 1:2000	REVISION: 0
DATE: 14/12/2022	PAGE SIZE: A3





2.13 Item 13

2.13.1 Request for Information

It is noted that the most recent groundwater monitoring was carried out on 3rd September 2019 and 16th July 2019 at two monitoring boreholes BH01 and BH02, as shown in Figure 4.1 'Groundwater Flow Direction' of the Tier 2 Assessment. Considering the direction of groundwater flow towards the north/north-west, it is considered that the monitoring location BH01 may not be fully representative of groundwater downgradient of the waste body. Accordingly, please install an additional borehole, BH03, outside the waste body towards the west/north-west and carry out up-to-date groundwater monitoring in BH01, BH02 and BH03. Include the monitoring locations in the Drawing required under Point 14. Additionally, include a log for the new borehole.

2.13.2 Response

Additional site investigations works were completed on 29th of September 2022 by Causeway Geotechnical Ltd. in support of this RFI response.

The following works were completed:

- Two boreholes by rotary drilling (BH03 and LH01); and
- standpipe installation in two boreholes (BH03 and LH01).

A full copy of the geotechnical report is included in Appendix 7.

One groundwater borehole (BH03) was installed downgradient of the waste body and groundwater monitoring was undertaken at BH01, BH02 and BH03 on the 22nd November 2022.

A summary of the results is included in Table 2.3 below. Only parameters that were above the limit of detection are presented. Complete results of the leachate monitoring are included in Appendix 8.

Table 2-3: Groundwater Sampling Results November 2022

Test	Units	OTV	IGV	BH01	BH02	BH03
				DG	UG	DG
Carbon						
Organic Carbon, Total	mg/l			7.24	7.43	5.79
Inorganics						
Ammoniacal Nitrogen as N	mg/l	0.065	0.15	2.03	6.73	1.92
Oxygen, dissolved	mg/l	NAC		9.1	9.96	9.33
pH	pH Units			7.37	7.02	7.4
Chloride	mg/l	30	187.5	35	44.6	36.6
Conductivity @ 20 deg.C	mS/cm		0.8	0.575	0.795	0.612
Alkalinity, Total as CaCO3	mg/l	200		307	480	479



Test	Units	OTV	IGV	BH01	BH02	BH03
				DG	UG	DG
Filtered (Dissolved) Metals						
Arsenic (diss.filt)	µg/l	10	7.5	82.5	20.8	49.5
Barium (diss.filt)	µg/l		100	22.8	63.9	48.4
Boron (diss.filt)	µg/l	1000	750	11.4	22.1	12
Manganese (diss.filt)	µg/l	50		397	1230	832
Nickel (diss.filt)	µg/l	20	15	0.736	0.714	1.09
Phosphorus (diss.filt)	µg/l	30	35	24.4	21.6	12.7
Zinc (diss.filt)	µg/l	100	75	1.74	7.78	<1
Sodium (Dis.Filt)	mg/l	150	150	31.5	36.9	38
Magnesium (Dis.Filt)	mg/l	50		8.19	11.9	9.41
Potassium (Dis.Filt)	mg/l	5		1.25	6.61	1.57
Calcium (Dis.Filt)	mg/l	200		88.8	121	89.6
Iron (Dis.Filt)	mg/l	0.2		5.38	7.07	2.25
Mineral Oil / Oils & Greases						
Mineral oil >C10 C40 (aq)	µg/l		10	<100	<100	932
Microbiological						
Coliforms, Total*	CFU/100ml		0	15.6	45	866
Coliforms, Faecal*	CFU/100ml		0	<1	<1	>100

Notes:

1. OTV-Overall threshold value, European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010) as amended in 2011, 2012, 2016.
2. IGV-Interim Guideline Values, from EPA, Towards Setting Guideline Values for the Protection of Groundwater in Ireland, 2003.
3. UG = upgradient, DG=downgradient.

* Items shaded in orange are in exceedance of the OTV Standards.
 * Items shaded in blue are in exceedance of the EPA IGV Standards.

The results of groundwater monitoring from BH01 (downgradient), BH02 (upgradient) and BH03 (downgradient) report exceedances of the IGVs and European Groundwater (OTV) limit values and are very similar to the 2019 monitoring results for the Tier 2 Assessment.

Samples recovered from monitoring wells BH01 to BH03 reported ammoniacal nitrogen concentrations ranging from 1.92 mg/l to 6.73 mg/l, which exceed guideline threshold values. Results indicate ammonia concentrations upgradient to be greater than downgradient of the landfill. Given the presence of peat soils surrounding the site, ammoniacal N levels are likely going to be naturally high. Despite the presence of peat soils and the lack of background water quality data for the area, the ammoniacal N levels detected at BH01 to BH03 may also be an indication of impact from the landfill.

Chloride levels ranging from 35 mg/l to 44.6 mg/l in BH01 to BH03 exceed the OTV limit value. The concentration differences between the monitoring wells are considered negligible.



Arsenic concentration in upgradient well BH02 is 20.8 mg/l and downgradient ranges from 49.5 mg/l to 82.5 mg/l at BH03 and BH01, respectively. Levels of arsenic detected at both monitoring wells exceed guideline threshold limit values. The notable differences in arsenic concentrations between upgradient well BH02 and downgradient BH01 and BH03 may be an indication of a leachate plume.

Iron and manganese concentrations detected during the monitoring period exceeded the IGV limit. Iron levels ranged from 20.8 mg/l downgradient (BH03) to 82.5 mg/l at BH02 (upgradient). Manganese levels range from 397 mg/l downgradient (BH01) to 1230 mg/l at BH02 (upgradient), confirming the Tier 2 Assessment analysis which relates the notable differences in manganese levels to the local geology, as BH01 has been installed into predominantly overburden peat and clay material, whereas BH02 is installed within mostly limestone bedrock where potential for higher levels of manganese during abstraction will be greater.

Mineral oil concentrations of 932 µg/l were detected at downgradient well BH03 during the July monitoring round and exceeded the IGV threshold of 10 µg/l. Results show mineral oil levels were below the limit of detection (LOD) at BH01 and BH02. Note the LOD is greater than the threshold value for mineral oil.

The results for all other parameters are below the laboratory limit of detection at the 3 no. sampling locations, as were the 2019 results.

The presence of elevated ammonia, chloride, arsenic and mineral oil concentrations are typically present in landfill leachate and suggest that leachate is migrating into the underling and adjacent groundwaters. The levels detected at borehole BH02 indicates the landfill is likely impacting water quality locally at this location.

2.14 Item 14

2.14.1 Request for Information

Provide one Drawing showing all of the following elements interpolated:

- (i) the entire site boundary in red;*
- (ii) the waste body boundary, in a different colour than red;*
- (iii) all leachate, groundwater, gas and surface water monitoring locations;*
- (iv) the following waterbodies:
 - (a) existing perimeter drains and the proposed surface water drainage referred to in Section 5.1.7 of the Tier 3 Assessment;*
 - (b) the man-made peatland drainage channel where the surface water monitoring in 2019 was carried out;*
 - (c) the small low flowing stream located along the north-eastern boundary of the site referred to in the walkover checklist under Point 7; and**



(d) the adjacent river along the western boundary referred to in Section 3.4 of the Tier 3 Assessment.

Note that each land water drain, channel and waterbody should be shown in blue and be annotated. Please also include arrows showing water flow direction in each land drain and waterbody.

2.14.2 Response

See Appendix 9.

The small low flowing stream along the north-eastern boundary of the site in the walkover checklist as mentioned in item (iv)(c) as per Appendix 5 of the Tier 2 Assessment refers to the man-made peatland drainage where surface water monitoring was conducted in 2019, included in the drawing as per item (iv)(b). The reference has been updated in the walkover checklist, Appendix 5 of this report.

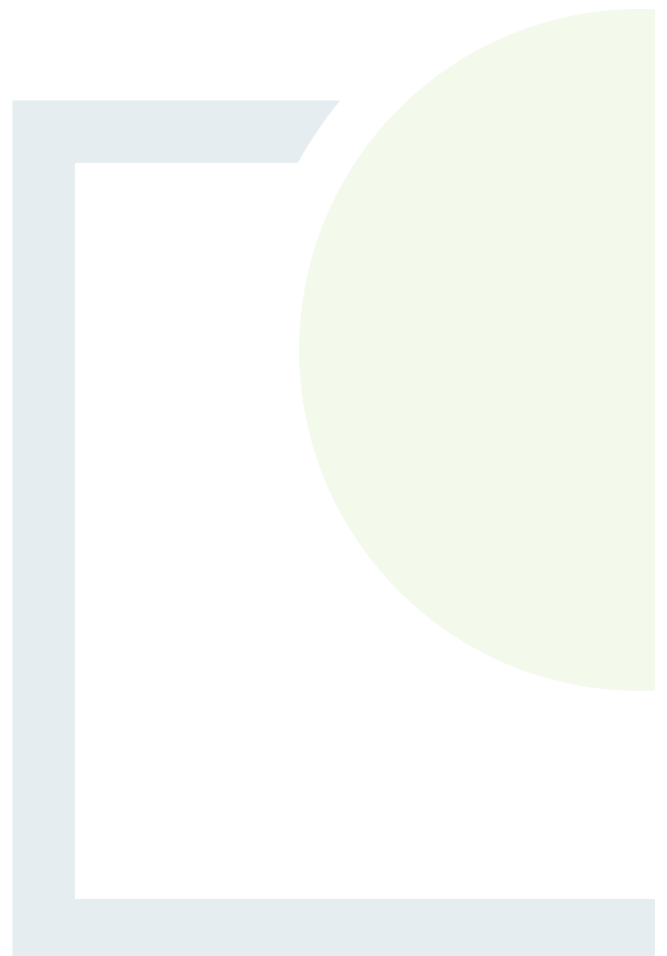
The adjacent river along the western boundary referred to in Section 3.4 of the Tier 3 Assessment is a surface water drain and has been referenced incorrectly in the Tier 3 Assessment.



CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 1

Regulation 7 Notice





Headquarters, PO Box 3000
Johnstown Castle Estate
Co Wexford,
Y35 W821, Ireland

Ceannchethrú, Bosca Poist 3000
Eastát Chaisleán Bhaile Sheáin
Contae Loch Garman,
Y35 W821, Éire

T: +353 53 916 0600
F: +353 53 916 0699
E: info@epa.ie
W www.epa.ie
LoCall: 0818 33 55 99

Reg. No. H0194-01

Re: Ahascra Historic Landfill – Notice in accordance with Regulation 7(4) of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations, 2008

Dear Mr. Lynch,

I am to refer to the above referenced application for a certificate of authorisation in relation to the above referenced historic landfill.

Having examined the foregoing, I am to advise that the Agency is of the view that the application does not comply with Regulation 7(2) of the Waste Management (Certification of Historic Unlicensed Waste Disposal and Recovery Activity) Regulations, 2008.

You are therefore requested in accordance with Regulation 7(4) of the Regulations, to take steps to supply the information detailed below:

REGULATION 7(2) COMPLIANCE REQUIREMENTS

1. It is noted that no site boundary is shown for the landfill on the GIS map at <https://gis.epa.ie/EPAMaps/>. Please amend the Section 22 Register to reflect the site boundary for the closed landfill.
2. Provide a letter from the Qualified Body to the Qualified Person, as required under Section 2.3 of the EPA Code of Practice – Environmental Risk Assessment for Unregulated Waste Disposal Sites.
3. The Section 22 Register Number given in Section C.2 of the Application is S22-02664 however, Section 2.0 of the Tier 1 Assessment gives the following number S22-02656. State the correct Section 22 Register Number for the site.
4. The findings of the geophysical survey indicate that industrial waste was deposited in the landfill. State the nature of this waste. Additionally, state whether hazardous waste was deposited within the landfill. Classify any such waste in accordance with the “*EPA Waste Classification, List of Waste & Determining if Waste is Hazardous or Non-hazardous*”.

5. Section 5.1.1 of the Tier 3 Assessment states that the site is used for cattle grazing. Sections 2.2.1 and 3.1.2 of the Tier 2 Assessment indicate that parts of the site are used as an agricultural storage area and a gravel compound. State whether the site will continue to be used for the same purposes post remediation works.
6. Re-submit the Drawing No. P1766-0101-0003 of the Tier 3 Assessment to show reference labels for the six boreholes referred to as 'existing borehole to be retained & sealed for gas monitoring'. Additionally, state what monitoring was carried out at these boreholes and provide the associated monitoring results.
7. State the full date for the walkover checklist in the Tier 2 Assessment.
8. It is noted that Photo No. 5 dated 23/10/19 and Photo No. 7 dated 23/10/19 of the Photographic log for the site are different photos but are both annotated '*surface water (SW01) located north-east of old landfill. Ponded water*'. Also, Photo No. 6 and Photo 8, dated 23/10/19, are different but both are annotated '*Surface water (SW02) located south-east of old landfill. Ponded water*'. Please re-submit the photos with correct annotations.
9. It is noted that no leachate monitoring was carried out within the waste body. Accordingly, please carry out leachate monitoring using appropriate boreholes within the waste body.
10. State the reason for proposing only one passive gas vent for the site, as indicated in Drawing No. P1766-0101-0003 of the Tier 3 Assessment.
11. Section 5.1.9 of the Tier 3 Assessment refers to the 'management of leachate breakouts or condensate' using gravel soakaways or similar approved. Clarify if it is considered that the proposed landfill cap will prevent leachate breakouts or condensate. If not, clarify if a leachate collection system has been considered to manage leachate breakouts or condensate?
12. It is noted that surface water monitoring was carried out on 16th July 2019 and 3rd September 2019 at two locations SW01 and SW02 on the surface water peatland drainage channel located along the eastern site boundary, as shown in Figure 4.2 'Surface Water Sampling Locations' of the Tier 2 Assessment. Considering that groundwater beneath the site flows towards the north/ north-west, and that both monitoring locations are upstream of the waste body, it is noted that surface water monitoring carried out may not reflect the potential impact of the landfill on surface water. Accordingly, please repeat surface water monitoring at the existing locations SW01 and SW02 and at one additional location downstream of the waste body. Include the monitoring locations in the Drawing required under Point 14.
13. It is noted that the most recent groundwater monitoring was carried out on 3rd September 2019 and 16th July 2019 at two monitoring boreholes BH01 and BH02, as shown in Figure 4.1 'Groundwater Flow Direction' of the Tier 2 Assessment. Considering the direction of groundwater flow towards the north/ north-west, it is considered that the monitoring location BH01 may not be fully representative of groundwater downgradient of the waste body. Accordingly, please install an additional borehole, BH03, outside the waste body towards the west/ north-west and carry out up-to-date groundwater monitoring in BH01, BH02 and BH03. Include the monitoring locations in the Drawing required under Point 14. Additionally, include a log for the new borehole.
14. Provide one Drawing showing all of the following elements interpolated:
 - (i) the entire site boundary in red;
 - (ii) the waste body boundary, in a different colour than red;
 - (iii) all leachate, groundwater, gas and surface water monitoring locations;
 - (iv) the following waterbodies:
 - (a) existing perimeter drains and the proposed surface water drainage referred to in Section 5.1.7 of the Tier 3 Assessment;
 - (b) the man-made peatland drainage channel where the surface water monitoring in 2019 was carried out;

- (c) the small low flowing stream located along the north-eastern boundary of the site referred to in the walkover checklist under Point 7; and
- (d) the adjacent river along the western boundary referred to in Section 3.4 of the Tier 3 Assessment.

Note that each land water drain, channel and waterbody should be shown in blue and be annotated. Please also include arrows showing water flow direction in each land drain and waterbody.

Your reply to this notice should include a **revised Non-technical Summary**, which reflects the information you supply in compliance with the notice, insofar as that information impinges on the non-technical summary.

In the case where any drawings already submitted are subject to revision consequent on this request, a revised drawing should be prepared in each case. It is not sufficient to annotate the original drawing with a textual correction. The revision status, such as revised drawing number and/or revision date should be clearly stated. Also, where such revised drawings are submitted, provide a list of drawing titles, drawing numbers and revision status, which correlates the revised drawings with the superseded versions.

Please supply the requested information within *eight weeks* of the date of this notice. Please note that during COVID-19 there are new arrangements in place for the receipt of all correspondence in relation to applications for Certificates of Authorisation. Accordingly, any correspondence in respect of the above referenced application should be sent to the Agency via file transfer by emailing historiclandfillapplications@epa.ie, quoting the Register Number H0194-01. The EPA doesn't accept files to be transferred using any file share application other than MS One Drive. Each file should be in a searchable .pdf format and a size not exceeding 10MB.

Please also note, post COVID-19, you may be contacted to submit the hard copies and CD-ROMs for the submitted electronic correspondence.

Yours sincerely,



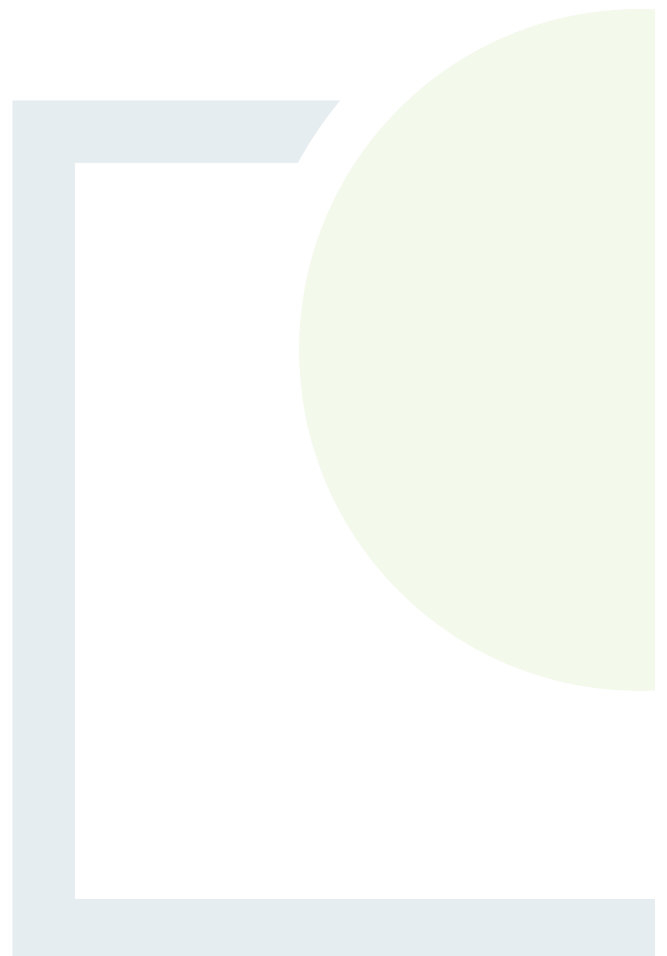
Ewa Babiarczyk
Inspector
Environmental Licensing Programme
Office of Environmental Sustainability



CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 2

A Letter from the Qualified
Body to the Qualified Person



Mr Chris Cronin MIEI
Fehily Timoney and Company
Core House,
Pouladuff Road,
Cork.

20th April 2022

Via Email

Re: Register of Chartered Engineers for Historic Landfill Register accordance with Section 2.3 of Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites (EPA, 2007)

To Whom it May Concern,

This letter confirms that Mr Chris Cronin is a member of Engineers Ireland in good standing – membr number 045403. Engineers Ireland confirms that Mr Chris Cronin has been assessed as a person who is qualified, trained and experienced to the standard set out in Section 2.3 of Code of Practice: Environmental Risk Assessment for Unregulated Waste Disposal Sites (EPA, 2007).



Damien Owens
Registrar,
Engineers Ireland

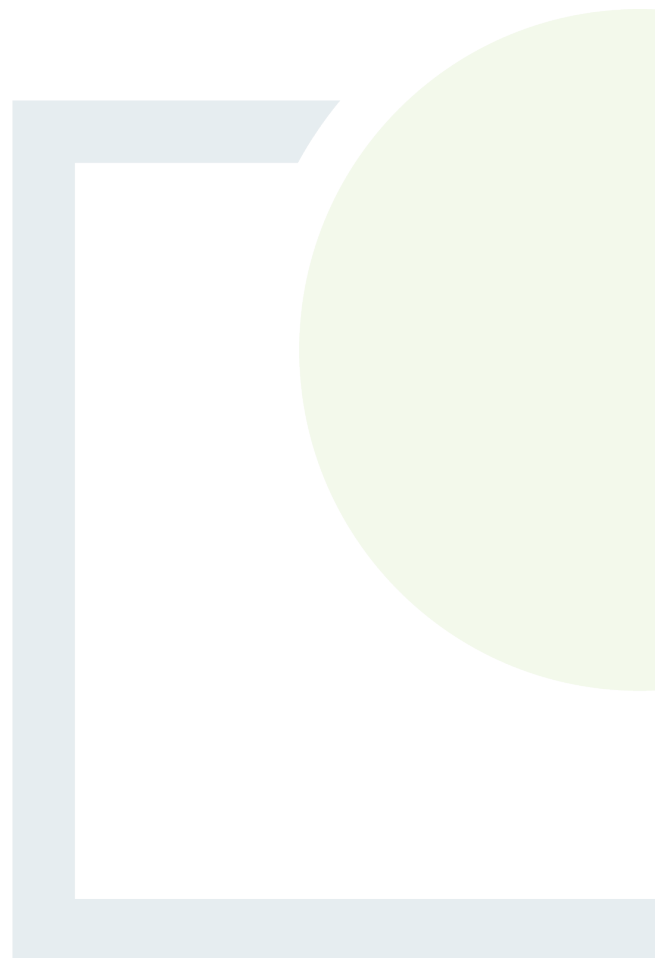
Note: The up-to-date status of registrants is available on the Engineers Ireland website:
<https://www.engineersireland.ie/Registers-and-Panels/10>



CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 3

Updated Geophysical Survey
Report



Ahascra Historic Landfill
Ahascra, Lisselton, Co. Kerry
Geophysical Survey

Report Status: Final

MGX Project Number: 6426

MGX File Ref: 6426f-005.doc

25th October 2022

Confidential Report To:

Fehily Timoney & Co.
Unit 16
North Park Offices
North Road
Dublin 11

Report submitted by :
Minerex Geophysics Limited

Unit F4, Maynooth Business Campus
Maynooth, Co. Kildare
Ireland
Tel.: 01-6510030
Email: info@mgx.ie

Issued by:



Author: John Connaughton (Geophysicist)



Reviewer: Hartmut Krahn (Senior Geophysicist)



Subsurface Geophysical Investigations

EXECUTIVE SUMMARY

1. Minorex Geophysics Ltd. (MGX) carried out a geophysical survey consisting of EM31 ground conductivity, 2D-Resistivity and seismic refraction (p-wave) surveying for the ground investigation of an historic landfill at Ahascra, Lisselton, County Kerry.
2. The main objectives of this survey were to identify the extent and depth of the former landfill site, quantify the volume of the waste, provide information on nature of the waste body, waste type and composition, look for evidence of leachate migration from the site and provide information on the underlying subsoil and bedrock.
3. The online bedrock geological map of Ireland (GSI, 2019) indicates the bedrock is Waulsortian Limestone while the overburden in the area is peat. The 2D-Resistivity indicates that the limestone is at a depth of approx. 12m.
4. The survey indicates that there is waste material under the whole site. The extent of the landfill is estimated at 23000 m².
5. If the waste was initially dumped on the peat at the same elevation as the surrounding topography, this would give an average thickness of 2.75 m for waste material. This would give a volume of 63250 m³.
6. It is difficult to differentiate between waste material and peat, with or without leachate. Assuming the peat below the landfill contains leachate to its full depth this would give a depth for the landfill and basal leachate of 12m, which would give a total volume of 276000 m³ for waste material and overburden with leachate.
7. The low resistivities and seismic velocities measured are consistent with domestic or commercial and industrial (C&I) waste rather than construction and demolition (C&D) type waste.
8. The results of direct ground investigation tie in well with the geophysical interpretation. The five trial pits all encountered waste and made ground.

CONTENTS

1. INTRODUCTION.....	1
1.1 Background.....	1
1.2 Objectives.....	1
1.3 Site Description.....	1
1.4 Geology	2
1.5 Report	2
2. GEOPHYSICAL SURVEY	3
2.1 Methodology	3
2.2 EM31 Ground Conductivity.....	3
2.3 2D-Resistivity	4
2.4 Seismic Refraction	4
2.5 Site Work.....	4
3. RESULTS AND INTERPRETATION	5
3.1 EM31 Ground Conductivity.....	5
3.2 2D-Resistivity	5
3.3 Seismic Refraction	6
3.4 Interpretation of Resistivity and Seismic Refraction.....	7
4. CONCLUSIONS.....	8
5. REFERENCES	9

List of Tables, Maps and Figures:

Title	Pages	Document Reference
Table 1: Geophysical Survey Locations and Acquisition Parameters	In text	In text
Map 1: Geophysical Survey Location Map	1 x A3	6426f_MapsFigs.dwg
Map 2: EM31 Ground Conductivity Contour Map	1 x A3	6426f_MapsFigs.dwg
Figure 1: Models of Geophysical Survey	1 x A3	6426f_MapsFigs.dwg
Figure 2: Interpretation of Geophysical Survey	1 x A3	6426f_MapsFigs.dwg

1. INTRODUCTION

1.1 Background

Minerex Geophysics Ltd. (MGX) carried out a geophysical survey at a historical landfill at Ahascra, Co. Kerry. The survey consisted of EM31 ground conductivity, 2D-Resistivity and seismic refraction (p-wave) measurements. The survey was commissioned by Fehily Timoney & Co.

The survey employed various geophysical methods that complement each other and improve the interpretation. The role of geophysics as a non-destructive fast method is to allow later targeted direct investigations. Those results can be used to improve the initial results and interpretation.

A geophysical survey is a fast and effective way to investigate the waste size, extent and possible leachate from the landfill in a non-invasive manner. The geological background is also investigated as part of the survey.

The geophysical survey is part of the tier 2 assessment of historical landfills. The Tier 1 Assessment (Kerry Co. CO. 2013) has assigned a risk classification of B: Moderate risk. It also notes that in 1986 there was an annual intake of 1,638 tones with 4 years remaining capacity. Waste activities had ceased before the completion of the 1998 Waste Management Plan for Kerry.

1.2 Objectives

The main objectives of the geophysical survey were:

- Identify the extent and depth of the former landfill site
- Quantify the volume of the waste
- Provide information on the depth and extent of the capping layer
- Provide information on nature of the waste body, waste type and composition
- Look for evidence of leachate migration from the site
- Provide information on the underlying subsoil and bedrock

1.3 Site Description

The site is located in the townland of Ahascra, Lisselton. It covers an area of 2.65 Ha consisting of one large grass field with an old compound in the east. The field is dome shaped and is higher than the surrounding landscape. Elevations on the site range generally from 12.2 mOD near the centre to 11 mOD near the edge. Around the edge of the field the elevations drops to 8m in the NW and 10.3 in the SE corner. Assess was from a gravel track in the north and through a gate in the NE corner of the field.

The site is surrounded by boggy agricultural land on all sides, there is a ditch running along the western and southern edge of the site.

1.4 Geology

The following information was obtained from the online bedrock geological map of Ireland (GSI, 2019).

The subsoil is described as cut over raised bog while the bedrock is Waulsortian Limestone which is described as massive unbedded lime-mudstone. This type of rock is karstifiable but there are no karst features noted in the area.

The ground water vulnerability in this area is designated as being moderate.

1.5 Report

This report includes the results and interpretation of the geophysical survey. Maps, figures and tables are included to illustrate the results of the survey. More detailed descriptions of geophysical methods and measurements can be found in GSEG (2002), Milsom (1989) and Reynolds (1997).

The client provided maps of the site and the digital version was used as the background map in this report. Elevations were surveyed on site and are used in the vertical sections.

The interpretative nature and the non-invasive survey methods must be taken into account when considering the results of this survey and Minerex Geophysics Limited, while using appropriate practice to execute, interpret and present the data, give no guarantees in relation to the existing subsurface.

2. GEOPHYSICAL SURVEY

2.1 Methodology

The methodology consisted of an EM31 Ground Conductivity measurements to map the site. 2D-Resistivity Profiling and Seismic Refraction Profiling were carried out perpendicular to each other through the middle of the waste body as identified from the EM31 ground conductivity results and the existing information.

The survey locations are indicated on Map 1. The profiles and their parameters are tabulated in Table 1 below.

All geophysical surveys are acquired, processed and reported in accordance with British Standards BS 5930:1999 +A2:2010 'Code of Practice for Site Investigations'.

Table 1: Geophysical Survey Locations and Acquisition Parameters

Profile Name	Electrode/Geophone Spacing/m	Number of Electrodes/Geophones	Profile Length/m
R1	3	86	255
R2	3	32	93
SUM			297
S1	3	86	255
S2	3	32	93
SUM			297

2.2 EM31 Ground Conductivity

The EM31 ground conductivity survey was carried out over the area indicated in Map 1 on lines nominally 10 m apart. Along each line a reading of ground conductivity was taken every second while walking along, thereby resulting in a survey grid of nominally 10 x 2 m. The locations were measured with a sub-meter accuracy SERES DGPS system attached to the EM31 and all data was jointly stored in a data logger. The conductivity meter was a GEONICS EM31 with Allegro data logger and NAV31 data acquisition software. The instrument was checked at a base station, the readings were stable and no drift occurred.

EM31 ground conductivity determines the bulk conductivity of the subsurface over a typical depth between 0 and 6 m bgl. and over a radius of approx. 5m around the instrument. The measurements are disturbed by metal and other conductive objects within the range of the instrument. Overground metal objects such as fences and metal posts were noted on site to differentiate them from waste metal buried underground during interpretation.

2.3 2D-Resistivity

2D-Resistivity profiles were surveyed with electrode spacing of 3 m, up to 64 electrodes per set-up and a maximum length of 189 m per profile. The readings were taken with a Tigre Resistivity Meter, Imager Cables, stainless steel electrodes, laptop and ImagerPro acquisition software.

During 2D-Resistivity surveying, data is acquired in the form of linear profiles using a suite of metal electrodes. A current is injected into the ground via a pair of electrodes while a potential difference is measured across a second pair of electrodes. This allows for the recording of the apparent resistivity in a two-dimensional arrangement below the profile. The data is inverted after the survey to obtain a model of subsurface resistivities. The generated model resistivity values and their spatial distribution can then be related to typical values for different geological and manmade materials.

The penetration depth of a resistivity profile increases towards the centre where it reaches an approx. value of $1/6^{\text{th}}$ of the layout length.

2.4 Seismic Refraction

Seismic refraction profiles were surveyed with geophone spacing of 3 m and 24 geophones per set-up resulting in a 69 m length per set-up. The recording equipment consisted of a 24 Channel GEOMETRICS ES-3000 engineering seismograph with 4.5 Hz vertical geophones. The seismic energy source consisted of a hammer and plate. A zero delay trigger was used to start the recording. Normally 7 shot points per p-wave profile were used.

In the seismic refraction survey method a p-wave is generated by a source at the surface resulting in energy travelling through surface layers directly and along boundaries between layers of differing seismic wave velocities. Processing of the seismic data allows geological layer thicknesses and boundaries to be established.

Seismic Refraction generally determines the depth to horizontal or near horizontal layers where the compaction/strength/rock quality changes with an accuracy of 10 – 20% of depth to that layer. Where low velocity layers or where layers dip with more than 20 degrees angle the accuracy becomes much less.

2.5 Site Work

The data acquisition was carried on 8th and 29^h of March 2019. The weather conditions were good throughout the acquisition period. Health and safety standards were adhered to at all times. The locations and elevations were surveyed with a TRIMBLE RTK-GPS to accuracy < 0.05 m.

Access was available on the historic landfill site but not in the periphery of the site.

3. RESULTS AND INTERPRETATION

The interpretation of geophysical data was carried out utilising the known response of geophysical measurements, typical physical parameters for subsurface features that may underlay the site, and the experience of the authors. The interpretation is based on all the methods carried out on site.

For this final version of the report the logs for trial pits and boreholes were received. The locations are shown on the maps and the abbreviated logs for trial pits are indicated on the figures.

3.1 EM31 Ground Conductivity

The EM31 ground conductivity values were merged into one data file for the survey area and contoured and gridded with the SURFER contouring package. The contours are created by gridding and interpolation and care must be taken when using the data. The contour map is overlaid over the location and base map (Map 2) and the values in milliSiemens/metre (mS/m) are indicated on the colour scale bar.

Within the top 6 m bgl. the conductivities are characteristic for certain overburden and rock types. If there is a high content of clay minerals (which are electrically conductive) then the overburden conductivity will be higher than as if there is a high content of clastic grains like sand or gravel. The purer the clay and the lower the sand/gravel content the higher the conductivity. The water content in the overburden also influences the conductivity but generally the clay content has a larger effect.

Non-natural material like waste or leachate will generally have a high conductivity or increase the conductivity of the natural geological material. Many waste materials decompose or dissolve in the ground and enrich the ground and water with ions, which increase the conductivity and decrease the resistivity. Waste material from domestic, commercial and industrial sources generally contains more decomposable or dissolvable material than waste from construction or demolition. Therefore domestic or commercial and industrial (C&I) waste will have lower resistivities and higher conductivities than C&D waste.

Conductivities through most of the site are high (>40 mS/m), there is a decrease in conductivity along the edge of the site, particularly along the eastern edge of the site where conductivities drop to 15 mS/m. A number of negative (Blank) readings are also seen throughout the site which indicates the presence of buried metal. The large area of negative readings in the east are due to the old compound which had large metal fences around it. The conductivities indicate waste material located through the entire extent of the site.

3.2 2D-Resistivity

The 2D-Resistivity data was positioned and inverted with the RES2DINV inversion package. Roll-along profiles were concatenated for a joint inversion. The programme uses a smoothness constrained least-squares inversion method to produce a 2D model of the subsurface model resistivities from the recorded apparent resistivity values. Three variations of the least squares method are available and for this project the Jacobian Matrix was recalculated for the first three iterations, then a Quasi-Newton approximation was

used for subsequent iterations. Each dataset was inverted using seven iterations resulting in a typical RMS error of <3.0%. The resulting models were colour contoured with the same resistivity scale for all profiles and they are displayed as cross sections (Figure 1). A vertical exaggeration of 4 is used for the sections.

The resistivities are the inverse value of the conductivities therefore remarks made above for the conductivity are also valid for the resistivity. It has to be considered that the conductivity is determined as a single bulk value for a depth range from 0 - 6 m bgl. while the 2D-Resistivity method determines the values based on depth levels.

Resistivities are characteristic for certain overburden and rock types. If there is a high content of clay minerals (which are electrically conductive) then the overburden resistivity will be lower than as if there is a high content of clastic grains like sand or gravel. The purer the clay and the lower the sand/gravel content the lower the resistivity. The water content in the overburden also influences the resistivities but generally the clay content has a larger effect.

The resistivities on this site shows a rapid change from low resistivities (<125 Ohmm) to high resistivities (>1000 Ohmm) at an elevation of between -2.5 and 1 mOD. The lower resistivities indicate landfill material, leachate and also possibly peat. The higher resistivities below indicate fresh limestone underlying the site. Near the surface the resistivities are higher, particularly near the start of profile R1 which indicates drier landfill material or a thicker layer of topsoil covering the landfill in this area.

3.3 Seismic Refraction

The p-wave seismic velocity is closely linked to the density of subsurface materials and to parameters like compaction, stiffness, strength and rock quality. The higher the density of the subsurface materials the higher the seismic velocity. Similarly for the other parameters it is generally valid that a more compacted, stiffer and stronger material will have a higher seismic velocity. For rock, the seismic velocity is higher when the rock is stronger, less weathered and has a higher quality. If the rock is more weathered, broken, fractured, fissured or karstified then the seismic velocity will be reduced compared to that of intact fresh rock.

Because of the above relationship, the seismic refraction method and seismic velocities are suitable to investigate ground where the layers get denser, more compacted and stronger with depth. A disadvantage is that some materials may have the same seismic velocity, in particular any capping material over the landfill will have a similar seismic velocity range as the landfill material below it.

The seismic refraction data was analysed using the SEISMAGER software package. The data shows very low seismic velocities near the surface but did not identify any higher velocity layers within the parameters of the survey. This is due to the thickness of the waste material or due to the minimal difference in seismic velocities between waste material and peat. Velocities were obtained for the top layer and the average seismic velocities obtained within the layers are annotated on the sections as bold green numbers on Figure 1.

3.4 Interpretation of Resistivity and Seismic Refraction

The seismic refraction and 2D-Resistivity provide information on two physical parameters of the landfill material, however as discussed above the landfill material may share some of these physical parameters with other material.

Interpreted cross sections are shown in Figure 2. The first layer represents waste material with the bottom of this layer being derived from the surrounding natural elevations. This layer is interpreted as waste material. The second layer represents low resistivities below the assumed original ground elevations. This layer is likely peat with leachate however it is possible some or all of the peat was removed before the landfill was opened. This layer would then be comprised of waste material as well. The higher resistivities within layer 3 are interpreted as fresh limestone. There does not appear to be any leachate within this layer.

4. CONCLUSIONS

The following conclusions are made:

Geological Background

The online bedrock geological map of Ireland (GSI, 2019) indicates the overburden in this area is cut raised peat while the bedrock is Waulsortian Limestone. The 2D-Resistivity indicates the limestone is at a depth of ~12m bgl.

Boreholes and Trial Pits

The results of direct ground investigation tie in well with the geophysical interpretation. The five trial pits all encountered waste and made ground.

Lateral extent of waste and landfill boundary

The EM31 ground conductivity indicates the landfill material extends throughout the survey area to where the ground slopes off towards the natural ground around it. There appears to be an area towards the middle of the site near the road where there was an old compound where there is less or no waste material. The total area covered by the waste body is approx. 23000 m².

Vertical extent (depth) of waste and basal leachate

The thickness/depth has been estimated from the seismic refraction and 2D-Resistivity data and historical maps. A thickness of 2.75 m for the landfill has been taken using the surrounding natural topography. Using the low resistivities, an average thickness of 12m has been calculated for a combined layer representing landfill material and leachate in peat.

Volume of waste and basal leachate

Considering the areas and average thickness above, the volume of waste material (Layer 1) has been calculated as 63250 m³. The volume of the total waste and basal leachate is estimated at 276000 m³.

Nature of waste

Low resistivities and seismic velocities measured are consistent with domestic or commercial and industrial (C&I) waste rather than construction and demolition (C&D) type waste.

Capping layer

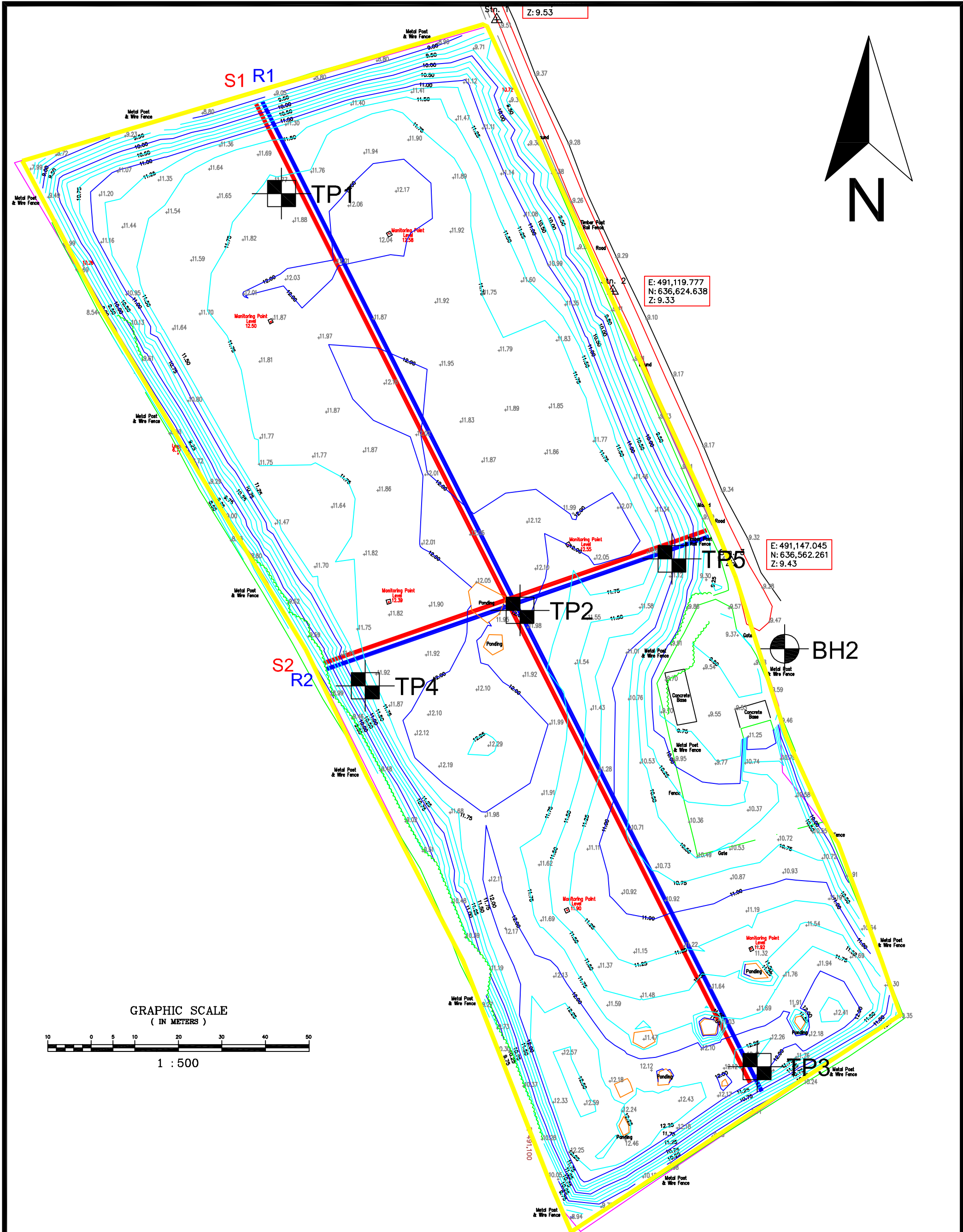
There is no engineered capping layer over the landfill but higher resistivities near the surface along some of the site such as near the start of profile R1 may indicate a thicker capping layer in this area.

Leachate

There is likely significant leachate movement below the landfill. This movement does not appear to penetrate into the bedrock below.

5. REFERENCES

1. **GSEG 2002.** Geophysics in Engineering Investigations. Geological Society Engineering Geology Special Publication 19, London, 2002.
2. **GSI, 2019.** Online Geological Map of Ireland. Geological Survey of Ireland 2019.
3. **Milsom, 1989.** Field Geophysics. John Wiley and Sons.
4. **Reynolds, 1997.** An Introduction to Applied and Environmental Geophysics. John Wiley and Son.
5. **Kerry Co. Co 2013.** Tier 1 Review Report – Ahascra, Lisselton S22 - 02664



Minerex
Geophysics Limited

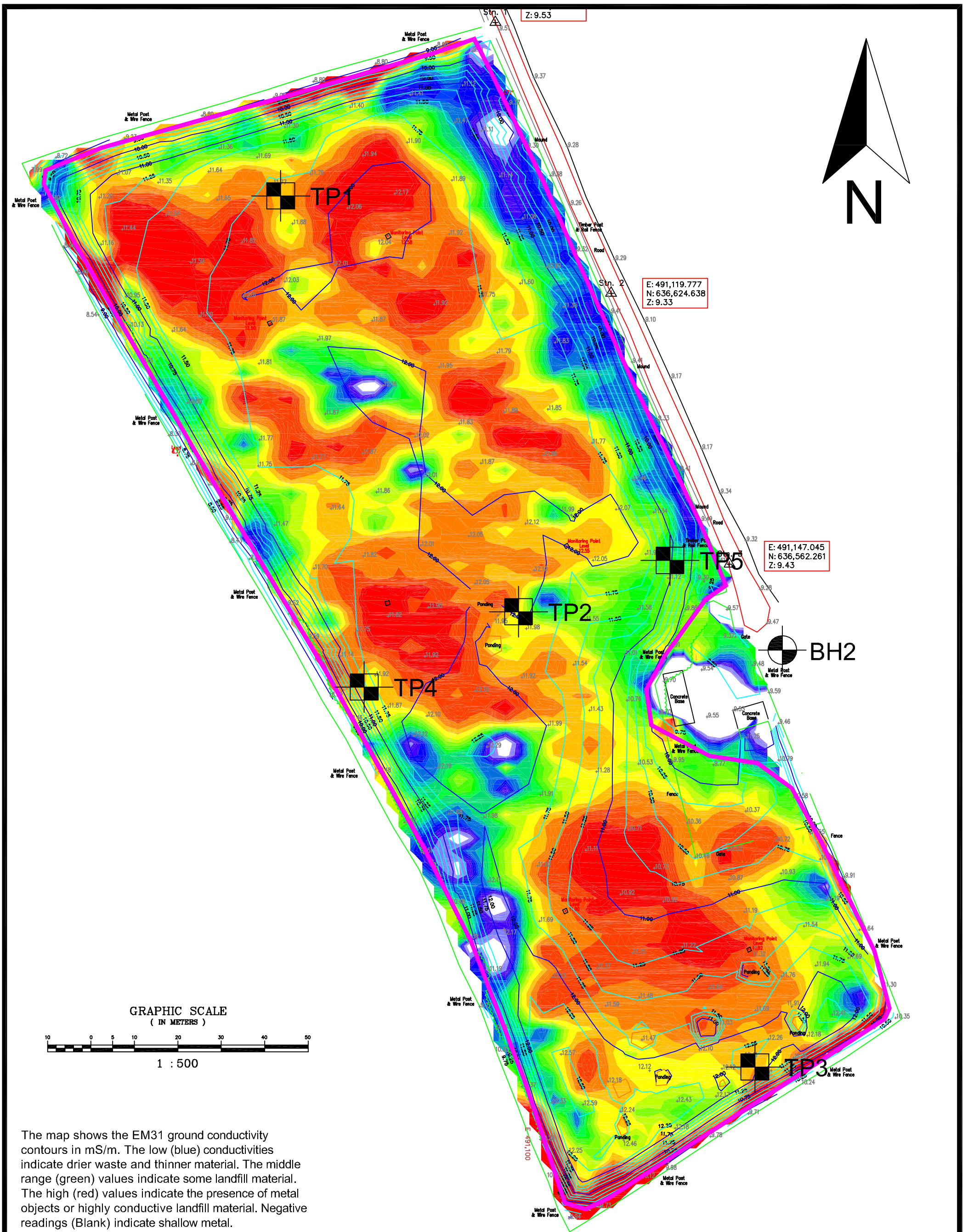
Unit F4, Maynooth Business Campus
Maynooth, Co. Kildare
Tel. (01) 6510030
Fax. (01) 6510033
Email: info@mgx.ic
Web: www.mgx.ic

CLIENT	Fehily Timoney & Co. Kerry Co. Co.
PROJECT	Ahascra Historical Landfill Geophysical Survey
TITLE	Map 1: Geophysical Survey Location Map

SCALE:	1:800 @ A3
PROJECT:	6426
DRAWN:	JC
DATE:	17/11/2019
MGX FILE:	6426f_MapsFigs.dwg
STATUS:	Final

LEGEND: Geophysical Survey Locations:

	R2	2D-Resistivity Profile
	S1	Seismic Refraction Profile
		EM31 Survey Area
	BH1	Borehole
	TP1	Trial Pit



The map shows the EM31 ground conductivity contours in mS/m. The low (blue) conductivities indicate drier waste and thinner material. The middle range (green) values indicate some landfill material. The high (red) values indicate the presence of metal objects or highly conductive landfill material. Negative readings (Blank) indicate shallow metal.

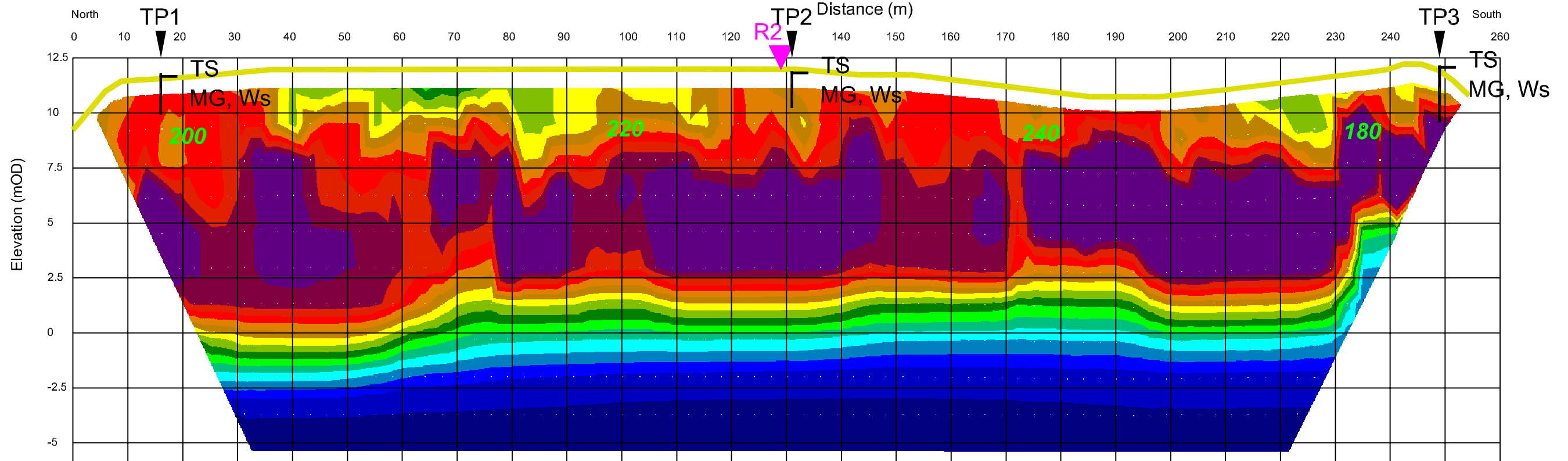
Minerex
Geophysics Limited
Unit F4, Maynooth Business Campus
Maynooth, Co. Kildare
Tel. (01) 6510030
Fax. (01) 6510033
Email: info@mgx.ic
Web: www.mgx.ic

CLIENT Fehily Timoney & Co.
Kerry Co. Co.
PROJECT Ahasra Historical Landfill
Geophysical Survey
TITLE Map 2: EM31 Ground Conductivity
Contour Map

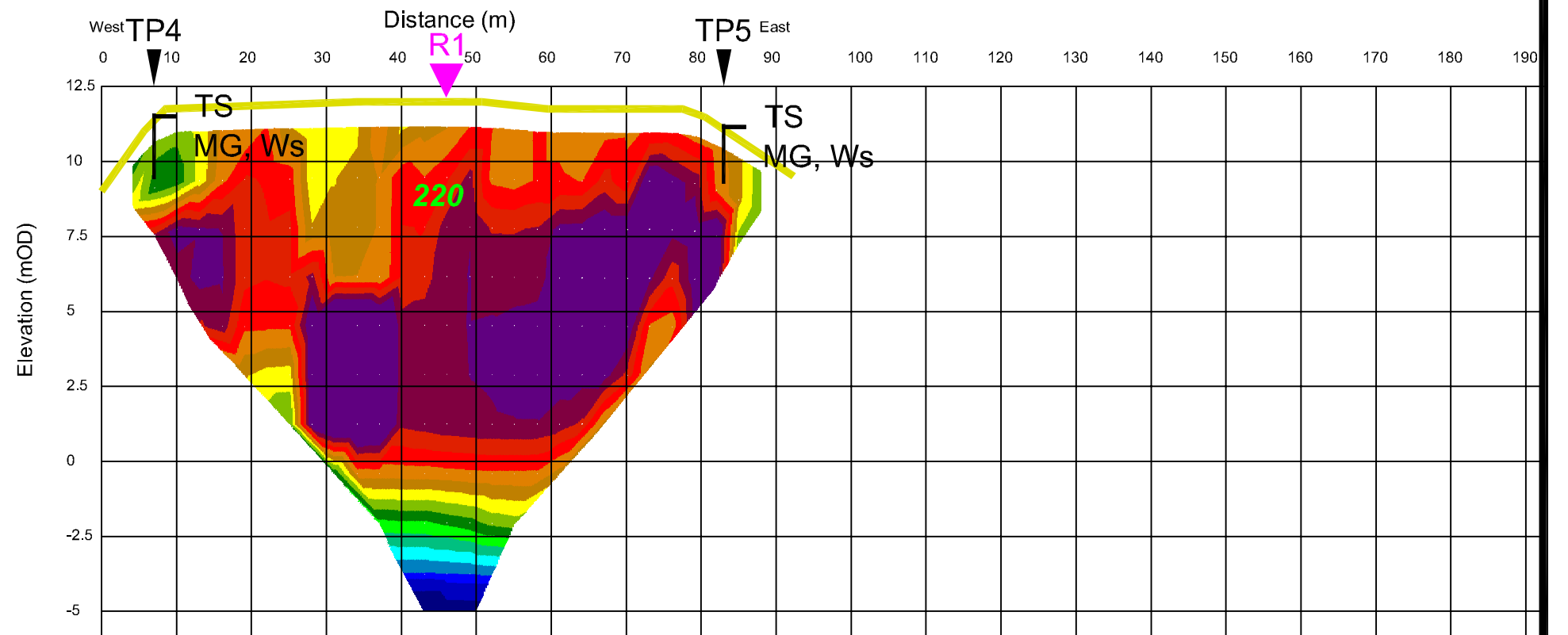
SCALE: 1:800 @ A3
PROJECT: 6426
DRAWN: JC
DATE: 17/11/2019
MGX FILE: 6426f_MapsFigs.dwg
STATUS: Final

LEGEND:
Interpreted Outline of Landfill
EM31 Ground Conductivity Scale in mS/m:
0 10 20 30 40 50 60 70 80 90 100

2D-Resistivity Profile R1 and Seismic Refraction Profile S1 Model



2D-Resistivity Profile R2 and Seismic Refraction Profile S2 Model



Minerex
Geophysics Limited
Unit F4, Maynooth Business Campus
Maynooth, Co. Kildare
Tel. (01) 6510030
Fax. (01) 6510033
Email: info@mgx.ie
Web: www.mgx.ie

CLIENT Fehily Timoney & Co.
Kerry Co. Co.
PROJECT Ahasra Historical Landfill
Geophysical Survey
TITLE Figure 1: Models of
Geophysical Survey

SCALE: 1:800 @ A3, VE x 4
PROJECT: 6425
DRAWN: JC
DATE: 17/11/2019
MGX FILE: 6425f_MapsFigs.dwg
STATUS: Final

LEGEND:

2D-Resistivity Model Values:

Resistivities (Ohmm) for 2D-Resistivity Model

15.6 31.2 62.5 125 250 500 1000 2000

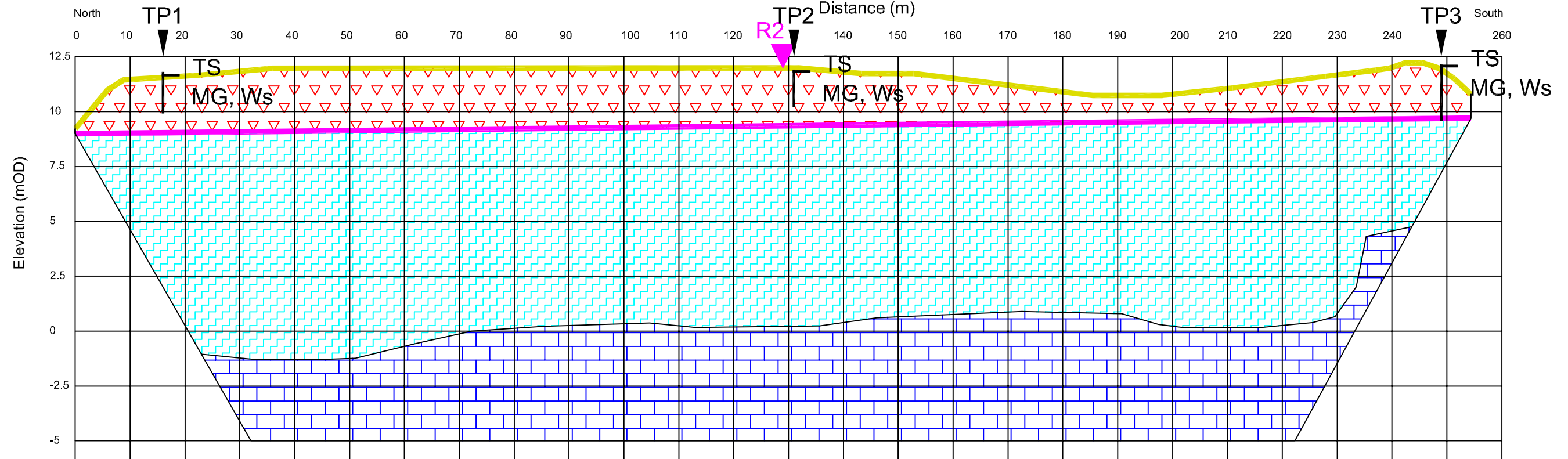
Seismic Velocities below the Surface:

220 Seismic Velocity in m/s (Direct Wave)

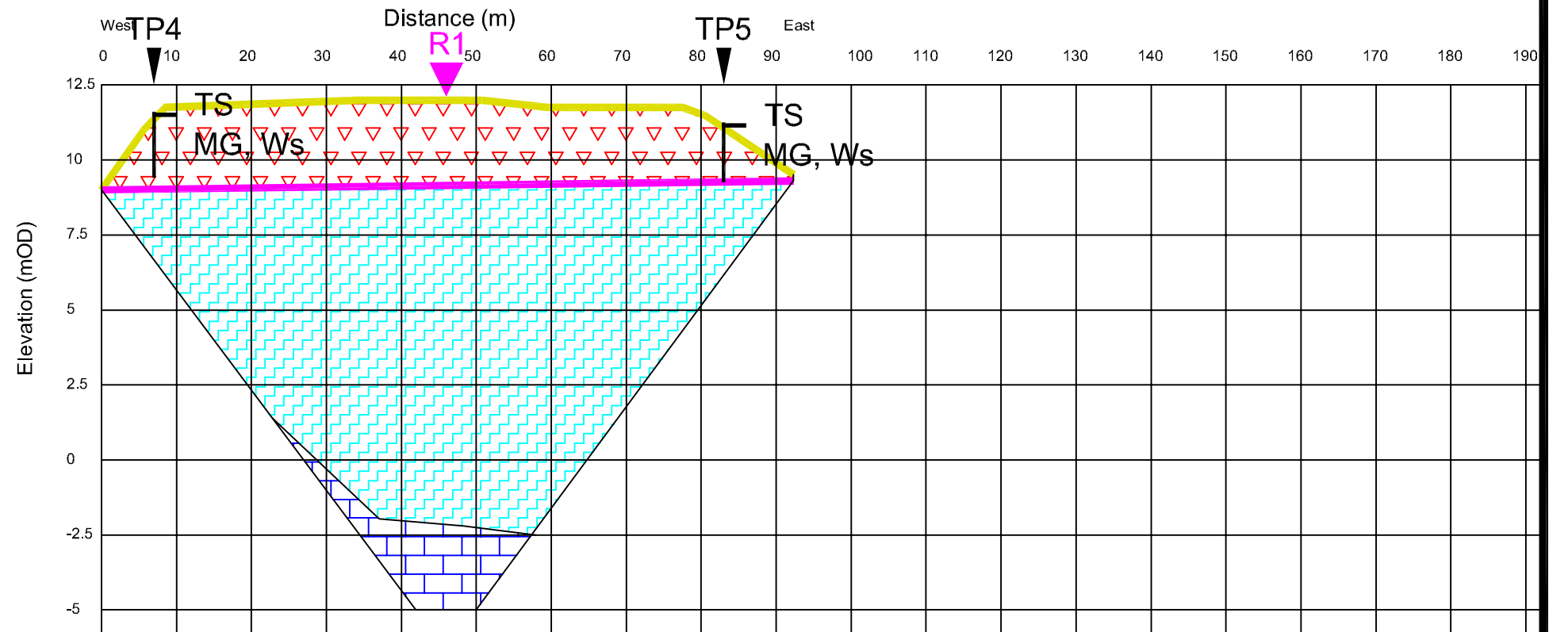
Abbreviated GI Logs:

TS Topsoil
Ws Waste Material
Mg Made Ground

2D-Resistivity Profile R1 and Seismic Refraction Profile S1 Interpretation



2D-Resistivity Profile R2 and Seismic Refraction Profile S2 Interpretation



Minerex
Geophysics Limited
Unit F4, Maynooth Business Campus
Maynooth, Co. Kildare
Tel. (01) 6510030
Fax. (01) 6510033
Email: info@mgx.ie
Web: www.mgx.ie

CLIENT Fehily Timoney & Co.
Kerry Co. Co.
PROJECT Ahasra Historical Landfill
Geophysical Survey
TITLE Figure 2: 1 nterpretation of
Geophysical Survey

SCALE: 1:800 @ A3, VE x 4
PROJECT: 6425
DRAWN: JC
DATE: 17/11/2019
MGX FILE: 6425f_MapsFigs.dwg
STATUS: Final

LEGEND:
Interpretation:
1 Waste Material
2 Waste Material or Peat with Leachate
3 Fresh Limestone

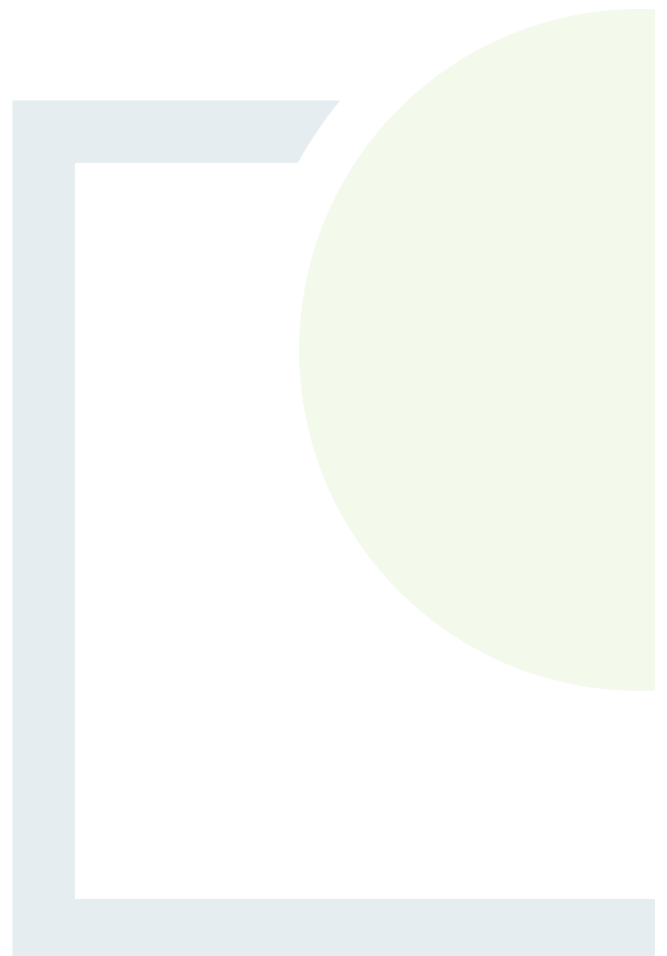
Abbreviated GI Logs:
TS Topsoil
Ws Waste Material
Mg Made Ground



CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 4

Updated Drawing No. P1766-
0101-0003

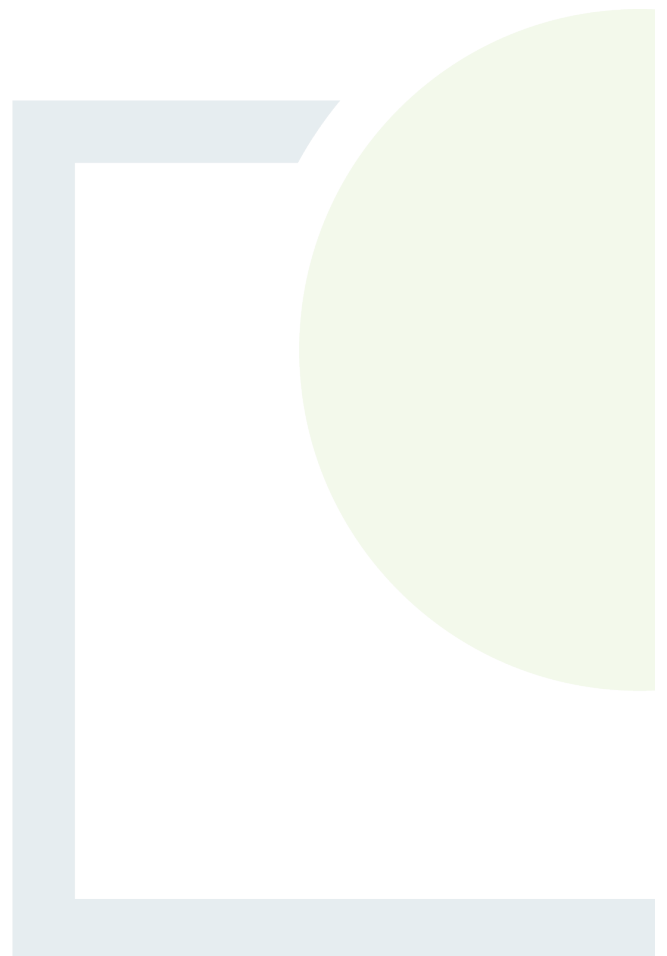




CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

APPENDIX 5

Updated Site Walkover
Checklist



Walkover Survey Checklist

Historic Kerry Landfills - Ahascra

Walkover Survey Checklist - 14 th February 2019		
Information	Checked	Comment (include distances from Site Boundary)
1. What is the current land use?	✓	Agricultural land
2. What are the neighbouring land uses?	✓	Agricultural land and bog land. Residential dwellings 50m west of site
3. What is the size of the site?	✓	Circa 2.65 ha
4. What is the topography?	✓	Site is generally flat, slight slope
5. Are there potential receptors (if yes, give details)?	✓	Nearby residences, groundwater
Houses		
Surface water features (if yes, distance and direction of flow)?	✓	Small watercourse with very low flow rate located to the north-eastern of site.
Any wetland or protected areas?	✓	Bog located directly east of site boundary
Public water supplies?	✓	Not identified
Private wells?	✓	Possible local usage
Services?	✓	None
Other buildings?	✓	None on-site
Other?		No
6. Are there any potential sources of contamination (if yes, give details)?	✓	Buried waste
Surface waste (if yes, what type)?	✓	None noted
Surface ponding of leachate	✓	None present
Leachate seepage	✓	None noted
Landfill gas odours	✓	None noted
7. Are there any outfalls to surface water? (If yes, are there discharges and what is the nature of the discharge?)	✓	No evidence
8. Are there any signs of impact on the environment? (if yes, take photographic evidence)	✓	None noted.
Vegetation die off, bare ground	✓	None noted
Leachate seepages	✓	None noted
Odours	✓	None Noted
Litter	✓	None
Gas bubbling through water	✓	None noted
Signs of settlement	✓	No
Subsidence, water logged areas	✓	No evidence

Walkover Survey Checklist

Historic Kerry Landfills - Ahascra

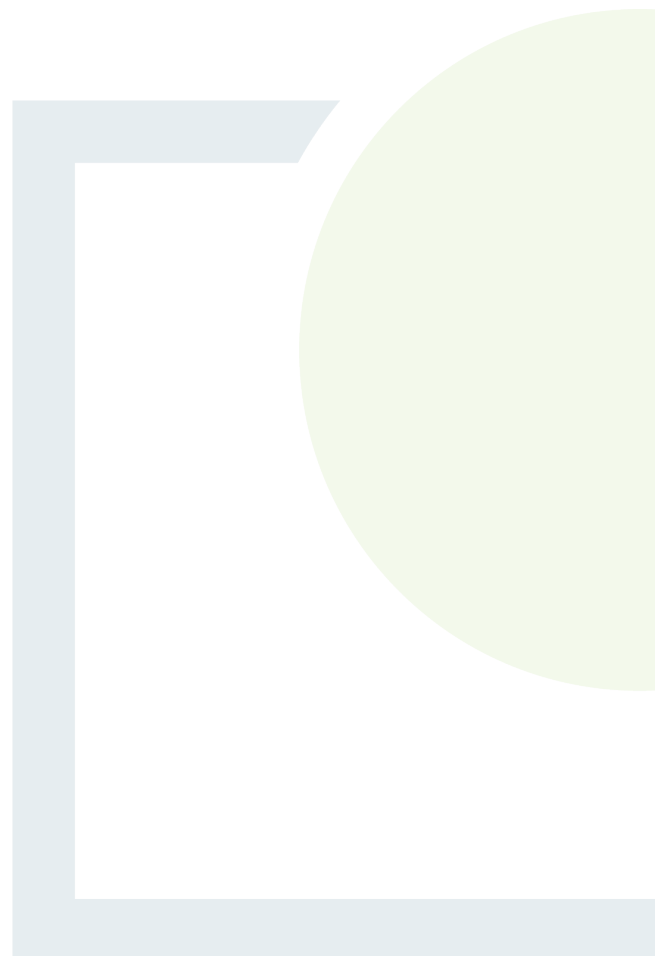
Walkover Survey Checklist		
Information	Checked	Comment (include distances from Site Boundary)
Drainage or hydraulic issues	✓	None noted
Downstream water quality appears poorer than upstream water quality	✓	No
9. Are there any indications of remedial measures? (Provide details)	✓	No
Capping	✓	No waste evident
Landfill gas collection	✓	No
Leachate collection	✓	No
10. Describe fences and security features (if any)	✓	Site is fenced with wooden posts and wire and access is through metal farm gates
Any other relevant information?		



CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

Appendix 6

Updated Photographic Log



PHOTOGRAPHIC LOG



Client Name: Kerry County Council

Site Location: Ahascra

Project Number: P1766

Photo No.

Date:

1

14/02/19

Description:

Main site entrance along south-eastern side of landfill.



Photo No.

Date:

2

14/02/19

Description:

View showing raised mounded profile of the landfill.



PHOTOGRAPHIC LOG



Client Name: Kerry County Council

Site Location: Ahascra

Project Number: P1766

Photo No.

Date:

3

23/10/19

Description:

Several deep depressions with surface water pools were identified across the landfill cap.



Photo No.

Date:

4

23/10/19

Description:

Possible leachate seepage identified within perimeter drain along western side of landfill.



PHOTOGRAPHIC LOG



Client Name: Kerry County Council

Site Location: Ahascra

Project Number: P1766

Photo No.

Date:

5

23/10/19

Description:

Surface water (SW01) located north-east of old landfill. Ponded water.



Photo No.

Date:

6

23/10/19

Description:

Surface water (SW02) located south-east of old landfill. Ponded water.

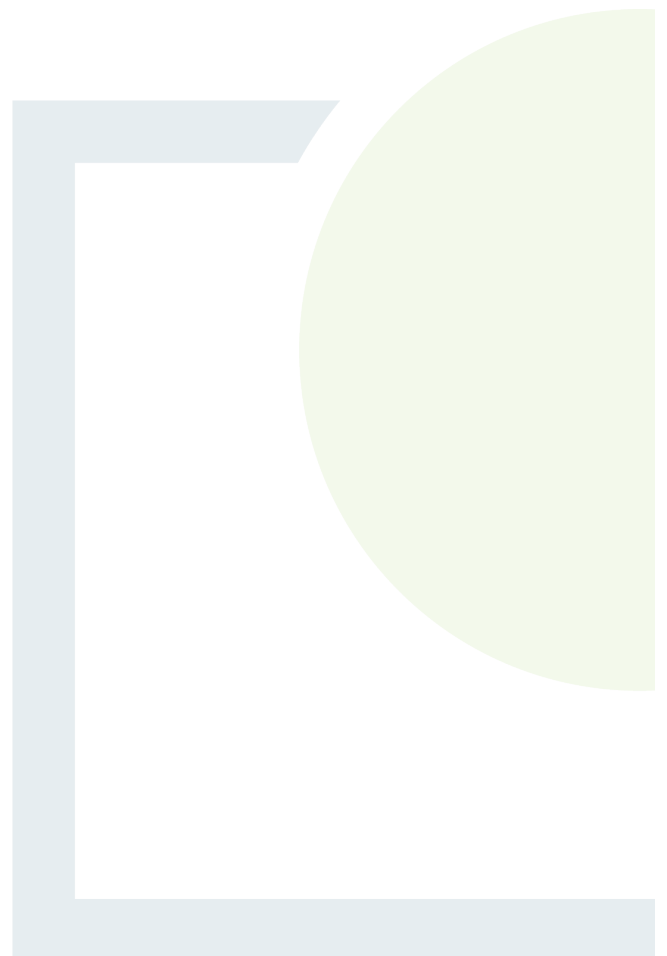




CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

Appendix 7

Geotechnical Report 2022





CAUSEWAY
— GEOTECH

Ahascra Historic Landfill – Ground Investigation

Client: Kerry County Council

Client's Representative: Fehily Timoney and Company

Report No.: 22-0540

Date: October 2022

Status: Final for Issue



CONTENTS

Document Control Sheet




Note on: Methods of describing soils and rocks & abbreviations used on exploratory hole logs

1	AUTHORITY	4
2	SCOPE	4
3	DESCRIPTION OF SITE	4
4	SITE OPERATIONS.....	5
	4.1 Summary of site works.....	5
	4.2 Boreholes.....	5
	4.3 Standpipe installations.....	5
	4.4 Surveying.....	5
	4.5 Groundwater monitoring	6
5	GROUND CONDITIONS	6
	5.1 General geology of the area	6
	5.2 Ground types encountered during investigation of the site	6
	5.3 Groundwater.....	6
6	REFERENCES	7

APPENDICES

Appendix A	Site and exploratory hole location plans
Appendix B	Borehole logs

Document Control Sheet

Report No.:		22-0540			
Project Title:		Ahascra Historic Landfill			
Client:		Kerry County Council			
Client's Representative:		Fehily Timoney and Company			
Revision:	A00	Status:	Final for Issue	Issue Date:	18 th October 2022
Prepared by:		Reviewed by:		Approved by:	
 Rachel White B.A. (Mod.) Geoscience		 Sean Ross BSc MSc MIEI PGeo		 Darren O'Mahony BSc MSc MIEI EurGeol PGeo	

The works were conducted in accordance with:

British Standards Institute (2015) BS 5930:2015+A1:2020, Code of practice for ground investigations.

BS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing.

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland

METHODS OF DESCRIBING SOILS AND ROCKS

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

Abbreviations used on exploratory hole logs	
U	Nominal 100mm diameter undisturbed open tube sample (thick walled sampler).
UT	Nominal 100mm diameter undisturbed open tube sample (thin walled sampler).
P	Nominal 100mm diameter undisturbed piston sample.
B	Bulk disturbed sample.
LB	Large bulk disturbed sample.
D	Small disturbed sample.
C	Core sub-sample (displayed in the Field Records column on the logs).
L	Liner sample from dynamic sampled borehole.
W	Water sample.
ES / EW	Soil sample for environmental testing / Water sample for environmental testing.
SPT (s)	Standard penetration test using a split spoon sampler (small disturbed sample obtained).
SPT (c)	Standard penetration test using 60 degree solid cone.
(x,x/x,x,x,x)	Blows per increment during the standard penetration test. The initial two values relate to the seating drive (150mm) and the remaining four to the 75mm increments of the test length.
(Y for Z/ Y for Z)	Incomplete standard penetration test where the full test length was not achieved. The blows 'X' represent the total blows for the given seating or test length 'Z' (mm).
N=X	SPT blow count 'N' given by the summation of the blows 'X' required to drive the full test length (300mm).
HVP / HVR	In situ hand vane test result (HVP) and vane test residual result (HVR). Results presented in kPa.
V VR	Shear vane test (borehole). Shear strength stated in kPa. V: undisturbed vane shear strength VR: remoulded vane shear strength
Soil consistency description	In cohesive soils, where samples are disturbed and there are no suitable laboratory tests, N values may be used to indicate consistency on borehole logs – a median relationship of $N \times 5 = C_u$ is used (as set out in Stroud & Butler 1975).
dd-mm-yyyy	Date at the end and start of shifts, shown at the relevant borehole depth. Corresponding casing and water depths shown in the adjacent columns.
▽	Water strike: initial depth of strike.
▼	Water strike: depth water rose to.
Abbreviations relating to rock core – reference Clause 36.4.4 of BS 5930: 2015+A1:2020	
TCR (%)	Total Core Recovery: Ratio of rock/soil core recovered (both solid and non-intact) to the total length of core run.
SCR (%)	Solid Core Recovery: Ratio of solid core to the total length of core run. Solid core has a full diameter, uninterrupted by natural discontinuities, but not necessarily a full circumference and is measured along the core axis between natural fractures.
RQD (%)	Rock Quality Designation: Ratio of total length of solid core pieces greater than 100mm to the total length of core run.
FI	Fracture Index: Number of natural discontinuities per metre over an indicated length of core of similar intensity of fracturing.
NI	Non Intact: Used where the rock material was recovered fragmented, for example as fine to coarse gravel size particles.
AZCL	Assessed zone of core loss: The estimated depth range where core was not recovered.
DIF	Drilling induced fracture: A fracture of non-geological origin brought about by the rock coring.
(xxx/xxx/xxx)	Spacing between discontinuities (minimum/average/maximum) measured in millimetres.

Ahascra Historic Landfill

1 AUTHORITY

On the instructions of Fehily Timoney and Company, (“the Client’s Representative”), acting on the behalf of Kerry County Council (“the Client”), a ground investigation was undertaken at the above location to investigate the current state of the existing landfill.

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

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

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

2 SCOPE

The extent of the investigation, as instructed by the Client’s Representative, included boreholes, groundwater monitoring and the preparation of a factual report on the findings.

3 DESCRIPTION OF SITE

As shown on the site location plan in Appendix A, the works were conducted on the site of Ahascra Historical Landfill, located in Ahascra, Bishopscourt, County Kerry. The site is bordered by Kiltan Bog to the east and agricultural land to the north, south and west.

Elevations vary across the site, with a rise in elevation to the south.

4 SITE OPERATIONS

4.1 Summary of site works

Site operations, which were conducted on the 29th of September 2022, comprised:

- two boreholes by rotary drilling; and
- a standpipe installation in two boreholes

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

4.2 Boreholes

Two boreholes (BH03 and LH01) were put to their completion by rotary drilling techniques only. The boreholes were completed using a Beretta T44 drilling rig.

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

Appendix B presents the borehole logs.

4.3 Standpipe installations

A groundwater monitoring standpipe was installed in both boreholes.

Details of the installations, including the depth range of the response zone, are provided in Appendix B on the individual borehole logs.

Wattera tubing was installed in both boreholes to allow for future groundwater and leachate sampling.

4.4 Surveying

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

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

4.5 Groundwater monitoring

Following completion of site works, groundwater and ground gas monitoring was conducted over two rounds. Ground water monitoring was carried out using a water interface probe.

Details of groundwater monitoring are presented Section 6.3.

5 GROUND CONDITIONS

5.1 General geology of the area

Published geological mapping indicate the superficial deposits underlying the site comprise cut over raised peat. These deposits are underlain by massive, unbedded limestones of the Waulsortian Limestones Formation.

5.2 Ground types encountered during investigation of the site

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

- **Topsoil:** encountered typically in 100mm thickness across the site.
- **Made Ground (landfill):** Landfill was encountered in LH01 extending to a depth of 4.00m.
- **Recent deposits (peat):** peat was encountered in BH03 to a depth of 2.20m.
- **Glacial Till:** sandy gravelly clay, encountered in BH03.
- **Bedrock (Limestone):** Rockhead was encountered at a depth of 4.00m in BH03 comprising grey limestone.

5.3 Groundwater

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

Groundwater strikes were encountered during rotary drilling at depths seen in Table 1 below.

Table 1. Groundwater strikes encountered during the ground investigations.

Location	Depth (mbgl)
BH03	4.00
LH01	2.60

It should be noted that the casing used in supporting the borehole walls during drilling may have sealed out additional groundwater strikes and the possibility of encountering groundwater at other depths during excavation works should not be ruled out.

It should be noted that any groundwater strikes within bedrock may have been masked by the fluid used as the drilling flush medium.

Subsequent groundwater monitoring of the standpipe installations recorded water levels as shown in Table 2.

Table 2. Groundwater monitoring.

Date	Water level (mbgl)	
	BH03	LH01
10/10/2022	0.75	3.80
17/10/2022	0.40	3.90

Continued monitoring of the two installed standpipes will give an indication of the seasonal variation in groundwater level.

6 REFERENCES

Geotechnical Society of Ireland (2016), Specification & Related Documents for Ground Investigation in Ireland.

IS EN 1997-2: 2007: Eurocode 7 - Geotechnical design - Part 2 Ground investigation and testing. National Standards Authority of Ireland.

BS 5930: 2015+A1:2020: Code of practice for ground investigations. British Standards Institution.

BS EN ISO 14688-1:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 1 Identification and description.

BS EN ISO 14688-2:2018: Geotechnical investigation and testing. Identification and classification of soil. Part 2 Principles for a classification.

BS 1377: 1990: Methods of test for soils for civil engineering purposes. British Standards Institution.

BS EN ISO 14689-1:2018: Geotechnical investigation and testing. Identification and classification of rock. Identification and description



CAUSEWAY
— GEOTECH

APPENDIX A
SITE AND EXPLORATORY HOLE LOCATION PLANS





Project No.: 22-0540

Client: Kerry County Council

Project Name: Ahascra Historic Landfill

Client's Representative: Fehily Timoney and Company

Legend Key



Title:
Site Location Plan

Last Revised:
17/10/2022

Scale:
1:10000



Project No.: 22-0540

Client: Kerry County Council

Project Name: Ahascra Historic Landfill

Client's Representative: Fehily Timoney and Company

Legend Key

○ Locations By Type - RO



Title:
Exploratory Hole Plan

Last Revised:
18/10/2022

Scale:
1:1500



Microsoft product screen shot(s) reprinted with permission from Microsoft Corporation

70 Metres
200 Feet



CAUSEWAY
— GEOTECH

APPENDIX B
BOREHOLE LOGS



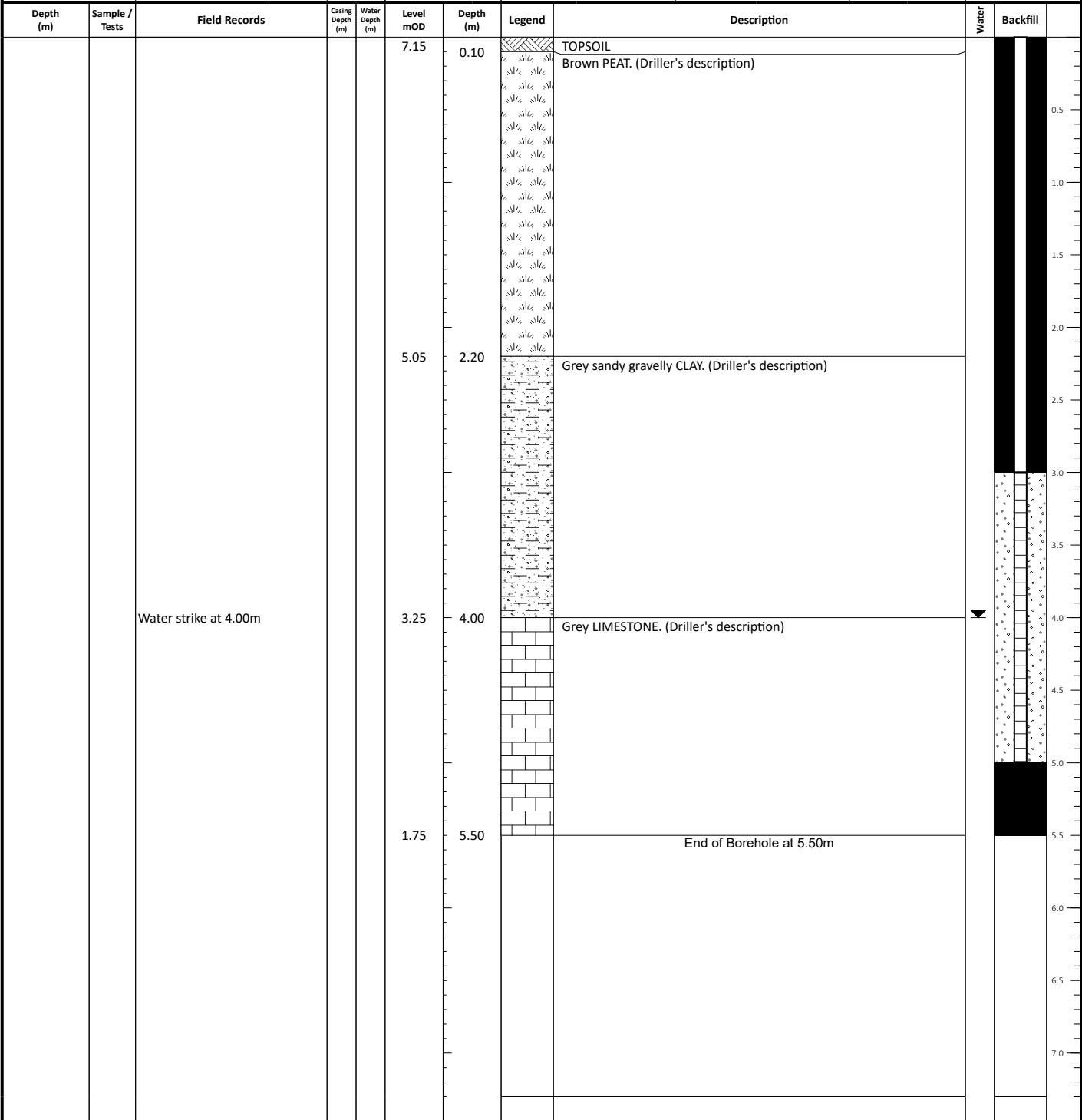


Project No.
22-0540

Project Name: Ahascra Historic Landfill
Client: Kerry County Council
Client's Rep: Fehily Timoney and Company

Borehole ID
BH03

Method Rotary Drilling	Plant Used Beretta T44	Top (m) 0.00	Base (m) 5.50	Coordinates 490869.26 E 636726.51 N	Final Depth: 5.50 m	Start Date: 29/09/2022	Driller: PJ	Sheet 1 of 1 Scale: 1:40
					Elevation: 7.25 mOD	End Date: 29/09/2022	Logger: SR	FINAL



Water Strikes				Remarks							
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)	Hand dug inspection pit excavated to 1.20m.							
4.00	4.00										
Casing Details				Water Added							
To (m)	Diam (mm)	From (m)	To (m)								
5.50	200										
				Core Barrel	Flush Type	Termination Reason			Last Updated		
					Air	Terminated at scheduled depth.			18/10/2022		



CAUSEWAY
GEOTECH

Project No.
22-0540

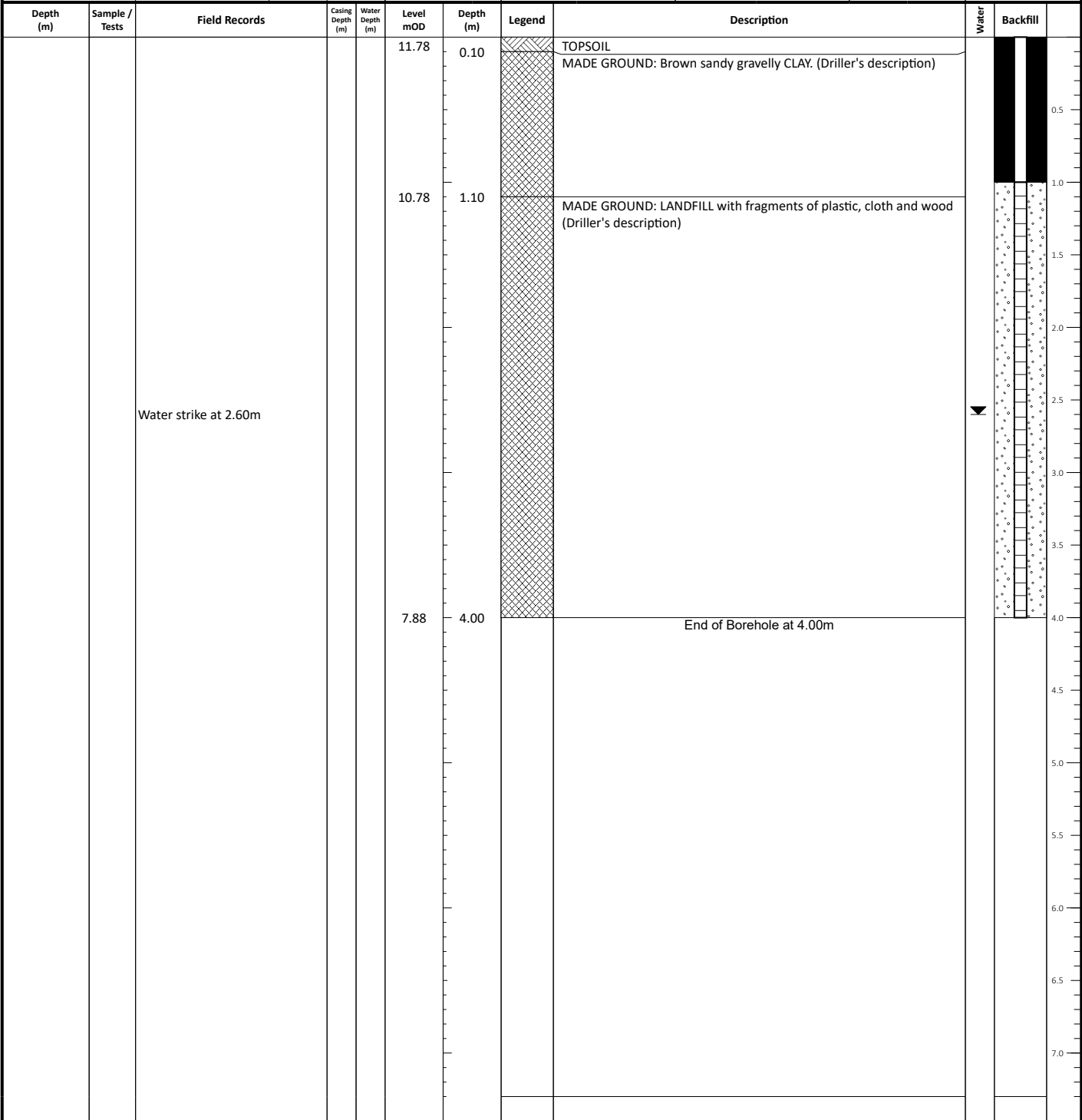
Project Name: Ahascra Historic Landfill

Client: Kerry County Council

Client's Rep: Fehily Timoney and Company

Borehole ID
LH01

Method Rotary Drilling	Plant Used Beretta T44	Top (m) 0.00	Base (m) 4.00	Coordinates 491084.02 E 636583.37 N	Final Depth: 4.00 m	Start Date: 29/09/2022	Driller: PJ	Sheet 1 of 1 Scale: 1:40
					Elevation: 11.88 mOD	End Date: 29/09/2022	Logger: SR	



Water Strikes				Remarks Hand dug inspection pit excavated to 1.20m.					
Struck at (m)	Casing to (m)	Time (min)	Rose to (m)						
2.60	2.60								
Casing Details		Water Added		Core Barrel					
To (m)	Diam (mm)	From (m)	To (m)						
4.00	200								
				Flush Type Air		Termination Reason Terminated at scheduled depth.		Last Updated 18/10/2022	

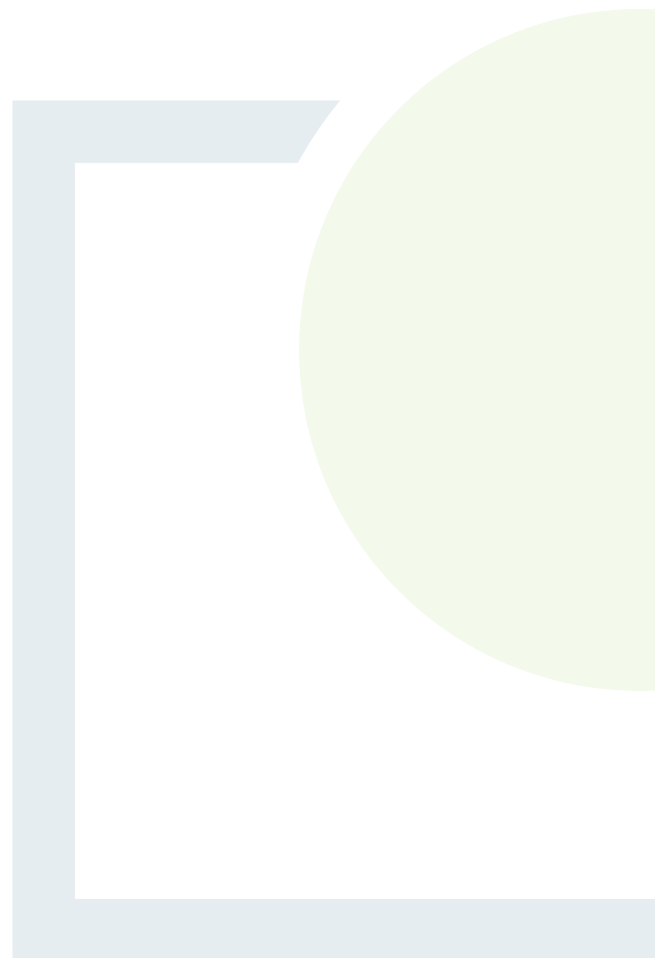




CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

Appendix 8

Environmental Monitoring
Results 2022





Fehily Timoney
3rd Floor
North Park Offices
North Park Business Park
North Road
Dublin
Dublin 11

Attention: Sean Foley

CERTIFICATE OF ANALYSIS

Date of report Generation:	05 December 2022
Customer:	Fehily Timoney
Sample Delivery Group (SDG):	221125-76
Your Reference:	P22-163
Location:	Ahascra
Report No:	670875
Order Number:	Z3711

We received 3 samples on Friday November 25, 2022 and 3 of these samples were scheduled for analysis which was completed on Monday December 05, 2022. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

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

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

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

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-76
Client Ref.: P22-163

Report Number: 670875
Location: Ahascra

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
27218412	SW01		0.00 - 0.00	22/11/2022
27218425	SW02		0.00 - 0.00	22/11/2022
27218437	SW03		0.00 - 0.00	22/11/2022

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-76
Client Ref.: P22-163

Report Number: 670875
Location: Ahascra

Superseded Report:

Results Legend <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;">X Test</div> <div style="display: flex; align-items: center;">N No Determination Possible</div> </div> Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)	Customer Sample Reference	AGS Reference	Depth (m)	Container	Sample Type	
		27218412	SW01		0.00 - 0.00	HNO3 Filtered (ALE204) H2SO4 (ALE244) 500ml Plastic (ALE208) 250ml BOD (ALE212) 0.5l glass bottle (ALE227)	SW
		27218425	SW02		0.00 - 0.00	HNO3 Filtered (ALE204) H2SO4 (ALE244) 500ml Plastic (ALE208) 250ml BOD (ALE212) 0.5l glass bottle (ALE227)	SW
		27218437	SW03		0.00 - 0.00	HNO3 Filtered (ALE204) H2SO4 (ALE244) 500ml Plastic (ALE208) 250ml BOD (ALE212) 0.5l glass bottle (ALE227)	SW
						NaOH (ALE245) HNO3 Filtered (ALE204) H2SO4 (ALE244) 500ml Plastic (ALE208) 250ml BOD (ALE212) 0.5l glass bottle (ALE227)	SW
						NaOH (ALE245) HNO3 Filtered (ALE204) H2SO4 (ALE244) 500ml Plastic (ALE208) 250ml BOD (ALE212) 0.5l glass bottle (ALE227)	SW
						NaOH (ALE245) HNO3 Filtered (ALE204) H2SO4 (ALE244) 500ml Plastic (ALE208) 250ml BOD (ALE212) 0.5l glass bottle (ALE227)	SW
VOC MS (W)	All	NDPs: 0 Tests: 3			X	X	

27218437	SW03		0.00 - 0.00	Vial (ALE297)	SW	
				NaOH (ALE245)	SW	X



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-76
Client Ref.: P22-163

Report Number: 670875
Location: Ahascra

Superseded Report:

Results Legend		Customer Sample Ref.	SW01	SW02	SW03		
# ISO17025 accredited. M mCERTS accredited. aq Aqueous / settled sample. diss.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery (F) Trigger breach confirmed 1-4*@\$ Sample deviation (see appendix)		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00 Surface Water (SW) 22/11/2022	0.00 - 0.00 Surface Water (SW) 22/11/2022	0.00 - 0.00 Surface Water (SW) 22/11/2022		
Component	LOD/Units	Method					
Suspended solids, Total	<2 mg/l	TM022	9.8 #	<4 #	4.67 #		
BOD, unfiltered	<1 mg/l	TM045	<3 #	<3 #	<3 #		
Oxygen, dissolved	<0.3 mg/l	TM046	9.16	9.48	9.06		
Organic Carbon, Total	<3 mg/l	TM090	46.9 #	36.3 #	58.1 #		
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	<0.2 #	<0.2 #	1.33 #		
Fluoride	<0.5 mg/l	TM104	<0.5	<0.5	<0.5		
COD, unfiltered	<7 mg/l	TM107	121 #	155 #	164 #		
Arsenic (diss.filt)	<0.5 µg/l	TM152	0.84 #	0.598 #	2.71 #		
Barium (diss.filt)	<0.2 µg/l	TM152	11.5 #	2.66 #	9.82 #		
Boron (diss.filt)	<10 µg/l	TM152	16.1 #	<10 #	27.9 #		
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08 #	<0.08 #	<0.08 #		
Chromium (diss.filt)	<1 µg/l	TM152	<1 #	<1 #	<1 #		
Copper (diss.filt)	<0.3 µg/l	TM152	1.05 #	8.48 #	1.74 #		
Lead (diss.filt)	<0.2 µg/l	TM152	0.345 #	2.76 #	0.396 #		
Manganese (diss.filt)	<3 µg/l	TM152	115 #	50 #	44.5 #		
Nickel (diss.filt)	<0.4 µg/l	TM152	1.06 #	0.835 #	1.22 #		
Phosphorus (diss.filt)	<10 µg/l	TM152	89.5 #	30.4 #	95.6 #		
Selenium (diss.filt)	<1 µg/l	TM152	<1 #	<1 #	<1 #		
Thallium (diss.filt)	<2 µg/l	TM152	<2 #	<2 #	<2 #		
Zinc (diss.filt)	<1 µg/l	TM152	10.5 #	67.4 #	22.5 #		
Sodium (Dis.Filt)	<0.076 mg/l	TM152	17.7 #	11.2 #	19.3 #		
Magnesium (Dis.Filt)	<0.036 mg/l	TM152	5 #	1.96 #	6.49 #		
Potassium (Dis.Filt)	<0.2 mg/l	TM152	2.81 #	5.24 #	3.95 #		
Calcium (Dis.Filt)	<0.2 mg/l	TM152	29.1 #	5.91 #	32.1 #		
Iron (Dis.Filt)	<0.019 mg/l	TM152	1.44 #	1.23 #	0.835 #		
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172	<100	<100	<100		
Mercury (diss.filt)	<0.01 µg/l	TM183	0.0108	0.0185	0.0143		
Chloride	<2 mg/l	TM184	43.8 #	34.6 #	48.2 #		
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	<0.1 #	<0.1 #	1.79 #		
Sulphate (soluble) as S	<1 mg/l	TM184	<5 #	<5 #	<5 #		
PCB congener 28	<0.015 µg/l	TM197	<0.015	<0.015	<0.015		
PCB congener 52	<0.015 µg/l	TM197	<0.015	<0.015	<0.015		
PCB congener 101	<0.015 µg/l	TM197	<0.015	<0.015	<0.015		



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-76
Client Ref.: P22-163

Report Number: 670875
Location: Ahascra

Superseded Report:

SVOC MS (W) - Aqueous

Results Legend		Customer Sample Ref.	SW01	SW02	SW03		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00		
M	mCERTS accredited.		Surface Water (SW)	Surface Water (SW)	Surface Water (SW)		
aq	Aqueous / settled sample.		22/11/2022	22/11/2022	22/11/2022		
diss.filt	Dissolved / filtered sample.		25/11/2022	25/11/2022	25/11/2022		
tot.unfilt	Total / unfiltered sample.		221125-76	221125-76	221125-76		
*	Subcontracted - refer to subcontractor report for accreditation status.		27218412	27218425	27218437		
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-4*§	Sample deviation (see appendix)						
Component	LOD/Units		Method				
1,2-Trichlorobenzene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2-Chlorophenol (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2-Methylphenol (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2-Nitroaniline (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
2-Nitrophenol (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
3-Nitroaniline (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
4-Chloroaniline (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
4-Methylphenol (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
4-Nitroaniline (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
4-Nitrophenol (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
Azobenzene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
Acenaphthylene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
Acenaphthene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
Anthracene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	<4	<4	<4	#	#
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<2	<2	<2	#	#
Benzo(a)anthracene (aq)	<1 µg/l	TM176	<2	<2	<2	#	#



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-76
Client Ref.: P22-163

Report Number: 670875
Location: Ahascra

Superseded Report:

VOC MS (W)

Results Legend		Customer Sample Ref.	SW01	SW02	SW03		
# ISO17025 accredited. M mCERTS accredited. aq Aqueous / settled sample. diss.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery (F) Trigger breach confirmed 1-4*# Sample deviation (see appendix)		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00 Surface Water (SW) 22/11/2022	0.00 - 0.00 Surface Water (SW) 22/11/2022	0.00 - 0.00 Surface Water (SW) 22/11/2022		
Component	LOD/Units	Method					
Dibromofluoromethane**	%	TM208	105	110	104		
Toluene-d8**	%	TM208	97.3	98	97.2		
4-Bromofluorobenzene**	%	TM208	96.9	97.6	98.9		
Dichlorodifluoromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Chloromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Vinyl chloride	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Bromomethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Chloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Trichlorofluoromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,1-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Carbon disulphide	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Dichloromethane	<3 µg/l	TM208	<3 #	<3 #	<3 #		
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 #	<1 #	<1 #		
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,1-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
2,2-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Bromochloromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Chloroform	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,1,1-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,1-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Carbontetrachloride	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,2-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Benzene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Trichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,2-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Dibromomethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Bromodichloromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Toluene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,1,2-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,3-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #	<1 #		



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-76
Client Ref.: P22-163

Report Number: 670875
Location: Ahascra

Superseded Report:

VOC MS (W)

Results Legend			Customer Sample Ref.	SW01	SW02	SW03			
# ISO17025 accredited. M mCERTS accredited. sq. Aqueous / settled sample. dis. fil. Dissolved / filtered sample. tot.unfil. Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery. (F) Trigger breach confirmed 1-4# Sample deviation (see appendix)			Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00 Surface Water (SW) 22/11/2022	0.00 - 0.00 Surface Water (SW) 22/11/2022	0.00 - 0.00 Surface Water (SW) 22/11/2022			
Component	LOD/Units	Method							
Tetrachloroethene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
Dibromochloromethane	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,2-Dibromoethane	<1 µg/l	TM208	<1	<1	<1	#	#	#	
Chlorobenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1	<1	<1	#	#	#	
Ethylbenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
m,p-Xylene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
o-Xylene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
Styrene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
Bromoform	<1 µg/l	TM208	<1	<1	<1	#	#	#	
Isopropylbenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,2,3-Trichloropropane	<1 µg/l	TM208	<1	<1	<1	#	#	#	
Bromobenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
Propylbenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
2-Chlorotoluene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
4-Chlorotoluene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
tert-Butylbenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,2,4-Trimethylbenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
sec-Butylbenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
4-iso-Propyltoluene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,3-Dichlorobenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,4-Dichlorobenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
n-Butylbenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,2-Dichlorobenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
Hexachlorobutadiene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1	<1	<1	#	#	#	
Naphthalene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,2,3-Trichlorobenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	
1,3,5-Trichlorobenzene	<1 µg/l	TM208	<1	<1	<1	#	#	#	



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-76
Client Ref.: P22-163

Report Number: 670875
Location: Ahascra

Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
TM022	Method 2540D, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part120 1981,BS EN 872	Determination of total suspended solids in waters
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids
TM046	Method 4500G, AWWA/APHA, 20th Ed., 1999	Measurement of Dissolved Oxygen by Oxygen Meter
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit
TM152	ISO 17294-2:2016 Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS)	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS
TM183	BS EN 23506:2002. (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM197	Modified: US EPA Method 8082.EA Method 174 and 5109631	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Waters
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4, Standard Methods for the examination of waters and wastewaters 20th Edition, PHA, Washington DC, USA. ISBN 0-87553-235-7 and The Determination of Alkalinity and Acidity in water HMSO, 1981, ISBN 0 11 751601 5.	Determination of pH, EC, TDS and Alkalinity in Aqueous samples

NA = not applicable.

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-76
Client Ref.: P22-163

Report Number: 670875
Location: Ahascra

Superseded Report:

Test Completion Dates

Lab Sample No(s)	27218412	27218425	27218437
Customer Sample Ref.	SW01	SW02	SW03
AGS Ref.			
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Surface Water	Surface Water	Surface Water

	27218412	27218425	27218437
Ammoniacal Nitrogen	30-Nov-2022	28-Nov-2022	28-Nov-2022
Anions by Kone (w)	25-Nov-2022	25-Nov-2022	25-Nov-2022
BOD True Total	30-Nov-2022	30-Nov-2022	30-Nov-2022
COD Unfiltered	05-Dec-2022	05-Dec-2022	05-Dec-2022
Cyanide Comp/Free/Total/Thiocyanate	29-Nov-2022	29-Nov-2022	29-Nov-2022
Dissolved Metals by ICP-MS	28-Nov-2022	28-Nov-2022	28-Nov-2022
Dissolved Oxygen by Probe	25-Nov-2022	25-Nov-2022	25-Nov-2022
Fluoride	28-Nov-2022	28-Nov-2022	28-Nov-2022
Mercury Dissolved	01-Dec-2022	30-Nov-2022	01-Dec-2022
Mineral Oil C10-40 Aqueous (W)	02-Dec-2022	02-Dec-2022	02-Dec-2022
PCB Congeners - Aqueous (W)	02-Dec-2022	02-Dec-2022	02-Dec-2022
pH Value	28-Nov-2022	28-Nov-2022	28-Nov-2022
Suspended Solids	30-Nov-2022	30-Nov-2022	30-Nov-2022
SVOC MS (W) - Aqueous	30-Nov-2022	30-Nov-2022	30-Nov-2022
Total Organic and Inorganic Carbon	26-Nov-2022	26-Nov-2022	26-Nov-2022
VOC MS (W)	30-Nov-2022	29-Nov-2022	30-Nov-2022



CERTIFICATE OF ANALYSIS

SDG: 221125-76
Client Ref: P22-163

Report Number: 670875
Location: Ahascra

Superseded Report:

Appendix

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

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

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

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

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

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

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

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

General

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

19. Sample Deviations

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

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

20. Asbestos

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

Identification of Asbestos in Bulk Materials & Soils

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

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

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

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

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



Fehily Timoney
3rd Floor
North Park Offices
North Park Business Park
North Road
Dublin
Dublin 11

Attention: Sean Foley

CERTIFICATE OF ANALYSIS

Date of report Generation:	07 December 2022
Customer:	Fehily Timoney
Sample Delivery Group (SDG):	221125-78
Your Reference:	P22-163
Location:	Ahascra
Report No:	671231
Order Number:	Z3711

We received 1 sample on Friday November 25, 2022 and 1 of these samples were scheduled for analysis which was completed on Wednesday December 07, 2022. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

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

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

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

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-78
Client Ref.: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
27218468	LH01		0.00 - 0.00	22/11/2022

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-78
Client Ref.: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

Results Legend <div style="display: flex; flex-direction: column; gap: 5px;"> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: yellow; border: 1px solid black; margin-right: 5px;"></div> Test </div> <div style="display: flex; align-items: center;"> <div style="width: 15px; height: 15px; background-color: red; color: white; border: 1px solid black; margin-right: 5px; display: flex; align-items: center; justify-content: center;">N</div> No Determination Possible </div> </div> Sample Types - S - Soil/Solid UNS - Unspecified Solid GW - Ground Water SW - Surface Water LE - Land Leachate PL - Prepared Leachate PR - Process Water SA - Saline Water TE - Trade Effluent TS - Treated Sewage US - Untreated Sewage RE - Recreational Water DW - Drinking Water Non-regulatory UNL - Unspecified Liquid SL - Sludge G - Gas OTH - Other	Lab Sample No(s)							
	Customer Sample Reference							
	AGS Reference							
	Depth (m)							
	Container	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)
	Sample Type	SW	SW	SW	SW	SW	SW	SW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 1			X			
Anions by Kone (w)	All	NDPs: 0 Tests: 1		X				
BOD True Total	All	NDPs: 0 Tests: 1	X					
COD Unfiltered	All	NDPs: 0 Tests: 1	X					
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 1				X		
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 1				X		
Dissolved Oxygen by Probe	All	NDPs: 0 Tests: 1		X				
Fluoride	All	NDPs: 0 Tests: 1		X				
Mercury Dissolved	All	NDPs: 0 Tests: 1				X		
Mineral Oil C10-40 Aqueous (W)	All	NDPs: 0 Tests: 1	X					
Nitrite by Kone (w)	All	NDPs: 0 Tests: 1					X	
Organotins in Aqueous Samples	All	NDPs: 0 Tests: 1	X					
PCB Congeners - Aqueous (W)	All	NDPs: 0 Tests: 1	X					
Pesticides (Suite I) by GCMS	All	NDPs: 0 Tests: 1		X				
Pesticides (Suite II) by GCMS	All	NDPs: 0 Tests: 1		X				



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-78
Client Ref.: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

Results Legend	Lab Sample No(s)							
<p>X Test</p> <p>N No Determination Possible</p> <p>Sample Types -</p> <p>S - Soil/Solid</p> <p>UNS - Unspecified Solid</p> <p>GW - Ground Water</p> <p>SW - Surface Water</p> <p>LE - Land Leachate</p> <p>PL - Prepared Leachate</p> <p>PR - Process Water</p> <p>SA - Saline Water</p> <p>TE - Trade Effluent</p> <p>TS - Treated Sewage</p> <p>US - Untreated Sewage</p> <p>RE - Recreational Water</p> <p>DW - Drinking Water Non-regulatory</p> <p>UNL - Unspecified Liquid</p> <p>SL - Sludge</p> <p>G - Gas</p> <p>OTH - Other</p>	Customer Sample Reference							
	AGS Reference							
	Depth (m)							
	Container	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)
	Sample Type	SW	SW	SW	SW	SW	SW	SW
	Pesticides (Suite III) by GCMS	All	NDPs: 0 Tests: 1		X			
pH Value	All	NDPs: 0 Tests: 1		X				
Phosphate by Kone (w)	All	NDPs: 0 Tests: 1		X				
Silicon Dissolved by ICP-OES	All	NDPs: 0 Tests: 1				X		
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 1		X				
Total Organic and Inorganic Carbon	All	NDPs: 0 Tests: 1			X			
VOC MS (W)	All	NDPs: 0 Tests: 1						X



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-78
Client Ref.: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

Results Legend		Customer Sample Ref.	LH01			
# ISO17025 accredited. M mCERTS accredited. aq Aqueous / settled sample. diss.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery (F) Trigger breach confirmed 1-4* Sample deviation (see appendix)		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00 Surface Water (SW) 22/11/2022 25/11/2022 221125-78 27218468			
Component	LOD/Units	Method				
BOD, unfiltered	<1 mg/l	TM045	21.7	#		
Oxygen, dissolved	<0.3 mg/l	TM046	3.85			
Organic Carbon, Total	<3 mg/l	TM090	65.4	#		
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	34.2	#		
Fluoride	<0.5 mg/l	TM104	<0.5			
COD, unfiltered	<7 mg/l	TM107	489	#		
Antimony (diss.filt)	<1 µg/l	TM152	<1	#		
Arsenic (diss.filt)	<0.5 µg/l	TM152	0.908	#		
Barium (diss.filt)	<0.2 µg/l	TM152	101	#		
Beryllium (diss.filt)	<0.1 µg/l	TM152	<0.1	#		
Boron (diss.filt)	<10 µg/l	TM152	230	#		
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	#		
Chromium (diss.filt)	<1 µg/l	TM152	1.42	#		
Cobalt (diss.filt)	<0.5 µg/l	TM152	1.6	#		
Copper (diss.filt)	<0.3 µg/l	TM152	0.72	#		
Lead (diss.filt)	<0.2 µg/l	TM152	<0.2	#		
Manganese (diss.filt)	<3 µg/l	TM152	980	#		
Molybdenum (diss.filt)	<3 µg/l	TM152	<3	#		
Nickel (diss.filt)	<0.4 µg/l	TM152	2.72	#		
Phosphorus (diss.filt)	<10 µg/l	TM152	37.7	#		
Selenium (diss.filt)	<1 µg/l	TM152	<1	#		
Tellurium (diss.filt)	<2 µg/l	TM152	<2			
Thallium (diss.filt)	<2 µg/l	TM152	<2	#		
Titanium (diss.filt)	<1 µg/l	TM152	24.2	#		
Uranium (diss.filt)	<0.5 µg/l	TM152	0.524	#		
Vanadium (diss.filt)	<1 µg/l	TM152	<1	#		
Zinc (diss.filt)	<1 µg/l	TM152	9.29	#		
Tin (Diss.Filt)	<1 µg/l	TM152	<1	#		
Silver (diss.filt)	<0.5 µg/l	TM152	<0.5	#		
Sodium (Dis.Filt)	<0.076 mg/l	TM152	29	#		
Magnesium (Dis.Filt)	<0.036 mg/l	TM152	22	#		
Potassium (Dis.Filt)	<0.2 mg/l	TM152	16.7	#		
Calcium (Dis.Filt)	<0.2 mg/l	TM152	259	#		



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-78
Client Ref.: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

Results Legend		Customer Sample Ref.	LH01				
# ISO17025 accredited. M mCERTS accredited. aq Aqueous / settled sample. dis.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery. (F) Trigger breach confirmed 1-4# Sample deviation (see appendix)		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00 Surface Water (SW) 22/11/2022 . 25/11/2022 221125-78 27218468				
Component	LOD/Units	Method					
Iron (Dis.Filt)	<0.019 mg/l	TM152	30.5	#			
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172	180				
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01				
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184	<0.05	#			
Chloride	<2 mg/l	TM184	53.2	#			
Nitrite as N	<0.0152 mg/l	TM184	<0.0152	#			
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	<0.1	#			
Sulphate (soluble) as S	<1 mg/l	TM184	16.5	#			
PCB congener 28	<0.015 µg/l	TM197	<0.015				
PCB congener 52	<0.015 µg/l	TM197	<0.015				
PCB congener 101	<0.015 µg/l	TM197	<0.015				
PCB congener 118	<0.015 µg/l	TM197	<0.015				
PCB congener 138	<0.015 µg/l	TM197	<0.015				
PCB congener 153	<0.015 µg/l	TM197	<0.015				
PCB congener 180	<0.015 µg/l	TM197	<0.015				
Sum of detected EC7 PCB's	<0.105 µg/l	TM197	<0.105				
Cyanide, Total	<0.05 mg/l	TM227	<0.05				
Cyanide, Free	<0.05 mg/l	TM227	<0.05				
pH	<1 pH Units	TM256	6.76	#			
Conductivity @ 20 deg.C	<0.02 mS/cm	TM256	1.51	#			
Silicon (diss.filt)	<0.05 mg/l	TM284	7.69				
Dibutyl tin	<5 ng/l	TM328	<30				
Tributyl tin	<1 ng/l	TM328	<6				
Tetrabutyl tin	<2 ng/l	TM328	<12				
Triphenyl tin	<1 ng/l	TM328	<6				
Surrogate**	%	TM328	82.1				
Trifluralin	<0.01 µg/l	TM343	<0.1				
alpha-HCH	<0.01 µg/l	TM343	<0.1				
gamma-HCH (Lindane)	<0.01 µg/l	TM343	<0.1				
Heptachlor	<0.01 µg/l	TM343	<0.1				
Aldrin	<0.01 µg/l	TM343	<0.1				
beta-HCH	<0.01 µg/l	TM343	<0.1				
Isodrin	<0.01 µg/l	TM343	<0.1				



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-78
Client Ref.: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

Results Legend		Customer Sample Ref.	LH01				
# ISO17025 accredited. M mCERTS accredited. sq Aqueous / settled sample. dis.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery. (F) Trigger breach confirmed 1-4*§@ Sample deviation (see appendix)		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00 Surface Water (SW) 22/11/2022 . 25/11/2022 221125-78 27218468				
Component	LOD/Units	Method					
Heptachlor epoxide	<0.01 µg/l	TM343	<0.1				
o,p'-DDE	<0.01 µg/l	TM343	<0.1				
Endosulphan I	<0.01 µg/l	TM343	<0.1				
trans-Chlordane	<0.01 µg/l	TM343	<0.1				
cis-Chlordane	<0.01 µg/l	TM343	<0.1				
p,p'-DDE	<0.01 µg/l	TM343	<0.1				
Dieldrin	<0.01 µg/l	TM343	<0.1				
o,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.1				
Endrin	<0.01 µg/l	TM343	<0.1				
o,p'-DDT	<0.01 µg/l	TM343	<0.1				
p,p'-DDD (TDE)	<0.01 µg/l	TM343	<0.1				
Endosulphan II	<0.02 µg/l	TM343	<0.2				
p,p'-DDT	<0.01 µg/l	TM343	<0.2				
p,p'-Methoxychlor	<0.01 µg/l	TM343	<0.2				
Endosulphan Sulphate	<0.02 µg/l	TM343	<0.2				
Permethrin I	<0.01 µg/l	TM343	<0.1				
Permethrin II	<0.01 µg/l	TM343	<0.1				
Dichlorvos	<0.01 µg/l	TM344	<0.1				
Mevinphos	<0.01 µg/l	TM344	<0.1				
Tecnazene	<0.01 µg/l	TM344	<0.1				
Hexachlorobenzene	<0.01 µg/l	TM344	<0.1				
Diazinon	<0.01 µg/l	TM344	<0.1				
Triallate	<0.01 µg/l	TM344	<0.1				
Atrazine	<0.01 µg/l	TM344	<0.1				
Simazine	<0.01 µg/l	TM344	<0.1				
Disulfoton	<0.01 µg/l	TM344	<0.1				
Propetamphos	<0.01 µg/l	TM344	<0.1				
Chlorpyrifos-methyl	<0.01 µg/l	TM344	<0.1				
Dimethoate	<0.01 µg/l	TM344	<0.1				
Pirimiphos-methyl	<0.01 µg/l	TM344	<0.1				
Chlorpyrifos	<0.01 µg/l	TM344	<0.1				
Methyl Parathion	<0.01 µg/l	TM344	<0.1				
Malathion	<0.01 µg/l	TM344	<0.1				



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-78
Client Ref.: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

SVOC MS (W) - Aqueous

Results Legend		Customer Sample Ref.	LH01				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00				
M	mCERTS accredited.		Surface Water (SW)				
aq	Aqueous / settled sample.		22/11/2022				
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted - refer to subcontractor report for accreditation status.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-4*§	Sample deviation (see appendix)						
Component	LOD/Units		Method				
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176	<10	#			
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<10	#			
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<10	#			
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<10	#			
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<10	#			
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<10	#			
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<10	#			
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<10	#			
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<10	#			
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<10	#			
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<10	#			
2-Chlorophenol (aq)	<1 µg/l	TM176	<10	#			
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<10	#			
2-Methylphenol (aq)	<1 µg/l	TM176	<10	#			
2-Nitroaniline (aq)	<1 µg/l	TM176	<10	#			
2-Nitrophenol (aq)	<1 µg/l	TM176	<10	#			
3-Nitroaniline (aq)	<1 µg/l	TM176	<10	#			
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<10	#			
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<10	#			
4-Chloroaniline (aq)	<1 µg/l	TM176	<10	#			
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<10	#			
4-Methylphenol (aq)	<1 µg/l	TM176	<10	#			
4-Nitroaniline (aq)	<1 µg/l	TM176	<10	#			
4-Nitrophenol (aq)	<1 µg/l	TM176	<10	#			
Azobenzene (aq)	<1 µg/l	TM176	<10	#			
Acenaphthylene (aq)	<1 µg/l	TM176	<10	#			
Acenaphthene (aq)	<1 µg/l	TM176	<10	#			
Anthracene (aq)	<1 µg/l	TM176	<10	#			
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<10	#			
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<10	#			
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	<20	#			
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<10	#			
Benzo(a)anthracene (aq)	<1 µg/l	TM176	<10	#			



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-78
Client Ref.: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

VOC MS (W)

Results Legend		Customer Sample Ref.	LH01				
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00				
M	mCERTS accredited.		Surface Water (SW)				
aq	Aqueous / settled sample.		22/11/2022				
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted - refer to subcontractor report for accreditation status.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-4*§@	Sample deviation (see appendix)						
Component	LOD/Units		Method				
Dibromofluoromethane**	%	TM208	102				
Toluene-d8**	%	TM208	96.7				
4-Bromofluorobenzene**	%	TM208	97.1				
Dichlorodifluoromethane	<1 µg/l	TM208	<1	#			
Chloromethane	<1 µg/l	TM208	<1	#			
Vinyl chloride	<1 µg/l	TM208	<1	#			
Bromomethane	<1 µg/l	TM208	<1	#			
Chloroethane	<1 µg/l	TM208	<1	#			
Trichlorofluoromethane	<1 µg/l	TM208	<1	#			
1,1-Dichloroethene	<1 µg/l	TM208	<1	#			
Carbon disulphide	<1 µg/l	TM208	<1	#			
Dichloromethane	<3 µg/l	TM208	<3	#			
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1	#			
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1	#			
1,1-Dichloroethane	<1 µg/l	TM208	<1	#			
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1	#			
2,2-Dichloropropane	<1 µg/l	TM208	<1	#			
Bromochloromethane	<1 µg/l	TM208	<1	#			
Chloroform	<1 µg/l	TM208	<1	#			
1,1,1-Trichloroethane	<1 µg/l	TM208	<1	#			
1,1-Dichloropropene	<1 µg/l	TM208	<1	#			
Carbontetrachloride	<1 µg/l	TM208	<1	#			
1,2-Dichloroethane	<1 µg/l	TM208	<1	#			
Benzene	<1 µg/l	TM208	<1	#			
Trichloroethene	<1 µg/l	TM208	<1	#			
1,2-Dichloropropane	<1 µg/l	TM208	<1	#			
Dibromomethane	<1 µg/l	TM208	<1	#			
Bromodichloromethane	<1 µg/l	TM208	<1	#			
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1	#			
Toluene	<1 µg/l	TM208	<1	#			
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1	#			
1,1,2-Trichloroethane	<1 µg/l	TM208	<1	#			
1,3-Dichloropropane	<1 µg/l	TM208	<1	#			



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-78
Client Ref.: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

VOC MS (W)

Results Legend		Customer Sample Ref.	LH01			
# ISO17025 accredited. M mCERTS accredited. sq Aqueous / settled sample. dis.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery. (F) Trigger breach confirmed 1-4# Sample deviation (see appendix)		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00 Surface Water (SW) 22/11/2022 . 25/11/2022 221125-78 27218468			
Component	LOD/Units	Method				
Tetrachloroethene	<1 µg/l	TM208	<1	#		
Dibromochloromethane	<1 µg/l	TM208	<1	#		
1,2-Dibromoethane	<1 µg/l	TM208	<1	#		
Chlorobenzene	<1 µg/l	TM208	3.64	#		
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	<1	#		
Ethylbenzene	<1 µg/l	TM208	<1	#		
m,p-Xylene	<1 µg/l	TM208	1.18	#		
o-Xylene	<1 µg/l	TM208	<1	#		
Styrene	<1 µg/l	TM208	<1	#		
Bromoform	<1 µg/l	TM208	<1	#		
Isopropylbenzene	<1 µg/l	TM208	<1	#		
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	<1	#		
1,2,3-Trichloropropane	<1 µg/l	TM208	<1	#		
Bromobenzene	<1 µg/l	TM208	<1	#		
Propylbenzene	<1 µg/l	TM208	<1	#		
2-Chlorotoluene	<1 µg/l	TM208	<1	#		
1,3,5-Trimethylbenzene	<1 µg/l	TM208	<1	#		
4-Chlorotoluene	<1 µg/l	TM208	<1	#		
tert-Butylbenzene	<1 µg/l	TM208	<1	#		
1,2,4-Trimethylbenzene	<1 µg/l	TM208	2.39	#		
sec-Butylbenzene	<1 µg/l	TM208	<1	#		
4-iso-Propyltoluene	<1 µg/l	TM208	<1	#		
1,3-Dichlorobenzene	<1 µg/l	TM208	<1	#		
1,4-Dichlorobenzene	<1 µg/l	TM208	1.99	#		
n-Butylbenzene	<1 µg/l	TM208	<1	#		
1,2-Dichlorobenzene	<1 µg/l	TM208	<1	#		
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	<1	#		
1,2,4-Trichlorobenzene	<1 µg/l	TM208	<1	#		
Hexachlorobutadiene	<1 µg/l	TM208	<1	#		
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	<1	#		
Naphthalene	<1 µg/l	TM208	1.74	#		
1,2,3-Trichlorobenzene	<1 µg/l	TM208	<1	#		
1,3,5-Trichlorobenzene	<1 µg/l	TM208	<1	#		



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-78
Client Ref.: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

Table of Results - Appendix

Method No	Reference	Description
TM045	MEWAM BOD5 2nd Ed.HMSO 1988 / Method 5210B, AWWA/APHA, 20th Ed., 1999; SCA Blue Book 130	Determination of BOD5 (ATU) Filtered by Oxygen Meter on liquids
TM046	Method 4500G, AWWA/APHA, 20th Ed., 1999	Measurement of Dissolved Oxygen by Oxygen Meter
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM107	ISO 6060-1989	Determination of Chemical Oxygen Demand using COD Dr Lange Kit
TM152	ISO 17294-2:2016 Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS)	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM197	Modified: US EPA Method 8082.EA Method 174 and 5109631	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Waters
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4, Standard Methods for the examination of waters and wastewaters 20th Edition, PHA, Washington DC, USA. ISBN 0-87553-235-7 and The Determination of Alkalinity and Acidity in water HMSO, 1981, ISBN 0 11 751601 5.	Determination of pH, EC, TDS and Alkalinity in Aqueous samples
TM284		
TM328		
TM343	EPA 8270D - Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of Selected Pesticides (Suite I) in Liquids by GCMS
TM344	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite II) by GCMS
TM345	EPA 8270D – Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of selected pesticides (Suite III) by GCMS

NA = not applicable.

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-78
Client Ref.: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

Test Completion Dates

Lab Sample No(s)	27218468
Customer Sample Ref.	LH01
AGS Ref.	
Depth	0.00 - 0.00
Type	Surface Water

Ammoniacal Nitrogen	28-Nov-2022
Anions by Kone (w)	25-Nov-2022
BOD True Total	30-Nov-2022
COD Unfiltered	30-Nov-2022
Cyanide Comp/Free/Total/Thiocyanate	29-Nov-2022
Dissolved Metals by ICP-MS	28-Nov-2022
Dissolved Oxygen by Probe	25-Nov-2022
Fluoride	28-Nov-2022
Mercury Dissolved	01-Dec-2022
Mineral Oil C10-40 Aqueous (W)	02-Dec-2022
Nitrite by Kone (w)	25-Nov-2022
Organotins in Aqueous Samples	30-Nov-2022
PCB Congeners - Aqueous (W)	02-Dec-2022
Pesticides (Suite I) by GCMS	01-Dec-2022
Pesticides (Suite II) by GCMS	07-Dec-2022
Pesticides (Suite III) by GCMS	02-Dec-2022
pH Value	28-Nov-2022
Phosphate by Kone (w)	25-Nov-2022
Silicon Dissolved by ICP-OES	30-Nov-2022
SVOC MS (W) - Aqueous	30-Nov-2022
Total Organic and Inorganic Carbon	26-Nov-2022
VOC MS (W)	30-Nov-2022



CERTIFICATE OF ANALYSIS

SDG: 221125-78
Client Ref: P22-163

Report Number: 671231
Location: Ahascra

Superseded Report:

Appendix

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

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

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

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

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

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

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

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

General

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

19. Sample Deviations

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

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

20. Asbestos

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

Identification of Asbestos in Bulk Materials & Soils

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

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

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

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

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



Fehily Timoney
3rd Floor
North Park Offices
North Park Business Park
North Road
Dublin
Dublin 11

Attention: Sean Foley

CERTIFICATE OF ANALYSIS

Date of report Generation: 02 December 2022
Customer: Fehily Timoney
Sample Delivery Group (SDG): 221125-74
Your Reference: P22-163
Location: Ahascra
Report No: 670733
Order Number:

This report has been revised and directly supersedes 670023 in its entirety.

We received 3 samples on Friday November 25, 2022 and 3 of these samples were scheduled for analysis which was completed on Friday December 02, 2022. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

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

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

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

Approved By:

Sonia McWhan

Operations Manager





CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-74
Client Ref.: P22-163

Report Number: 670733
Location: Ahascra

Superseded Report: 670023

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
27218337	BH01		0.00 - 0.00	22/11/2022
27218354	BH02		0.00 - 0.00	22/11/2022
27218363	BH03		0.00 - 0.00	22/11/2022

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-74
Client Ref.: P22-163

Report Number: 670733
Location: Ahascra

Superseded Report: 670023

Results Legend		Customer Sample Ref.	BH01	BH02	BH03		
#	ISO17025 accredited.						
M	mCERTS accredited.						
aq	Aqueous / settled sample.						
diss.filt	Dissolved / filtered sample.						
tot.unfilt	Total / unfiltered sample.						
*	Subcontracted - refer to subcontractor report for accreditation status.						
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-4*\$@	Sample deviation (see appendix)						
		Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00		
		Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)		
		Date Sampled	22/11/2022	22/11/2022	22/11/2022		
		Sample Time					
		Date Received	25/11/2022	25/11/2022	25/11/2022		
		SDG Ref	221125-74	221125-74	221125-74		
		Lab Sample No.(s)	27218337	27218354	27218363		
		AGS Reference					
Component	LOD/Units	Method					
Coliforms, Total*	CFU/100ml	SUB	15.6	45	866		
Coliforms, Faecal*	CFU/100ml	SUB	<1	<1	>100		
Alkalinity, Total as CaCO3	<2 mg/l	TM043	307	480	479		
			#	#	#		
Oxygen, dissolved	<0.3 mg/l	TM046	9.1	9.96	9.33		
Organic Carbon, Total	<3 mg/l	TM090	7.24	7.43	5.79		
			#	#	#		
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099	2.03	6.73	1.92		
			#	#	#		
Fluoride	<0.5 mg/l	TM104	<0.5	<0.5	<0.5		
			#	#	#		
Arsenic (diss.filt)	<0.5 µg/l	TM152	82.5	20.8	49.5		
			#	#	#		
Barium (diss.filt)	<0.2 µg/l	TM152	22.8	63.9	48.4		
			#	#	#		
Boron (diss.filt)	<10 µg/l	TM152	11.4	22.1	12		
			#	#	#		
Cadmium (diss.filt)	<0.08 µg/l	TM152	<0.08	<0.08	<0.08		
			#	#	#		
Chromium (diss.filt)	<1 µg/l	TM152	<1	<1	<1		
			#	#	#		
Copper (diss.filt)	<0.3 µg/l	TM152	<0.3	<0.3	<0.3		
			#	#	#		
Lead (diss.filt)	<0.2 µg/l	TM152	<0.2	<0.2	<0.2		
			#	#	#		
Manganese (diss.filt)	<3 µg/l	TM152	397	1230	832		
			#	#	#		
Nickel (diss.filt)	<0.4 µg/l	TM152	0.736	0.714	1.09		
			#	#	#		
Phosphorus (diss.filt)	<10 µg/l	TM152	24.4	21.6	12.7		
			#	#	#		
Selenium (diss.filt)	<1 µg/l	TM152	<1	<1	<1		
			#	#	#		
Thallium (diss.filt)	<2 µg/l	TM152	<2	<2	<2		
			#	#	#		
Zinc (diss.filt)	<1 µg/l	TM152	1.74	7.78	<1		
			#	#	#		
Sodium (Dis.Filt)	<0.076 mg/l	TM152	31.5	36.9	38		
			#	#	#		
Magnesium (Dis.Filt)	<0.036 mg/l	TM152	8.19	11.9	9.41		
			#	#	#		
Potassium (Dis.Filt)	<0.2 mg/l	TM152	1.25	6.61	1.57		
			#	#	#		
Calcium (Dis.Filt)	<0.2 mg/l	TM152	88.8	121	89.6		
			#	#	#		
Iron (Dis.Filt)	<0.019 mg/l	TM152	5.38	7.07	2.25		
			#	#	#		
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172	<100	<100	932		
Mercury (diss.filt)	<0.01 µg/l	TM183	<0.01	<0.01	<0.01		
			#	#	#		
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184	<0.05	<0.05	<0.05		
			#	#	#		
Chloride	<2 mg/l	TM184	35	44.6	36.6		
			#	#	#		
Total Oxidised Nitrogen as N	<0.1 mg/l	TM184	<0.1	<0.1	<0.1		
			#	#	#		
Sulphate (soluble) as S	<1 mg/l	TM184	<1	<1	<1		
			#	#	#		
PCB congener 28	<0.015 µg/l	TM197	<0.015	<0.015	<0.015		
PCB congener 52	<0.015 µg/l	TM197	<0.015	<0.015	<0.015		



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-74
Client Ref.: P22-163

Report Number: 670733
Location: Ahascra

Superseded Report: 670023

SVOC MS (W) - Aqueous

Results Legend		Customer Sample Ref.	BH01	BH02	BH03		
#	ISO17025 accredited.	Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00		
M	mCERTS accredited.		Ground Water (GW)	Ground Water (GW)	Ground Water (GW)		
aq	Aqueous / settled sample.		22/11/2022	22/11/2022	22/11/2022		
diss.filt	Dissolved / filtered sample.		25/11/2022	25/11/2022	25/11/2022		
tot.unfilt	Total / unfiltered sample.		221125-74	221125-74	221125-74		
*	Subcontracted - refer to subcontractor report for accreditation status.		27218337	27218354	27218363		
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery						
(F)	Trigger breach confirmed						
1-4*§	Sample deviation (see appendix)						
Component	LOD/Units		Method				
1,2-Trichlorobenzene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2,4-Dichlorophenol (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2,4-Dimethylphenol (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2-Chloronaphthalene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2-Chlorophenol (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2-Methylnaphthalene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2-Methylphenol (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2-Nitroaniline (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
2-Nitrophenol (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
3-Nitroaniline (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
4-Bromophenylphenylether (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
4-Chloroaniline (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
4-Methylphenol (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
4-Nitroaniline (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
4-Nitrophenol (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
Azobenzene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
Acenaphthylene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
Acenaphthene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
Anthracene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176	<20	<16	<8	#	#
Butylbenzyl phthalate (aq)	<1 µg/l	TM176	<10	<8	<4	#	#
Benzo(a)anthracene (aq)	<1 µg/l	TM176	<10	<8	<4	#	#



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-74
Client Ref.: P22-163

Report Number: 670733
Location: Ahascra

Superseded Report: 670023

SVOC MS (W) - Aqueous

Results Legend			Customer Sample Ref.	BH01	BH02	BH03			
#	ISO17025 accredited.								
M	mCERTS accredited.								
aq	Aqueous / settled sample.								
dis.filt	Dissolved / filtered sample.								
tot.unfilt	Total / unfiltered sample.								
*	Subcontracted - refer to subcontractor report for accreditation status.								
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery.								
(F)	Trigger breach confirmed								
1-4*#	Sample deviation (see appendix)								
Component	LOD/Units	Method	Depth (m)	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
			Date Sampled	22/11/2022	22/11/2022	22/11/2022			
			Sample Time						
			Date Received	25/11/2022	25/11/2022	25/11/2022			
			SDG Ref	221125-74	221125-74	221125-74			
			Lab Sample No.(s)	27218337	27218354	27218363			
			AGS Reference						
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Benzo(a)pyrene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Carbazole (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Chrysene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Dibenzofuran (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
n-Dibutyl phthalate (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Diethyl phthalate (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Dimethyl phthalate (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
n-Dioctyl phthalate (aq)	<5 µg/l	TM176		<50	<40	<20			
				#	#	#			
Fluoranthene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Fluorene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Hexachlorobenzene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Hexachlorobutadiene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Pentachlorophenol (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Phenol (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Hexachloroethane (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Nitrobenzene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Naphthalene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Isophorone (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Phenanthrene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			
Pyrene (aq)	<1 µg/l	TM176		<10	<8	<4			
				#	#	#			



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-74
Client Ref.: P22-163

Report Number: 670733
Location: Ahascra

Superseded Report: 670023

VOC MS (W)

Results Legend		Customer Sample Ref.	BH01	BH02	BH03		
# ISO17025 accredited. M mCERTS accredited. aq Aqueous / settled sample. diss.filt Dissolved / filtered sample. tot.unfilt Total / unfiltered sample. * Subcontracted - refer to subcontractor report for accreditation status. ** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery (F) Trigger breach confirmed 1-4* @ Sample deviation (see appendix)		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference	0.00 - 0.00 Ground Water (GW) 22/11/2022	0.00 - 0.00 Ground Water (GW) 22/11/2022	0.00 - 0.00 Ground Water (GW) 22/11/2022		
Component	LOD/Units	Method					
Dibromofluoromethane**	%	TM208	103	104	103		
Toluene-d8**	%	TM208	97.3	97.6	97.4		
4-Bromofluorobenzene**	%	TM208	97	99.1	96.1		
Dichlorodifluoromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Chloromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Vinyl chloride	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Bromomethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Chloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Trichlorofluoromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,1-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Carbon disulphide	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Dichloromethane	<3 µg/l	TM208	<3 #	<3 #	<3 #		
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208	<1 #	<1 #	<1 #		
trans-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,1-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
cis-1,2-Dichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
2,2-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Bromochloromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Chloroform	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,1,1-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,1-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Carbontetrachloride	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,2-Dichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Benzene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Trichloroethene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,2-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Dibromomethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Bromodichloromethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
cis-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
Toluene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
trans-1,3-Dichloropropene	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,1,2-Trichloroethane	<1 µg/l	TM208	<1 #	<1 #	<1 #		
1,3-Dichloropropane	<1 µg/l	TM208	<1 #	<1 #	<1 #		



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-74
Client Ref.: P22-163

Report Number: 670733
Location: Ahascra

Superseded Report: 670023

VOC MS (W)

Results Legend			Customer Sample Ref.	BH01	BH02	BH03			
#	ISO17025 accredited.								
M	mCERTS accredited.								
sq	Aqueous / settled sample.								
dis.filt	Dissolved / filtered sample.								
tot.unfilt	Total / unfiltered sample.								
*	Subcontracted - refer to subcontractor report for accreditation status.								
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery.								
(F)	Trigger breach confirmed								
1-4#	Sample deviation (see appendix)								
Component	LOD/Units	Method	Depth (m)	Ground Water (GW)	Ground Water (GW)	Ground Water (GW)			
Tetrachloroethene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
Dibromochloromethane	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,2-Dibromoethane	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
Chlorobenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
Ethylbenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
m,p-Xylene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
o-Xylene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
Styrene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
Bromoform	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
Isopropylbenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,2,3-Trichloropropane	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
Bromobenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
Propylbenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
2-Chlorotoluene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,3,5-Trimethylbenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
4-Chlorotoluene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
tert-Butylbenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,2,4-Trimethylbenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
sec-Butylbenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
4-iso-Propyltoluene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,3-Dichlorobenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,4-Dichlorobenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
n-Butylbenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,2-Dichlorobenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,2,4-Trichlorobenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
Hexachlorobutadiene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
Naphthalene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,2,3-Trichlorobenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#
1,3,5-Trichlorobenzene	<1 µg/l	TM208	0.00 - 0.00	22/11/2022	22/11/2022	22/11/2022	<1	#	#



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-74
Client Ref.: P22-163

Report Number: 670733
Location: Ahascra

Superseded Report: 670023

Table of Results - Appendix

Method No	Reference	Description
SUB		Subcontracted Test
TM043	Method 2320B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part109 1984	Determination of alkalinity in aqueous samples
TM046	Method 4500G, AWWA/APHA, 20th Ed., 1999	Measurement of Dissolved Oxygen by Oxygen Meter
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser
TM152	ISO 17294-2:2016 Water quality - Application of inductively coupled plasma mass spectrometry (ICP-MS)	Analysis of Aqueous Samples by ICP-MS
TM172	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	EPH in Waters
TM176	EPA 8270D Semi-Volatile Organic Compounds by Gas Chromatography/Mass Spectrometry (GC/MS)	Determination of SVOCs in Water by GCMS
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 38924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM197	Modified: US EPA Method 8082.EA Method 174 and 5109631	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Waters
TM208	Modified: US EPA Method 8260b & 624	Determination of Volatile Organic Compounds by Headspace / GC-MS in Waters
TM227	Standard methods for the examination of waters and wastewaters 20th Edition, AWWA/APHA Method 4500.	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4, Standard Methods for the examination of waters and wastewaters 20th Edition, PHA, Washington DC, USA. ISBN 0-87553-235-7 and The Determination of Alkalinity and Acidity in water HMSO, 1981, ISBN 0 11 751601 5.	Determination of pH, EC, TDS and Alkalinity in Aqueous samples

NA = not applicable.

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



CERTIFICATE OF ANALYSIS

Validated

SDG: 221125-74
Client Ref.: P22-163

Report Number: 670733
Location: Ahascra

Superseded Report: 670023

Test Completion Dates

Lab Sample No(s)	27218337	27218354	27218363
Customer Sample Ref.	BH01	BH02	BH03
AGS Ref.			
Depth	0.00 - 0.00	0.00 - 0.00	0.00 - 0.00
Type	Ground Water	Ground Water	Ground Water

Alkalinity as CaCO3	30-Nov-2022	29-Nov-2022	30-Nov-2022
Ammoniacal Nitrogen	30-Nov-2022	30-Nov-2022	30-Nov-2022
Anions by Kone (w)	25-Nov-2022	25-Nov-2022	25-Nov-2022
Coliforms (W)	28-Nov-2022	28-Nov-2022	28-Nov-2022
Cyanide Comp/Free/Total/Thiocyanate	29-Nov-2022	29-Nov-2022	29-Nov-2022
Dissolved Metals by ICP-MS	28-Nov-2022	28-Nov-2022	28-Nov-2022
Dissolved Oxygen by Probe	25-Nov-2022	27-Nov-2022	25-Nov-2022
Fluoride	28-Nov-2022	28-Nov-2022	28-Nov-2022
Mercury Dissolved	01-Dec-2022	01-Dec-2022	01-Dec-2022
Mineral Oil C10-40 Aqueous (W)	02-Dec-2022	02-Dec-2022	02-Dec-2022
PCB Congeners - Aqueous (W)	02-Dec-2022	02-Dec-2022	02-Dec-2022
pH Value	28-Nov-2022	28-Nov-2022	28-Nov-2022
Phosphate by Kone (w)	25-Nov-2022	25-Nov-2022	25-Nov-2022
SVOC MS (W) - Aqueous	30-Nov-2022	30-Nov-2022	30-Nov-2022
Total Organic and Inorganic Carbon	26-Nov-2022	26-Nov-2022	26-Nov-2022
VOC MS (W)	30-Nov-2022	30-Nov-2022	30-Nov-2022



CERTIFICATE OF ANALYSIS

SDG: 221125-74
Client Ref: P22-163

Report Number: 670733
Location: Ahascra

Superseded Report: 670023

Appendix

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

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

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

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

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

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

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

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

General

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

19. Sample Deviations

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

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

20. Asbestos

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

Identification of Asbestos in Bulk Materials & Soils

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

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

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

Visual Estimation Of Fibre Content

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

Respirable Fibres

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

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

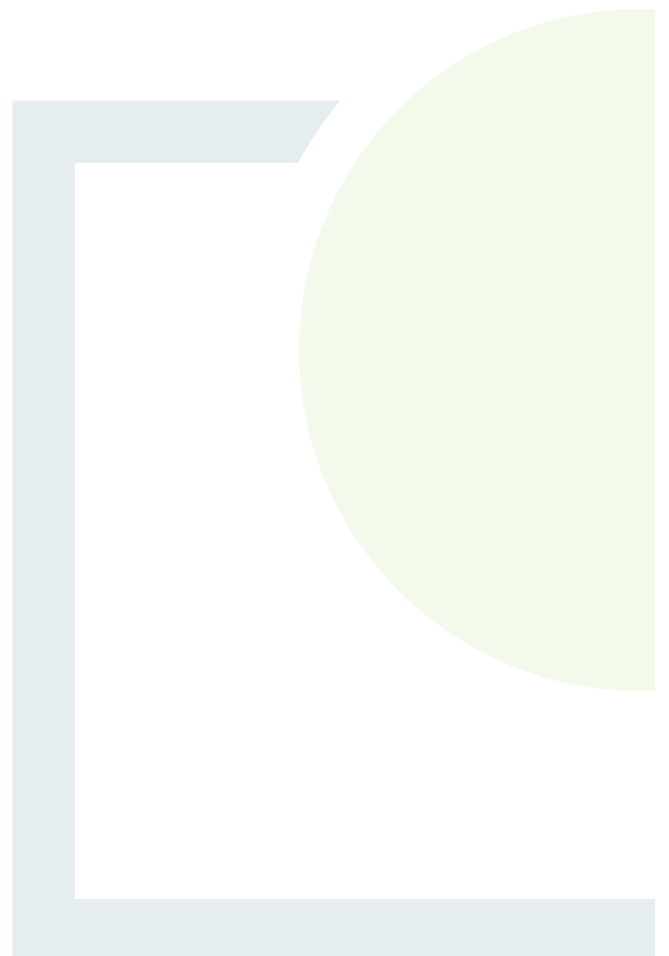
The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

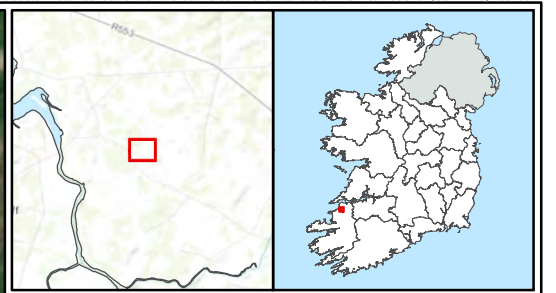


CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING

Appendix 9

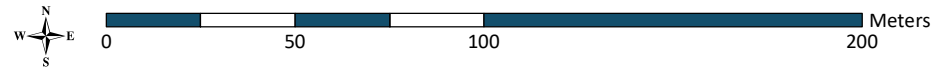
Drawing Requested Under
Point 14





- Legend**
- Site Boundary
 - Waste Boundary
 - Proposed Surface Water Drainage
 - Existing Surface Water Drain
 - Surface Water Sampling Locations
- Borehole Locations**
- Type**
- ⊗ Groundwater
 - ⊗ Leachate
 - ⊗ Retained & Sealed for Gas Monitoring

TITLE:	Ahascra Historic Landfill		
PROJECT:	Ahascra Historic Landfill- Regulation 7 RFI		
FIGURE NO.:	-		
CLIENT:	Kerry County Council		
SCALE:	1:2000	REVISION:	0
DATE:	14/12/2022	PAGE SIZE:	A3





**CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE
& PLANNING**

www.fehilytimoney.ie

📍 CORK OFFICE

Core House
Pouladuff Road,
Cork, T12 D773,
Ireland
+353 21 496 4133

📍 Dublin Office

J5 Plaza,
North Park Business Park,
North Road, Dublin 11, D11 PXT0,
Ireland
+353 1 658 3500

📍 Carlow Office

Unit 6, Bagenalstown Industrial
Park, Royal Oak Road,
Muine Bheag,
Co. Carlow, R21 XW81,
Ireland
+353 59 972 3800

