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KILKENNY HISTORIC LANDFILLS

TIER 3 RISK ASSESSMENT
HISTORIC LANDFILL AT THORPES, CO. KILKENNY

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Prepared for: Kilkenny County Council

Date: January 2021

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TIER 3 RISK ASSESSMENT
HISTORIC LANDFILL AT THORPES, CO. KILKENNY

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Client: Kilkenny County Council

Keywords: Environmental Risk Assessment, site investigation, waste, leachate, remediation.

Abstract: This report presents the findings of a Tier 3 risk assessment carried out on the Thorpes Historic Landfill site, Co. Kilkenny, conducted in accordance with the EPA Code of Practice for unregulated landfill sites. The Tier 3 risk assessment was conducted following recommendations made in an earlier Tier 2 risk assessment.

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1. INTRODUCTION

1.1 Overview

Fehily Timoney and Company (FT) was appointed by Kilkenny County Council to carry out and prepare a Tier 3 risk assessment for Thorpes Historical landfill located east of the town of Ballyragget, Co. Kilkenny. The location of the site is presented in Figure 1.1.

This Tier 3 is developed upon the findings of:

- Tier 1 Risk Assessment, Kilkenny County Council.
- Tier 2 Risk Assessment including Site Investigations and Testing, Fehily Timoney and Company, 2019.

All FT risk assessments were carried out in accordance with the Environmental Protection Agency (EPA) Code of practice (CoP) - Environmental Risk Assessment for Unregulated Waste Disposal Sites guidance document.

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Map Path: R:\Map Production\2020\P20-015\Workspace\P20-015_Fig1-1_SiteLocation_A3.mxd

Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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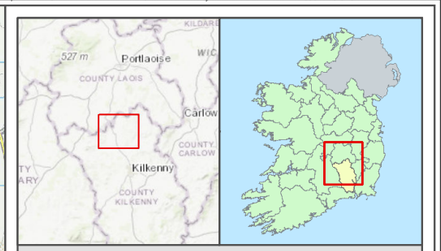

Co. Kilkenny

Legend

Site Boundary

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Meters
0 25 50 100

Kilometers
0 0.5 1 2

Figure Title	Site Location Plan and Aerial View
Figure No.	1.1
Project	Historical Landfills: Thorpes
Client	Kilkenny County Council
Scale	1:50,000
Page Size	A3
Revision	A
Date	28/01/2021

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1.2 Tier 1 Risk Classification

Kilkenny County Council initially prepared a Tier 1 risk assessment for the site. This risk assessment determined that the site was a medium (Class B) risk to the receiving environment. Applying the EPA risk assessment tool as per the EPA CoP for Unregulated Waste Disposal Sites, yielded risk scores of 50% for source-pathway-receptors (SPR) linkages SPR1, SPR5, SPR7 and SPR8. All other SPR linkages were calculated to be of low risk. A summary of the risks is presented below in Table 1-1.

Table 1-1 normalised scores for Tier 1 assessment have been provided for reference purposes as per the current (2020) EPA Section 22 register.

Table 1-1: Tier 1 SPR Linkages

SPR No.	Linkage	Normalised Score	Justification
Leachate migration through combined groundwater and surface water pathways			
SPR1	Leachate => surface water	50%	Groundwater vulnerability was identified as being 'High' and site is underlain by a 'Poor Aquifer – Bedrock which is generally unproductive'; an area of 'Regionally important Aquifer – Karstified (diffuse)' is present within 50m of the western site perimeter. The nearest SAC/NHA (River Nore / Abbeyleix Woods Complex) is located greater than 1km from the waste body. There is a direct connection between the site and the Ballyragget stream.
SPR2	Leachate => SWDTE	0%	There is no SWDTE at risk from the site
Leachate migration through groundwater pathway			
SPR3	Leachate => human presence	33.3%	Residential dwellings located within 250m south-west of the waste body. It is unlikely that this dwelling would be exposed to any subsurface leachate.
SPR4	Leachate => GWDTE	0%	The nearest SAC/NHA (River Nore / Abbeyleix Woods Complex) is located greater than 1 km away from the site boundary.
SPR5	Leachate => Aquifer	50%	Poor Aquifer – generally unproductive except for Local Zones.
SPR6	Leachate => Public Supply	21.4%	No public water supply within 1km of the site (Karst aquifer adjacent to site).
SPR7	Leachate => SWDTE	50%	Direct connection between the waste and surface Ballyragget stream, which crosses the entire site through the centre.
Leachate migration through surface water pathway			
SPR8	Leachate => Surface Water	50%	There is a direct connection between the landfill site and the Ballyragget stream surface water receptor, which crosses the site.

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SPR No.	Linkage	Normalised Score	Justification
SPR9	Leachate => SWDTE	0%	There is a direct surface water pathway from the site to surface water receptors.
Landfill gas migration pathway (lateral & vertical)			
SPR10	Landfill Gas => Human Presence	5%	The historic landfill is located within dense forestation overgrown with the groundwater vulnerability described as 'High' and the aquifer as 'Poor'.
SPR11	Landfill Gas => Human Presence	0%	The historic landfill is located within dense forestation overgrown with the nearest residential dwelling located within 250 m west of the waste body.

1.3 Tier 2 Site investigation

Fehily Timoney and Company (FT) was appointed by Kilkenny County Council to undertake a Tier 2 Risk Assessment. The Tier 2 risk assessment included the following elements:

- Intrusive site investigation works
- Surface water monitoring upstream and downstream of the site
- Factual reporting

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The Tier 2 site investigations confirmed that the historic landfill typically contained fragments of waste typical of non-putrescible commercial and industrial type waste deposited in a single infill area tending east to west within and along the banks of the Ballyragget stream within the site, which covers an area of approximately 0.84 hectares. The waste footprint was estimated from the site walkover, extending to maximum dimensions 210m in length and 40m in width.

1.4 Tier 2 Risk Classification and Tier 2 SPRs

The Tier 2 site investigation risk assessment concluded that the risk rating of the site was Low (Class C). The highest single risk rating for the site was calculated to be 17% for source-pathway-receptor (SPR) Linkage 8, which referred to leachate migration through a surface water pathway to a surface water receptor. The SPR linkages examined in the Tier 2 are presented on Table 1.2:

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Table 1-2: Tier 2 Selected SPR Linkages

SPR No.	Linkage	Normalised Score	Justification
Leachate migration through combined groundwater and surface water pathways			
SPR1	Leachate => surface water	8%	Groundwater vulnerability was identified as 'Low' for the central and eastern areas and as 'High' within the western portion of the site. The site is underlain by a 'Poor Aquifer – generally unproductive except for Local Zones'. The nearest SAC/NHA (River Nore / Abbeyleix Woods Complex) is located greater than 1km from the waste body. There is a direct connection between the site and the Ballyragget stream. Surface water monitoring was conducted at upstream and downstream locations on the Ballyragget stream as part of the Tier 2 site investigation. Surface water monitoring did not demonstrate any deterioration in water quality between upstream and downstream monitoring locations therefore indicating that the landfill is not having a deleterious effect on the Ballyragget stream and connected rivers, as the nearest surface water receptors.
SPR2	Leachate => SWDTE	0%	Aquifer and bedrock present a groundwater pathway however, the surface water monitoring did not demonstrate any deterioration in surface water quality.
Leachate migration through groundwater pathway			
SPR3	Leachate => human presence	6%	Residential dwellings located within 250m south-west of the waste body. Dwellings are upgradient of the site and it is unlikely that this dwelling would be exposed to any subsurface leachate.
SPR4	Leachate => GWDTE	0%	No public water supply within 1km of the site (Karst aquifer adjacent to site).
SPR5	Leachate => Aquifer	2%	Poor Aquifer – generally unproductive except for Local Zones.
SPR6	Leachate => Public Supply	4%	No public water supply within 1km of the site (Karst aquifer adjacent to site).
SPR7	Leachate => SWDTE	6%	Direct connection between the waste and surface Ballyragget stream, which crosses the entire site through the centre. The nearest SAC/NHA (River Nore / Abbeyleix Woods Complex) is located greater than 1km from the waste body. Surface water monitoring did not indicate any deterioration in surface quality attributable to the presence of waste at the historical landfill.
Leachate migration through surface water pathway			
SPR8	Leachate => Surface Water	17%	There is a direct connection between the landfill site and the Ballyragget stream surface water receptor, which crosses the entire site. Surface water monitoring did not demonstrate any deterioration in water quality between upstream and

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SPR No.	Linkage	Normalised Score	Justification
			downstream monitoring locations therefore indicating that the landfill is not having a deleterious effect on the Ballyragget stream, as the nearest surface water receptor.
SPR9	Leachate => SWDTE	0%	There is a direct surface water pathway from the site to surface water receptors. The nearest SAC/NHA (River Nore / Abbeyleix Woods Complex) is located greater than 1km from the waste body. Surface water monitoring did not demonstrate any deterioration in water quality between upstream and downstream monitoring locations.
Landfill gas migration pathway (lateral & vertical)			
SPR10	Landfill Gas => Human Presence	5%	The historic landfill is located within dense forestation overgrown with the groundwater vulnerability described as 'High' and the aquifer as 'Poor'. No visual or olfactory evidence of putrescible / biodegradable waste was noted by FT during the site walkover.
SPR11	Landfill Gas => Human Presence	0%	The historic landfill is located within dense forestation overgrown with the nearest residential dwelling located approximately 250 m south-west of the site. No visual or olfactory evidence of putrescible / biodegradable waste was noted by FT during the site walkover.

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1.4.1 Leachate migration through surface water pathways (SPR8)

Leachate migration poses a low risk to the adjacent surface water stream, the Ballyragget stream. Surface water monitoring was conducted on four occasions, in September 2018, May and twice in June 2020 at two locations on the Ballyragget stream upstream and downstream of the historic landfill. The monitoring results did not present concentrations above the relevant surface water quality thresholds nor did they suggest any deterioration in water quality downstream of the waste body. Although leachate wasn't observed within the Ballyragget Stream and the outcome of surface water monitoring doesn't suggest the site is actively causing a deterioration in water quality downstream of the site there is still a potential pathway for leachate to migrate to the river.

The Tier 2 assessment recommended that additional surface water monitoring be conducted prior to a Certificate of Authorisation (CoA) application. This Tier 3 has been prepared for the purpose of examining the findings of additional surface water monitoring and to inform appropriate site remediation measures.

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2. TIER 3 QUANTITATIVE RISK ASSESSMENT

2.1 Tier 3 Overview

A Tier 3 assessment includes some form of quantitative risk assessment either as a Generic Quantitative Risk Assessment (GQRA) or as a Detailed Quantitative Risk Assessment (DQRA).

This Tier 3 assessment report applies a GQRA to further assess the risk to surface waters and further examines the Tier 2 (see Table 1-2) linkage in relation to the SPR8 Leachate migration through surface water pathway resulting in a risk rating score of 17%.

As part of the Tier 3 assessment, a further review of the Tier 2 site investigations and environment risk assessments was conducted.

The 2018 site investigation findings and the subsequent 2019 Tier 2 assessment concluded that the Thorpes site presents a **low risk**.

The Tier 2 report recommended additional surface water monitoring be conducted at upstream and downstream locations on the Ballyragget Stream prior to the Certificate of Authorisation (CoA) application. This Tier 3 assessment included an analysis and interpretation of those additional rounds of monitoring to confirm the findings of the Tier assessment and confirm the potential risk of the site to the Ballyragget Stream.

Based on the outcomes of the GQRA, suitable remediation measures are presented in Section 4. of this report.

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2.2 Generic Quantitative Risk Assessment

The generic quantitative risk assessment addressed the risk SPR8 Leachate migration through surface water pathway to surface water receptors (SPR8).

The GQRA rely on information gathered as part of the Tier 2 investigations and additional surface water monitoring conducted in 2020. Relevant environmental characteristics considered in evaluating the site and carrying out this Tier 3 investigation are discussed below.

2.3 Existing Geological, and Hydrogeological and Hydrological Environment

The risk to adjacent surface water was identified as the primary environmental risk associated with the site. The application of the EPA risk calculation and scoring methodology, as outlined in the EPA CoP, is reliant on understanding the geological and hydrogeological characteristics of the site and the surrounding environment. An accurate understanding and rating of the geological, hydrogeological and hydrological characteristics of the site and environment are directly linked to determining the primary source-pathway-receptor linkages and potential impacts/risks associated with the site. The Tier 2 site investigation and risk assessment provided a better understanding of the site and surrounding environs. Summary findings of the relevant environmental characteristics considered when evaluating the site and carrying out this Tier 3 investigation are discussed below.

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The site is approximately 1.8 ha in size, in a rural area predominantly overgrown with vegetation and trees, primarily agricultural area in north Kilkenny. The site is located 1.5 km from Ballyragget town. Lands within 1 km of the site are used primarily for agriculture namely grazing. The quaternary map provided by GSI Online identifies the quaternary sediments at the site as 'glaciofluvial sands and gravels' derived from Limestones.

The bedrock beneath the site is founded on the Killeshin Siltstone Formation. This formation is described as 'Muddy siltstone and silty mudstone'. An unconformity runs northwest to southeast beyond the southwestern boundary of the site. The bedrock mapping indicates the sites western boundary lies near 'cherty, muddy, calcarenitic limestone' bedrock from the Clongrenan Formation. The bedrock is characterised as typically medium-coarse grained thick limestone beds with a variable presence of shales. Evidence of karstic landforms have been identified within this bedrock formation at Donaghmore Well located approximately 1.5 km south of the project site.

The underlying bedrock aquifer is a 'Poor Aquifer – Bedrock which is generally unproductive'. An area of 'Regionally important Aquifer – Karstified (diffuse)' is present within 50m of the western site perimeter. There are no Groundwater Drinking Water Protection Areas within the site boundaries according to GSI. The closest one, Ballyconra PWS, is located approximately 2.5 km from site.

The vulnerability of groundwater to contamination is classified as High.

The site is located within the: Nore catchment (Hydrometric Area 15), in the Nore_SC_080 sub-catchment and Nore_130 river sub-basin. The nearest surface water feature to the site is a stream (EPA Name: Ballyragget) which crosses the entire site in the flows through the centre of the site in a southwest direction towards the River Nore, meeting c.1.70 km downstream of the site. The Nore River is located approximately 1.60 km west of the site at its closest point. The Nore discharges eventually to River Barrow, which discharges to Waterford Harbour c. 67 km south of the site.

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2.3.1 Conceptual Site Model (CSM)

A revised conceptual site model has been prepared as part of the Tier 2 assessment and is included below for reference. The revised CSM illustrates the identified potential for leachate migration from the site to the adjacent surface water stream, the Ballyragget stream.

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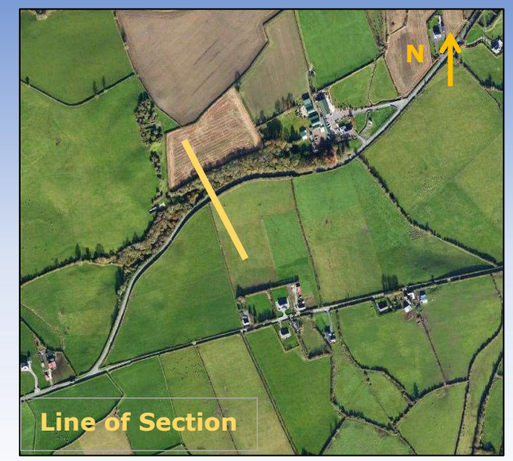
LANDFILL GAS

LEACHATE MIGRATION

ASSUMED INDUSTRIAL AND COMMERCIAL WASTE

GROUNDWATER LEVEL



River Barrow and River Nore SAC c.1.8km south west

River Nore SPA c.1.9km south west

FLY TIPPING WASTE BODY

R694 ROAD

DENSE TREE & VEGETATION COVER

EXPOSED WASTE AT STREAM BANK

GROUNDWATER (Assumed)

BALLYRAGGET STREAM

Flows west/south-west to River Nore

GROUNDWATER

Poor Bedrock Aquifer

Vulnerability Medium - High

GLACIOFLUVIAL SANDS & GRAVELS

(West)

SHALLOW & DEEP WELL DRAINED MINERAL SOILS

(East)

LIMESTONE BEDROCK

(West)

SW FLOW DIRECTION

West South-West

MUDDY SILTSTONE AND SILTY MUDSTONE BEDROCK

(East)

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CROSS SECTION NORTH-WEST / SOUTH-EAST

FIGURE 2.1 THORPES HISTORIC LANDFILL
CONCEPTUAL SITE MODEL

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2.4 Impact of Leachate on Receiving Surface Waters

The potential impact of leachate emissions to the waterbody crossing the site was identified as being the primary risk associated with the site.

Surface water monitoring was conducted in 2018 at two locations upstream (SW2) and downstream (SW1) of the site. In accordance with Tier 2 recommendations, to further assess the potential impact of the landfill, if any, on downstream water quality, further surface water analysis was undertaken at both monitoring locations, SW1 and SW2, monthly for three months on the 13th May, 10th June and 30th June 2020.

The results of the surface water monitoring from SW1 (downstream) and SW2 (upstream) show no exceedances of the water quality standards as per the European Communities Environmental Objectives (Surface Waters) Regulations 2009 as amended 2015, 2019 on four no. monitoring rounds with the exception of ortho-phosphate as PO_4[1].

The results of all monitoring rounds for this site, including September 2018, are shown in Table 3-3. The complete laboratory reports with all results are presented in Appendix 1 to this report.

Orthophosphate (ortho-P) is found to be above the surface water quality thresholds, with upstream samples consistently yielding slightly higher concentrations than downstream samples.

This indicates that the elevated concentrations of ortho-P downstream of the site are more likely to be caused by sources upstream and not directly associated with the waste present.

A review of publicly available EPA monitoring data was conducted to determine surface quality of the River Nore, downstream of the site and to which the Ballyragget Stream is a tributary. The closest monitoring station upstream of the Ballyragget Stream and River Nore confluence is Station ID: RS15NO11400, '0.5 km u/s Ballyragget'. The EPA data (2017) shows a baseline concentration of 0.035 mg/l Orthophosphate for the 2007 to 2018 period. The closest monitoring station downstream to Ballyragget Stream and River Nore confluence is Station ID: RS15NO11480, 'upstream Ballyragget WWTP'. The 2017 baseline concentration for orthophosphate at this location is 0.047 mg/l.

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This data shows a slight increase in orthophosphate concentrations between locations upstream and downstream of the Ballyragget Stream confluence, however downstream concentrations remaining slightly above the 'Good' status mean surface water quality threshold value of 0.035 mg/l for orthophosphate as per European Communities Environmental Objectives (Surface Waters) Regulations 2009 as amended 2015, 2019.

It is noted that the downstream location is positioned downstream of another stream and tributary of the River Nore which may be contributing to the observed increase in orthophosphate concentrations in the River Nore.

[1] Orthophosphate as PO_4 is expressed as 'Molybdate Reactive Phosphorous' within S.I. No. 272 of 2009 (as amended).

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Table 2-1: Surface Water Sampling Results

Test	Units	EQS[1]	MAC	19/09/2018		13/05/2020		10/06/2020		30/06/2020	
				SW1	SW2	SW1	SW2	SW1	SW2	SW1	SW2
Inorganics											
Ammoniacal Nitrogen as N (Total Ammonia)	mg/l	0.065 (mean) 0.140 (95%ile)	0.14	<0.2	<0.2	-	-	-	-	-	-
Conductivity @ 20 deg.C	mS/cm			0.56	0.543	0.521	0.534	0.528	0.545	0.532	0.535
Fluoride	mg/l	0.5		-	-	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Oxygen, dissolved	mg/l			10.1	10.3	10.4	10.7	10.8	10.9	12.1	12.4
pH	pH Units	6.0<pH<9.0		8.08	8.08	8.3	8.32	8.2	8.24	8.25	8.28
Phosphate (Ortho as PO4)	mg/l	≤0.035(mean) ≤0.075 (95%ile)		-	-	0.067	0.092	0.109	0.142	0.114	0.146
Sulphate	mg/l			13.6	14.4	-	-	-	-	-	-
Chloride	mg/l			21.1	23.6	19.3	18.9	19.5	18.6	22.7	20.4
COD, unfiltered	mg/l			-	-	<7	9.01	15.2	16.3	<7	<7
Ammoniacal Nitrogen as N (low level)	mg/l	≤0.065 (mean) ≤0.140 (95%ile)	0.14	-	-	<0.01	<0.01	0.0532	0.0287	0.0274	0.041
Cyanide, Total	mg/l	0.01		-	-	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
BOD, unfiltered	mg/l	≤1.5 (mean) ≤2.6 (95%ile)		<1	<1	<1	<1	<1	<1	<1	<1
Suspended solids, Total	mg/l			-	-	<2	<4	3.75	6.2	<2	<2
Sulphate (soluble) as S	mg/l			-	-	5.37	5.13	4.87	4.83	5.13	4.87
Filtered (Dissolved) Metals											
Mercury (diss.filt)	µg/l		0.07	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Arsenic (diss.filt)	µg/l	25		-	-	<0.5	0.5	<0.5	<0.5	<0.5	0.511
Cadmium (diss.filt)	µg/l	0.15	0.9	-	-	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Chromium (diss.filt)	µg/l	4.7	32	-	-	<1	<1	<1	<1	<1	<1
Copper (diss.filt)	µg/l	30		-	-	0.706	0.768	0.755	0.75	0.777	0.735

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Test	Units	EQS[1]	MAC	19/09/2018		13/05/2020		10/06/2020		30/06/2020	
				SW1	SW2	SW1	SW2	SW1	SW2	SW1	SW2
Lead (diss.filt)	µg/l	1.2	14	-	-	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Nickel (diss.filt)	µg/l	4	34	-	-	<0.4	<0.4	<0.4	<0.4	0.575	0.52
Semi-Volatile Organic Compounds (SVOCs)											
1,2,4-Trichlorobenzene (aq)	µg/l	0.4	N/A	-	-	<1	<1	<1	<1	<2	<1
Anthracene (aq)	µg/l	0.1	0.1	-	-	<1	<1	<1	<1	<2	<1
bis(2-Ethylhexyl) phthalate (aq)	µg/l	1.3	N/A	-	-	<2	<2	<2	<2	<4	<2
Benzo(b)fluoranthene (aq)	µg/l		0.017	-	-	<1	<1	<1	<1	<2	<1
Benzo(k)fluoranthene (aq)	µg/l		0.017	-	-	<1	<1	<1	<1	<2	<1
Benzo(a)pyrene (aq)	µg/l	0.00017	0.27	-	-	<1	<1	<1	<1	<2	<1
Benzo(g,h,i)perylene (aq)	µg/l		0.0082	-	-	<1	<1	<1	<1	<2	<1
Diethyl phthalate (aq)	µg/l	1.3	N/A	-	-	<1	<1	<1	<1	<2	<1
Fluoranthene (aq)	µg/l	0.0063	0.12	-	-	<1	<1	<1	<1	<2	<1
Hexachlorobenzene (aq)	µg/l		0.05	-	-	<1	<1	<1	<1	<2	<1
Hexachlorobutadiene (aq)	µg/l		0.6	-	-	<1	<1	<1	<1	<2	<1
Pentachlorophenol (aq)	µg/l	0.4	1	-	-	<1	<1	<1	<1	<2	<1
Phenol (aq)	µg/l	8	46	-	-	<1	<1	<1	<1	<2	<1
Naphthalene (aq)	µg/l	2	130	-	-	<1	<1	<1	<1	<2	<1
Indeno(1,2,3-cd)pyrene (aq)	µg/l		N/A	-	-	<1	<1	<1	<1	<2	<1
Volatile Organic Compounds (VOCs)											
Dichloromethane	µg/l	20	N/A	-	-	<3	<3	<3	<3	<3	<3
Carbontetrachloride	µg/l	12	N/A	-	-	<1	<1	<1	<1	<1	<1
1,2-Dichloroethane	µg/l	10	N/A	-	-	<1	<1	<1	<1	<1	<1
Benzene	µg/l	10	50	-	-	<1	<1	<1	<1	<1	<1
Toluene	µg/l	10		-	-	<1	<1	<1	<1	<1	<1
m,p-Xylene	µg/l	10		-	-	<1	<1	<1	<1	<1	<1
o-Xylene	µg/l	10		-	-	<1	<1	<1	<1	<1	<1

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Test	Units	EQS[1]	MAC	19/09/2018		13/05/2020		10/06/2020		30/06/2020	
				SW1	SW2	SW1	SW2	SW1	SW2	SW1	SW2
1,2,4-Trichlorobenzene	µg/l	0.4	N/A	-	-	<1	<1	<1	<1	<1	<1
Hexachlorobutadiene	µg/l		0.6	-	-	<1	<1	<1	<1	<1	<1
Naphthalene	µg/l	2	130	-	-	<1	<1	<1	<1	<1	<1
1,2,3-Trichlorobenzene	µg/l	0.4	N/A	-	-	<1	<1	<1	<1	<1	<1
1,3,5-Trichlorobenzene	µg/l	0.4	N/A	-	-	<1	<1	<1	<1	<1	<1
Combined Pesticides / Herbicides											
Pentachlorobenzene	µg/l	0.007	N/A	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Trifluralin	µg/l	0.03	N/A	-	-	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01
Alachlor	µg/l	0.3	0.7	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Heptachlor	µg/l	0.0000002	0.0003	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Aldrin	µg/l	sum = 0.01	N/A	-	-	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01
Terbutryn	µg/l	0.065	0.34	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Isodrin	µg/l	sum = 0.01	N/A	-	-	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01
Heptachlor epoxide	µg/l	0.0000002	0.0003	-	-	<0.02	<0.02	<0.01	<0.01	<0.01	<0.01
Endosulphan I	µg/l	0.005	0.01	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,3,5-Trichlorobenzene	µg/l	0.4	N/A	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	µg/l	sum = 0.01	N/A	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobutadiene	µg/l		0.6	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
1,2,4-Trichlorobenzene	µg/l	0.4	N/A	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	µg/l	sum = 0.01	N/A	-	-	<0.01	<0.01	<0.01	<0.02	<0.01	<0.01
1,2,3-Trichlorobenzene	µg/l	0.4	N/A	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dichlorvos	µg/l	0.0006	0.0007	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan II	µg/l	0.005	0.01	-	-	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
p,p'-DDT	µg/l	0.01	N/A	-	-	<0.01	<0.01	<0.02	<0.02	<0.03	<0.03
Hexachlorobenzene	µg/l		0.05	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulphan Sulphate	µg/l	0.005	0.01	-	-	<0.04	<0.04	<0.02	<0.02	<0.02	<0.02
Diazinon	µg/l	0.01	0.02	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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Test	Units	EQS[1]	MAC	19/09/2018		13/05/2020		10/06/2020		30/06/2020	
				SW1	SW2	SW1	SW2	SW1	SW2	SW1	SW2
Triallate	µg/l	670	670	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Atrazine	µg/l	0.6	2	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Simazine	µg/l	1	4	-	-	<0.01	<0.01	<0.01	<0.01	0.0156	0.0165
Chlorpyriphos-methyl	µg/l	0.03	0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Dimethoate	µg/l	0.8	4	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorpyriphos	µg/l	0.03	0.1	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Chlorfenvinphos	µg/l	0.1	0.3	-	-	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01

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). Refers to Annual-Average (AA)

* Items shaded in **bold** are in exceedance of the European Communities MACs

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

conclusions and recommendations

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3. CONCLUSIONS AND RECCOMENDATIONS

3.1 Conclusion

This Tier 3 assessment:

- Reviewed the findings of the Tier 1 risk assessment.
- Reviewed the findings of the Tier 2 site investigation and risk assessment.
- Applied a GQRA and reviewed additional surface water monitoring results comparing them to relevant surface water quality standards in order to determine the impact of the deposited waste on the quality of the Ballyragget Stream.
- Determined the site to be a Low Risk (Class C), with the highest risk identified at the site is the potential for migration of pollutants from the site to the adjacent Ballyragget stream. However, monitoring of the stream has shown no observable impact of the landfill on the water body.
- Based on the site investigation results of the initial Tier 2 assessment and the further monitoring undertaken the site is classified as Low Risk.
- For a low-risk site, the CoP indicates that these sites are not considered to pose a significant risk to the environment or human health.

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3.2 Recommendations

It is recommended that this site can proceed with a Certificate of Authorisation application. The Tier 3 environmental risk assessment has confirmed the risk rating of the site to be Low risk (Class C).

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4. REMEDIAL ACTION PLAN

4.1 Remediation Plan

The Tier 3 risk assessment has determined the site to be a Low Risk (Class C), with the principle risk identified at the site is the potential for migration of pollutants from the site to the adjacent Ballyragget stream.

4.1.1 Leachate migration through surface water pathways (SPR8)

The Tier 2 assessment determined that the site presented only a low risk to the environment, with respect to all SPR linkages with the highest calculated score for the site being 17%, referring to SPR8.

Three additional rounds of surface water monitoring on the Ballyragget Stream conducted in 2020, indicated that the waste is not causing deleterious effect on the surface water quality of the stream.

Elevated concentrations of ortho-phosphate, above the environmental quality standard threshold value were detected in upstream and downstream samples, with upstream samples yielding higher concentrations than downstream samples. This indicates that the elevated concentrations observed are likely attributed to other sources upstream of the waste material and not directly associated with the site.

These findings confirm the determination that the risk associated with the site is low.

No physical remediation or engineering works are proposed. The primary objective of the proposed remediation will be to routinely monitor the surface water quality of the Ballyragget Stream, upstream and downstream of the site.

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4.1.1 Proposed Surface Water Monitoring Regime

The EPA Landfill Monitoring landfill manual outlines recommended, minimum monitoring requirements for ground and surface waters. These parameters are shown in Table 5-1 below and are as presented in Table C.2 of the EPA's *Landfill Manuals - Landfill Monitoring, 2nd Edition (2003).*

Surface water monitoring shall be measured at SW1 and SW2 locations annually in accordance with parameters listed in Table 5-1.

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Table 5-1: Proposed Monitoring Schedule

Monitoring Parameter[2]	Frequency	Surface Water	Location
Temperature	Annual	✓	SW1 SW2
Dissolved Oxygen		✓	
pH		✓	
Electrical Conductivity		✓	
Total suspended solids		✓	
Total dissolved solids		✓	
Ammonia (as N)		✓	
Total oxidized nitrogen (as N)		✓	
Total organic carbon		✓	
Biochemical Oxygen Demand		✓	
Chemical Oxygen Demand		✓	
Metals[3]		✓	
Total Alkalinity (as $CaCO_3$)		✓	
Sulphate		✓	
Chloride		✓	
Molybdate Reactive Phosphorous		✓	
Cyanide (Total)		✓	
Fluoride		✓	

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[2] Tables D.1 and D.2 of the EPA Landfill Monitoring manual recommend guideline minimum reporting values for parameters.

[3] Metals for analysis should include: calcium, magnesium, sodium, potassium, iron, manganese, cadmium, chromium (total), copper, nickel, lead, zinc, arsenic, boron and mercury.

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30 YEARS

CONSULTANTS IN ENGINEERING,
ENVIRONMENTAL SCIENCE & PLANNING

APPENDIX 1

Surface Water Sampling Results

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

Attention: Daniel Hayden

CERTIFICATE OF ANALYSIS

Date:	28 September 2018
Customer:	D_FTIM_DUB
Sample Delivery Group (SDG):	180920-159
Your Reference:	Surface Water
Location:	Thorpes
Report No:	474401

This report has been revised and directly supersedes 474266 in its entirety.

We received 2 samples on Thursday September 20, 2018 and 2 of these samples were scheduled for analysis which was completed on Friday September 28, 2018. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

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Approved By:

Sonia McWhan
Operations Manager

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CERTIFICATE OF ANALYSIS

SDG:	180920-159	**Client Reference:**	Surface Water	**Report Number:**	474401
Location:	Thorpes	**Order Number:**	Z1237	**Superseded Report:**	474266

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
18372401	SW1		0.00 - 0.00	19/09/2018
18379843	SW2		0.00 - 0.00	19/09/2018

Maximum Sample/Coolbox Temperature (°C) :

ISO5667-3 Water quality - Sampling - Part3 -

During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

12.2

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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

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Validated

CERTIFICATE OF ANALYSIS

SDG:	180920-159	**Client Reference:**	Surface Water	**Report Number:**	474401
Location:	Thorpes	**Order Number:**	Z1237	**Superseded Report:**	474266

Results Legend

X Test

N No Determination Possible

Sample Types -

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

Lab Sample No(s)						18372401				18379843
Customer Sample Reference						SW1				SW2
AGS Reference										
Depth (m)						0.00 - 0.00				0.00 - 0.00
Container						250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)
Sample Type						SW	SW	SW	SW	SW	SW	SW	SW
Ammoniacal Nitrogen	All	NDPs: 0 Tests: 2						X				X	
Anions by Kone (w)	All	NDPs: 0 Tests: 2					X				X		
BOD True Total	All	NDPs: 0 Tests: 2				X				X			
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2					X				X		
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2							X				X
Dissolved Oxygen by Probe	All	NDPs: 0 Tests: 2					X				X		
pH Value	All	NDPs: 0 Tests: 2					X				X		

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Validated

CERTIFICATE OF ANALYSIS

SDG:	180920-159	**Client Reference:**	Surface Water	**Report Number:**	474401
Location:	Thorpes	**Order Number:**	Z1237	**Superseded Report:**	474266

Results Legend	
#	ISO17025 accredited.
M	*m*CERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted test.
**	% 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
1-5&+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	19/09/2018	19/09/2018				
			Sample Time	.	.				
			Date Received	20/09/2018	20/09/2018				
			SDG Ref	180920-159	180920-159				
			Lab Sample No.(s)	18372401	18379843				
			AGS Reference						
BOD, unfiltered	<1 mg/l	TM045		<1 #	<1 #				
Oxygen, dissolved	<0.3 mg/l	TM046		10.1	10.3				
Ammoniacal Nitrogen as N	<0.2 mg/l	TM099		<0.2 #	<0.2 #				
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120		0.56 #	0.543 #				
Sodium (Dis.Filt)	<0.076 mg/l	TM152		19.7 #	17.4 #				
Potassium (Dis.Filt)	<0.2 mg/l	TM152		3.51 #	3.45 #				
Sulphate	<2 mg/l	TM184		13.6 #	14.4 #				
Chloride	<2 mg/l	TM184		21.1 #	23.6 #				
pH	<1 pH Units	TM256		8.08 #	8.08 #				

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CERTIFICATE OF ANALYSIS

SDG:	180920-159	**Client Reference:**	Surface Water	**Report Number:**	474401
Location:	Thorpes	**Order Number:**	Z1237	**Superseded Report:**	474266

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
TM099	BS 2690: Part 7:1968 / BS 6068: Part2.11:1984	Determination of Ammonium in Water Samples using the Kone Analyser
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS
TM184	EPA Methods 325.1 & 325.2,	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers
TM256	The measurement of Electrical Conductivity and the Laboratory determination of pH Value of Natural, Treated and Wastewaters. HMSO, 1978. ISBN 011 751428 4.	Determination of pH in Water and Leachate using the GLpH pH Meter

NA = not applicable.

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

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CERTIFICATE OF ANALYSIS

SDG:	180920-159	**Client Reference:**	Surface Water	**Report Number:**	474401
Location:	Thorpes	**Order Number:**	Z1237	**Superseded Report:**	474266

Test Completion Dates

Lab Sample No(s)	18372401	18379843
Customer Sample Ref.	SW1	SW2
AGS Ref.		
Depth	0.00 - 0.00	0.00 - 0.00
Type	Surface Water	Surface Water
Ammoniacal Nitrogen	27-Sep-2018	26-Sep-2018
Anions by Kone (w)	28-Sep-2018	27-Sep-2018
BOD True Total	26-Sep-2018	26-Sep-2018
Conductivity (at 20 deg.C)	27-Sep-2018	25-Sep-2018
Dissolved Metals by ICP-MS	28-Sep-2018	27-Sep-2018
Dissolved Oxygen by Probe	22-Sep-2018	21-Sep-2018
pH Value	28-Sep-2018	25-Sep-2018

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Appendix

General

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

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

3. 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.

4. 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.

5. 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.

6. 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 (2005), 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.

7. 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.

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

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

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals - total metals must be requested separately.

11. Results relate only to the items tested.

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

13. **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.

14. **Product analyses** - Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethyphenol, 3,5 Dimethylphenol).

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

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

18. 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.

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

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

21. 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.

22. 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.

23. 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.

24. **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.

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	**Holding time exceeded before sample received**
5	**Samples exceeded holding time before presevation was performed**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to sampled on date**
&	**Sample Holding Time exceeded - Late arrival of instructions.**

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Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials 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 (2005).

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, based on HSG 248 (2005).

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.

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.

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

Attention: Gary Lawlor

CERTIFICATE OF ANALYSIS

Date of report Generation:	22 May 2020
Customer:	Fehily Timoney
Sample Delivery Group (SDG):	200516-38
Your Reference:	P20-015
Location:	Thorpes Landfill
Report No:	553006

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We received 2 samples on Saturday May 16, 2020 and 2 of these samples were scheduled for analysis which was completed on Friday May 22, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

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

EPA Export 22-10-2021:02:37:56

CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
22157361	SW1		0.00 - 0.00	13/05/2020
22157370	SW2		0.00 - 0.00	13/05/2020

Maximum Sample/Coolbox Temperature (°C) : **6.8**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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

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Validated

CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

- X Test
- N No Determination Possible

Sample Types -

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

Lab Sample No(s)			22157361						22157370					
Customer Sample Reference			SW1						SW2					
AGS Reference														
Depth (m)			0.00 - 0.00						0.00 - 0.00					
Container			0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)
Sample Type			SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
Acid Herbicides by GCMS	All	NDPs: 0 Tests: 2	X						X					
Ammonium Low	All	NDPs: 0 Tests: 2				X					X			
Anions by Kone (w)	All	NDPs: 0 Tests: 2	X						X					
BOD True Total	All	NDPs: 0 Tests: 2		X						X				
COD Unfiltered	All	NDPs: 0 Tests: 2		X						X				
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2			X						X			
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 2			X								X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2					X					X		
Dissolved Oxygen by Probe	All	NDPs: 0 Tests: 2			X						X			
Fluoride	All	NDPs: 0 Tests: 2			X						X			
Mercury Dissolved	All	NDPs: 0 Tests: 2					X					X		
Mineral Oil C10-40 Aqueous (W)	All	NDPs: 0 Tests: 2			X						X			
PCB Congeners - Aqueous (W)	All	NDPs: 0 Tests: 2			X						X			
Pesticides (Suite I) by GCMS	All	NDPs: 0 Tests: 2	X						X					
Pesticides (Suite II) by GCMS	All	NDPs: 0 Tests: 2	X						X					

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15:39:37 22/05/2020

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CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

Sample Types -
S - Soil/Solid
UNS - Unspecified Solid
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SW - Surface Water
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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)								22157361							22157370
Customer Sample Reference								SW1							SW2
AGS Reference															
Depth (m)								0.00 - 0.00							0.00 - 0.00
Container								0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	Vial (ALE297)	0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)
Sample Type								SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW	SW
Pesticides (Suite III) by GCMS	All	NDPs: 0 Tests: 2						X						X					
pH Value	All	NDPs: 0 Tests: 2								X						X			
Phosphate by Kone (w)	All	NDPs: 0 Tests: 2						X						X					
Suspended Solids	All	NDPs: 0 Tests: 2								X						X			
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 2						X						X					
VOC MS (W)	All	NDPs: 0 Tests: 2											X						X

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CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2			
			Depth (m)	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Surface Water (SW)	Surface Water (SW)			
			Date Sampled	13/05/2020	13/05/2020			
			Sample Time	.	.			
			Date Received	16/05/2020	16/05/2020			
			SDG Ref	200516-38	200516-38			
			Lab Sample No.(s)	22157361	22157370			
			AGS Reference					
Suspended solids, Total	<2 mg/l	TM022		<2 #	<4 #			
BOD, unfiltered	<1 mg/l	TM045		<1 #	<1 #			
Oxygen, dissolved	<0.3 mg/l	TM046		10.4	10.7			
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		<0.01 #	<0.01 2 #			
Fluoride	<0.5 mg/l	TM104		<0.5	<0.5			
COD, unfiltered	<7 mg/l	TM107		<7 #	9.01 #			
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120		0.521 #	0.534 #			
Arsenic (diss.filt)	<0.5 µg/l	TM152		<0.5 #	0.5 #			
Barium (diss.filt)	<0.2 µg/l	TM152		22.1 #	22.1 #			
Boron (diss.filt)	<10 µg/l	TM152		19.2 #	21.2 #			
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #			
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #			
Copper (diss.filt)	<0.3 µg/l	TM152		0.706 #	0.768 #			
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	<0.2 #			
Manganese (diss.filt)	<3 µg/l	TM152		<3 #	<3 #			
Nickel (diss.filt)	<0.4 µg/l	TM152		<0.4 #	<0.4 #			
Phosphorus (diss.filt)	<10 µg/l	TM152		34.3 #	34.8 #			
Selenium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #			
Thallium (diss.filt)	<2 µg/l	TM152		<2 #	<2 #			
Zinc (diss.filt)	<1 µg/l	TM152		21 #	3.35 #			
Sodium (Dis.Filt)	<0.076 mg/l	TM152		14.6 #	14.8 #			
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		13.7 #	14.6 #			
Potassium (Dis.Filt)	<0.2 mg/l	TM152		2.33 #	2.05 #			
Calcium (Dis.Filt)	<0.2 mg/l	TM152		99.9 #	101 #			
Iron (Dis.Filt)	<0.019 mg/l	TM152		<0.019 #	0.0193 #			
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172		<100	<100			
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01	<0.01			
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184		0.067 #	0.092 #			
Chloride	<2 mg/l	TM184		19.3 #	18.9 #			
Sulphate (soluble) as S	<1 mg/l	TM184		5.37 #	5.13 #			
PCB congener 28	<0.015 µg/l	TM197		<0.015	<0.015			
PCB congener 52	<0.015 µg/l	TM197		<0.015	<0.015			
PCB congener 101	<0.015 µg/l	TM197		<0.015	<0.015			

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CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2
			Depth (m)	0.00 - 0.00	0.00 - 0.00
			Sample Type	Surface Water (SW)	Surface Water (SW)
			Date Sampled	13/05/2020	13/05/2020
			Sample Time	.	.
			Date Received	16/05/2020	16/05/2020
			SDG Ref	200516-38	200516-38
			Lab Sample No.(s)	22157361	22157370
			AGS Reference		
PCB congener 118	<0.015 µg/l	TM197		<0.015	<0.015
PCB congener 138	<0.015 µg/l	TM197		<0.015	<0.015
PCB congener 153	<0.015 µg/l	TM197		<0.015	<0.015
PCB congener 180	<0.015 µg/l	TM197		<0.015	<0.015
Sum of detected EC7 PCB's	<0.105 µg/l	TM197		<0.105	<0.105
Cyanide, Total	<0.05 mg/l	TM227		<0.05 2	<0.05
pH	<1 pH Units	TM256		8.3 #	8.32 #
Trifluralin	<0.01 µg/l	TM343		<0.02	<0.02
alpha-HCH	<0.01 µg/l	TM343		<0.01	<0.01
gamma-HCH (Lindane)	<0.01 µg/l	TM343		<0.01	<0.01
Heptachlor	<0.01 µg/l	TM343		<0.01	<0.01
Aldrin	<0.01 µg/l	TM343		<0.02	<0.02
beta-HCH	<0.01 µg/l	TM343		<0.01	<0.01
Isodrin	<0.01 µg/l	TM343		<0.02	<0.02
delta-HCH	<0.01 µg/l	TM343		<0.01	<0.01
Heptachlor epoxide	<0.01 µg/l	TM343		<0.02	<0.02
o,p'-DDE	<0.01 µg/l	TM343		<0.02	<0.02
Endosulphan I	<0.01 µg/l	TM343		<0.01	<0.01
trans-Chlordane	<0.01 µg/l	TM343		<0.02	<0.02
cis-Chlordane	<0.01 µg/l	TM343		<0.02	<0.02
p,p'-DDE	<0.01 µg/l	TM343		<0.02	<0.02
Dieldrin	<0.01 µg/l	TM343		<0.01	<0.01
o,p'-DDD (TDE)	<0.01 µg/l	TM343		<0.01	<0.01
Endrin	<0.01 µg/l	TM343		<0.01	<0.01
o,p'-DDT	<0.01 µg/l	TM343		<0.01	<0.01
p,p'-DDD (TDE)	<0.01 µg/l	TM343		<0.01	<0.01
Endosulphan II	<0.02 µg/l	TM343		<0.02	<0.02
p,p'-DDT	<0.01 µg/l	TM343		<0.01	<0.01
o,p'-Methoxychlor	<0.01 µg/l	TM343		<0.01	<0.01
p,p'-Methoxychlor	<0.01 µg/l	TM343		<0.02	<0.02
Endosulphan Sulphate	<0.02 µg/l	TM343		<0.04	<0.04
Permethrin I	<0.01 µg/l	TM343		<0.01	<0.01
Permethrin II	<0.01 µg/l	TM343		<0.01	<0.01

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CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
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1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	13/05/2020	13/05/2020				
			Sample Time	.	.				
			Date Received	16/05/2020	16/05/2020				
			SDG Ref	200516-38	200516-38				
			Lab Sample No.(s)	22157361	22157370				
			AGS Reference						
1,3,5-Trichlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
Hexachlorobutadiene	<0.01 µg/l	TM344		<0.01	<0.01				
1,2,4-Trichlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
1,2,3-Trichlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
Dichlorvos	<0.01 µg/l	TM344		<0.01	<0.01				
Dichlobenil	<0.01 µg/l	TM344		<0.01	<0.01				
Mevinphos	<0.01 µg/l	TM344		<0.01	<0.01				
Tecnazene	<0.01 µg/l	TM344		<0.01	<0.01				
Hexachlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
Demeton-S-methyl	<0.01 µg/l	TM344		<0.01	<0.01				
Phorate	<0.01 µg/l	TM344		<0.01	<0.01				
Diazinon	<0.01 µg/l	TM344		<0.01	<0.01				
Triallate	<0.01 µg/l	TM344		<0.01	<0.01				
Atrazine	<0.01 µg/l	TM344		<0.01	<0.01				
Simazine	<0.01 µg/l	TM344		<0.01	<0.01				
Disulfoton	<0.01 µg/l	TM344		<0.01	<0.01				
Propetamphos	<0.01 µg/l	TM344		<0.01	<0.01				
Chlorpyriphos-methyl	<0.01 µg/l	TM344		<0.01	<0.01				
Dimethoate	<0.01 µg/l	TM344		<0.01	<0.01				
Pirimiphos-methyl	<0.01 µg/l	TM344		<0.01	<0.01				
Chlorpyriphos	<0.01 µg/l	TM344		<0.01	<0.01				
Methyl Parathion	<0.01 µg/l	TM344		<0.01	<0.01				
Malathion	<0.01 µg/l	TM344		<0.01	<0.01				
Fenthion	<0.01 µg/l	TM344		<0.01	<0.01				
Fenitrothion	<0.01 µg/l	TM344		<0.01	<0.01				
Triadimefon	<0.01 µg/l	TM344		<0.01	<0.01				
Pendimethalin	<0.01 µg/l	TM344		<0.01	<0.01				
Parathion	<0.01 µg/l	TM344		<0.01	<0.01				
Chlorfenvinphos	<0.01 µg/l	TM344		<0.01	<0.01				
trans-Chlordane	<0.01 µg/l	TM344		<0.01	<0.01				
cis-Chlordane	<0.01 µg/l	TM344		<0.01	<0.01				
Ethion	<0.01 µg/l	TM344		<0.01	<0.01				
Carbophenothion	<0.01 µg/l	TM344		<0.01	<0.01				

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SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

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			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	13/05/2020	13/05/2020				
			Sample Time	.	.				
			Date Received	16/05/2020	16/05/2020				
			SDG Ref	200516-38	200516-38				
			Lab Sample No.(s)	22157361	22157370				
			AGS Reference						
Triazophos	<0.01 µg/l	TM344		<0.01	<0.01				
Phosalone	<0.01 µg/l	TM344		<0.01	<0.01				
Azinphos methyl	<0.02 µg/l	TM344		<0.04	<0.04				
Azinphos ethyl	<0.02 µg/l	TM344		<0.02	<0.02				
Etridiazole	<0.01 µg/l	TM345		<0.01	<0.01				
Pentachlorobenzene	<0.01 µg/l	TM345		<0.01	<0.01				
Tributylphosphate	<0.01 µg/l	TM345		<0.01	<0.01				
Propachlor	<0.01 µg/l	TM345		<0.01	<0.01				
Quintozene (PCNB)	<0.01 µg/l	TM345		<0.01	<0.01				
Omethoate	<0.01 µg/l	TM345		<0.02	<0.02				
Propazine	<0.01 µg/l	TM345		<0.01	<0.01				
Propyzamide	<0.01 µg/l	TM345		<0.01	<0.01				
Alachlor	<0.01 µg/l	TM345		<0.01	<0.01				
Prometryn	<0.01 µg/l	TM345		<0.01	<0.01				
Telodrin	<0.01 µg/l	TM345		<0.01	<0.01				
Terbutryn	<0.01 µg/l	TM345		<0.01	<0.01				
Chlorothalonil	<0.01 µg/l	TM345		<0.01	<0.01				
Etrimphos	<0.01 µg/l	TM345		<0.01	<0.01				
Metazachlor	<0.01 µg/l	TM345		<0.01	<0.01				
Cyanazine	<0.01 µg/l	TM345		<0.01	<0.01				
Trietazine	<0.01 µg/l	TM345		<0.01	<0.01				
Coumaphos	<0.01 µg/l	TM345		<0.01	<0.01				
Phosphamidon I	<0.01 µg/l	TM345		<0.02	<0.02				
Phosphamidon II	<0.01 µg/l	TM345		<0.01	<0.01				
Dinitro-o-cresol	<0.1 µg/l	TM411		<0.1	<0.1				
Clopyralid	<0.04 µg/l	TM411		<0.04	<0.04				
MCPA	<0.05 µg/l	TM411		<0.05	<0.05				
Mecoprop	<0.04 µg/l	TM411		<0.04	<0.04				
Dicamba	<0.04 µg/l	TM411		<0.04	<0.04				
MCPB	<0.05 µg/l	TM411		<0.05	<0.05				
2,4-DB	<0.1 µg/l	TM411		<0.1	<0.1				
2,3,6-Trichlorobenzoic acid	<0.05 µg/l	TM411		<0.05	<0.05				
Dichlorprop	<0.1 µg/l	TM411		<0.1	<0.1				

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CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

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			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	13/05/2020	13/05/2020				
			Sample Time	.	.				
			Date Received	16/05/2020	16/05/2020				
			SDG Ref	200516-38	200516-38				
			Lab Sample No.(s)	22157361	22157370				
			AGS Reference						
Triclopyr	<0.05 µg/l	TM411		<0.05	<0.05				
Fenoprop (Silvex)	<0.1 µg/l	TM411		<0.1	<0.1				
2,4-Dichlorophenoxyacetic acid	<0.05 µg/l	TM411		<0.05	<0.05				
2,4,5-Trichlorophenoxyacetic acid	<0.05 µg/l	TM411		<0.05	<0.05				
Bromoxynil	<0.04 µg/l	TM411		<0.04	<0.04				
Benazolin	<0.04 µg/l	TM411		<0.04	<0.04				
Ioxynil	<0.05 µg/l	TM411		<0.05	<0.05				
Pentachlorophenol	<0.04 µg/l	TM411		<0.04	<0.04				
Fluoroxypyr	<0.1 µg/l	TM411		2.07	1.28				

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CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2
			Depth (m)	0.00 - 0.00	0.00 - 0.00
			Sample Type	Surface Water (SW)	Surface Water (SW)
			Date Sampled	13/05/2020	13/05/2020
			Sample Time	.	.
			Date Received	16/05/2020	16/05/2020
			SDG Ref	200516-38	200516-38
			Lab Sample No.(s)	22157361	22157370
			AGS Reference		
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176		<1 #	<1 #
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176		<1 #	<1 #
2,4-Dichlorophenol (aq)	<1 µg/l	TM176		<1 #	<1 #
2,4-Dimethylphenol (aq)	<1 µg/l	TM176		<1 #	<1 #
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176		<1 #	<1 #
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176		<1 #	<1 #
2-Chloronaphthalene (aq)	<1 µg/l	TM176		<1 #	<1 #
2-Chlorophenol (aq)	<1 µg/l	TM176		<1 #	<1 #
2-Methylnaphthalene (aq)	<1 µg/l	TM176		<1 #	<1 #
2-Methylphenol (aq)	<1 µg/l	TM176		<1 #	<1 #
2-Nitroaniline (aq)	<1 µg/l	TM176		<1 #	<1 #
2-Nitrophenol (aq)	<1 µg/l	TM176		<1 #	<1 #
3-Nitroaniline (aq)	<1 µg/l	TM176		<1 #	<1 #
4-Bromophenylphenylether (aq)	<1 µg/l	TM176		<1 #	<1 #
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176		<1 #	<1 #
4-Chloroaniline (aq)	<1 µg/l	TM176		<1	<1
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176		<1 #	<1 #
4-Methylphenol (aq)	<1 µg/l	TM176		<1 #	<1 #
4-Nitroaniline (aq)	<1 µg/l	TM176		<1 #	<1 #
4-Nitrophenol (aq)	<1 µg/l	TM176		<1	<1
Azobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #
Acenaphthylene (aq)	<1 µg/l	TM176		<1 #	<1 #
Acenaphthene (aq)	<1 µg/l	TM176		<1 #	<1 #
Anthracene (aq)	<1 µg/l	TM176		<1 #	<1 #
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176		<1 #	<1 #
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176		<1 #	<1 #
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176		<2 #	<2 #
Butylbenzyl phthalate (aq)	<1 µg/l	TM176		<1 #	<1 #
Benzo(a)anthracene (aq)	<1 µg/l	TM176		<1 #	<1 #

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CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	13/05/2020	13/05/2020				
			Sample Time	.	.				
			Date Received	16/05/2020	16/05/2020				
			SDG Ref	200516-38	200516-38				
			Lab Sample No.(s)	22157361	22157370				
			AGS Reference						
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Benzo(a)pyrene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Carbazole (aq)	<1 µg/l	TM176		<1 #	<1 #				
Chrysene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Dibenzofuran (aq)	<1 µg/l	TM176		<1 #	<1 #				
n-Dibutyl phthalate (aq)	<1 µg/l	TM176		<1 #	<1 #				
Diethyl phthalate (aq)	<1 µg/l	TM176		<1 #	<1 #				
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Dimethyl phthalate (aq)	<1 µg/l	TM176		<1 #	<1 #				
n-Dioctyl phthalate (aq)	<5 µg/l	TM176		<5 #	<5 #				
Fluoranthene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Fluorene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Hexachlorobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Hexachlorobutadiene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Pentachlorophenol (aq)	<1 µg/l	TM176		<1	<1				
Phenol (aq)	<1 µg/l	TM176		<1	<1				
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176		<1 #	<1 #				
Hexachloroethane (aq)	<1 µg/l	TM176		<1 #	<1 #				
Nitrobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Naphthalene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Isophorone (aq)	<1 µg/l	TM176		<1 #	<1 #				
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176		<1	<1				
Phenanthrene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Pyrene (aq)	<1 µg/l	TM176		<1 #	<1 #				

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CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2			
			Depth (m)	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Surface Water (SW)	Surface Water (SW)			
			Date Sampled	13/05/2020	13/05/2020			
			Sample Time	.	.			
			Date Received	16/05/2020	16/05/2020			
			SDG Ref	200516-38	200516-38			
			Lab Sample No.(s)	22157361	22157370			
			AGS Reference					
Dibromofluoromethane**	%	TM208		111	110			
Toluene-d8**	%	TM208		104	103			
4-Bromofluorobenzene**	%	TM208		105	103			
Dichlorodifluoromethane	<1 µg/l	TM208		<1 #	<1 #			
Chloromethane	<1 µg/l	TM208		<1 #	<1 #			
Vinyl chloride	<1 µg/l	TM208		<1 #	<1 #			
Bromomethane	<1 µg/l	TM208		<1 #	<1 #			
Chloroethane	<1 µg/l	TM208		<1 #	<1 #			
Trichlorofluoromethane	<1 µg/l	TM208		<1 #	<1 #			
1,1-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #			
Carbon disulphide	<1 µg/l	TM208		<1 #	<1 #			
Dichloromethane	<3 µg/l	TM208		<3 #	<3 #			
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #			
trans-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #			
1,1-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #			
cis-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #			
2,2-Dichloropropane	<1 µg/l	TM208		<1	<1			
Bromochloromethane	<1 µg/l	TM208		<1 #	<1 #			
Chloroform	<1 µg/l	TM208		<1 #	<1 #			
1,1,1-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #			
1,1-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #			
Carbontetrachloride	<1 µg/l	TM208		<1 #	<1 #			
1,2-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #			
Benzene	<1 µg/l	TM208		<1 #	<1 #			
Trichloroethene	<1 µg/l	TM208		<1 #	<1 #			
1,2-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #			
Dibromomethane	<1 µg/l	TM208		<1 #	<1 #			
Bromodichloromethane	<1 µg/l	TM208		<1 #	<1 #			
cis-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #			
Toluene	<1 µg/l	TM208		<1 #	<1 #			
trans-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #			
1,1,2-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #			
1,3-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #			

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CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

VOC MS (W)

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2
			Depth (m)	0.00 - 0.00	0.00 - 0.00
			Sample Type	Surface Water (SW)	Surface Water (SW)
			Date Sampled	13/05/2020	13/05/2020
			Sample Time	.	.
			Date Received	16/05/2020	16/05/2020
			SDG Ref	200516-38	200516-38
			Lab Sample No.(s)	22157361	22157370
			AGS Reference		
Tetrachloroethene	<1 µg/l	TM208		<1 #	<1 #
Dibromochloromethane	<1 µg/l	TM208		<1 #	<1 #
1,2-Dibromoethane	<1 µg/l	TM208		<1 #	<1 #
Chlorobenzene	<1 µg/l	TM208		<1 #	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #
o-Xylene	<1 µg/l	TM208		<1 #	<1 #
Styrene	<1 µg/l	TM208		<1 #	<1 #
Bromoform	<1 µg/l	TM208		<1 #	<1 #
Isopropylbenzene	<1 µg/l	TM208		<1 #	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #
1,2,3-Trichloropropane	<1 µg/l	TM208		<1 #	<1 #
Bromobenzene	<1 µg/l	TM208		<1 #	<1 #
Propylbenzene	<1 µg/l	TM208		<1 #	<1 #
2-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #
4-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #
tert-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #
sec-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208		<1 #	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #
n-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208		<1	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #
Hexachlorobutadiene	<1 µg/l	TM208		<1 #	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208		<1 #	<1 #
Naphthalene	<1 µg/l	TM208		<1 #	<1 #
1,2,3-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #
1,3,5-Trichlorobenzene	<1 µg/l	TM208		<1	<1

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CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**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
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
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	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.	Determination of pH in Water and Leachate using the GLpH pH Meter
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
TM411	Acid_Herbs_GCMS	Acid Herbs in Water by GCMS

NA = not applicable.

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

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CERTIFICATE OF ANALYSIS

SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	22157361	22157370
Customer Sample Ref.	SW1	SW2
AGS Ref.		
Depth	0.00 - 0.00	0.00 - 0.00
Type	Surface Water	Surface Water
Acid Herbicides by GCMS	20-May-2020	20-May-2020
Ammonium Low	19-May-2020	19-May-2020
Anions by Kone (w)	18-May-2020	18-May-2020
BOD True Total	21-May-2020	21-May-2020
COD Unfiltered	18-May-2020	18-May-2020
Conductivity (at 20 deg.C)	19-May-2020	20-May-2020
Cyanide Comp/Free/Total/Thiocyanate	19-May-2020	19-May-2020
Dissolved Metals by ICP-MS	21-May-2020	21-May-2020
Dissolved Oxygen by Probe	20-May-2020	20-May-2020
Fluoride	18-May-2020	18-May-2020
Mercury Dissolved	18-May-2020	18-May-2020
Mineral Oil C10-40 Aqueous (W)	22-May-2020	22-May-2020
PCB Congeners - Aqueous (W)	22-May-2020	22-May-2020
Pesticides (Suite I) by GCMS	21-May-2020	21-May-2020
Pesticides (Suite II) by GCMS	21-May-2020	21-May-2020
Pesticides (Suite III) by GCMS	21-May-2020	21-May-2020
pH Value	19-May-2020	19-May-2020
Phosphate by Kone (w)	18-May-2020	18-May-2020
Suspended Solids	21-May-2020	21-May-2020
SVOC MS (W) - Aqueous	19-May-2020	19-May-2020
VOC MS (W)	18-May-2020	18-May-2020

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SDG:	200516-38	**Client Reference:**	P20-015	**Report Number:**	553006
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Appendix General

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

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

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

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. **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.

18. **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**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **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 (2005), 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

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials 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 (2005).

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, based on HSG 248 (2005).

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.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2017).*

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.

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EPA Export 22-10-2021:02:37:57

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

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

Attention: Gary Lawlor

CERTIFICATE OF ANALYSIS

Date of report Generation:	18 June 2020
Customer:	Fehily Timoney
Sample Delivery Group (SDG):	200611-48
Your Reference:	P20-015
Location:	Thorpes Landfill
Report No:	555813

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We received 2 samples on Thursday June 11, 2020 and 2 of these samples were scheduled for analysis which was completed on Thursday June 18, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

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

EPA Export 22-10-2021:02:37:57

CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
22287201	SW1		0.00 - 0.00	10/06/2020
22287216	SW2		0.00 - 0.00	10/06/2020

Maximum Sample/Coolbox Temperature (°C) : **10.0**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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

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CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

- X Test
- N No Determination Possible

Sample Types -

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

Lab Sample No(s)			22287201							22287216						
Customer Sample Reference			SW1							SW2						
AGS Reference																
Depth (m)			0.00 - 0.00							0.00 - 0.00						
Container			0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	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	SW	SW	SW	SW	SW	SW	SW
Acid Herbicides by GCMS	All	NDPs: 0 Tests: 2	X							X						
Ammonium Low	All	NDPs: 0 Tests: 2				X							X			
Anions by Kone (w)	All	NDPs: 0 Tests: 2	X							X						
BOD True Total	All	NDPs: 0 Tests: 2		X							X					
COD Unfiltered	All	NDPs: 0 Tests: 2		X							X					
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2			X							X				
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 2						X							X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2					X							X		
Dissolved Oxygen by Probe	All	NDPs: 0 Tests: 2			X							X				
Fluoride	All	NDPs: 0 Tests: 2			X							X				
Mercury Dissolved	All	NDPs: 0 Tests: 2					X							X		
Mineral Oil C10-40 Aqueous (W)	All	NDPs: 0 Tests: 2			X							X				
PCB Congeners - Aqueous (W)	All	NDPs: 0 Tests: 2			X							X				
Pesticides (Suite I) by GCMS	All	NDPs: 0 Tests: 2	X							X						
Pesticides (Suite II) by GCMS	All	NDPs: 0 Tests: 2	X							X						

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Validated

CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

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

Lab Sample No(s)									22287201								22287216
Customer Sample Reference									SW1								SW2
AGS Reference																	
Depth (m)									0.00 - 0.00								0.00 - 0.00
Container									0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	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	SW	SW	SW	SW	SW	SW	SW
Pesticides (Suite III) by GCMS	All	NDPs: 0 Tests: 2							X							X						
pH Value	All	NDPs: 0 Tests: 2									X							X				
Phosphate by Kone (w)	All	NDPs: 0 Tests: 2							X							X						
Suspended Solids	All	NDPs: 0 Tests: 2									X							X				
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 2							X							X						
VOC MS (W)	All	NDPs: 0 Tests: 2													X							X

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CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2			
			Depth (m)	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Surface Water (SW)	Surface Water (SW)			
			Date Sampled	10/06/2020	10/06/2020			
			Sample Time	.	.			
			Date Received	11/06/2020	11/06/2020			
			SDG Ref	200611-48	200611-48			
			Lab Sample No.(s)	22287201	22287216			
			AGS Reference					
Suspended solids, Total	<2 mg/l	TM022		3.75 #	6.2 #			
BOD, unfiltered	<1 mg/l	TM045		<1 #	<1 #			
Oxygen, dissolved	<0.3 mg/l	TM046		10.8	10.9			
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		0.0532 #	0.0287 #			
Fluoride	<0.5 mg/l	TM104		<0.5	<0.5			
COD, unfiltered	<7 mg/l	TM107		15.2 #	16.3 #			
Conductivity @ 20 deg.C	<0.005 mS/cm	TM120		0.528 #	0.545 #			
Arsenic (diss.filt)	<0.5 µg/l	TM152		<0.5 #	<0.5 #			
Barium (diss.filt)	<0.2 µg/l	TM152		23.3 #	24.1 #			
Boron (diss.filt)	<10 µg/l	TM152		18.3 #	18.5 #			
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #			
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #			
Copper (diss.filt)	<0.3 µg/l	TM152		0.755 #	0.75 #			
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	<0.2 #			
Manganese (diss.filt)	<3 µg/l	TM152		<3 #	3.19 #			
Nickel (diss.filt)	<0.4 µg/l	TM152		<0.4 #	<0.4 #			
Phosphorus (diss.filt)	<10 µg/l	TM152		38.2 #	57.2 #			
Selenium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #			
Thallium (diss.filt)	<2 µg/l	TM152		<2 #	<2 #			
Zinc (diss.filt)	<1 µg/l	TM152		4.44 #	4.46 #			
Sodium (Dis.Filt)	<0.076 mg/l	TM152		17.8 #	19.3 #			
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		14 #	15.1 #			
Potassium (Dis.Filt)	<0.2 mg/l	TM152		2.97 #	2.84 #			
Calcium (Dis.Filt)	<0.2 mg/l	TM152		97.2 #	94.2 #			
Iron (Dis.Filt)	<0.019 mg/l	TM152		<0.019 #	<0.019 #			
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172		<100	<100			
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01	<0.01			
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184		0.109 #	0.142 #			
Chloride	<2 mg/l	TM184		19.5 #	18.6 #			
Sulphate (soluble) as S	<1 mg/l	TM184		4.87 #	4.83 #			
PCB congener 28	<0.015 µg/l	TM197		<0.015	<0.015			
PCB congener 52	<0.015 µg/l	TM197		<0.015	<0.015			
PCB congener 101	<0.015 µg/l	TM197		<0.015	<0.015			

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CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2
			Depth (m)	0.00 - 0.00	0.00 - 0.00
			Sample Type	Surface Water (SW)	Surface Water (SW)
			Date Sampled	10/06/2020	10/06/2020
			Sample Time	.	.
			Date Received	11/06/2020	11/06/2020
			SDG Ref	200611-48	200611-48
			Lab Sample No.(s)	22287201	22287216
			AGS Reference		
PCB congener 118	<0.015 µg/l	TM197		<0.015	<0.015
PCB congener 138	<0.015 µg/l	TM197		<0.015	<0.015
PCB congener 153	<0.015 µg/l	TM197		<0.015	<0.015
PCB congener 180	<0.015 µg/l	TM197		<0.015	<0.015
Sum of detected EC7 PCB's	<0.105 µg/l	TM197		<0.105	<0.105
Cyanide, Total	<0.05 mg/l	TM227		<0.05	<0.05
pH	<1 pH Units	TM256		8.2 #	8.24 #
Trifluralin	<0.01 µg/l	TM343		<0.01	<0.01
alpha-HCH	<0.01 µg/l	TM343		<0.01	<0.01
gamma-HCH (Lindane)	<0.01 µg/l	TM343		<0.01	<0.01
Heptachlor	<0.01 µg/l	TM343		<0.01	<0.01
Aldrin	<0.01 µg/l	TM343		<0.01	<0.01
beta-HCH	<0.01 µg/l	TM343		<0.01	<0.01
Isodrin	<0.01 µg/l	TM343		<0.01	<0.01
delta-HCH	<0.01 µg/l	TM343		<0.01	<0.01
Heptachlor epoxide	<0.01 µg/l	TM343		<0.01	<0.01
o,p'-DDE	<0.01 µg/l	TM343		<0.01	<0.01
Endosulphan I	<0.01 µg/l	TM343		<0.01	<0.01
trans-Chlordane	<0.01 µg/l	TM343		<0.01	<0.01
cis-Chlordane	<0.01 µg/l	TM343		<0.01	<0.01
p,p'-DDE	<0.01 µg/l	TM343		<0.01	<0.01
Dieldrin	<0.01 µg/l	TM343		<0.01	<0.01
o,p'-DDD (TDE)	<0.01 µg/l	TM343		<0.01	<0.01
Endrin	<0.01 µg/l	TM343		<0.01	<0.02
o,p'-DDT	<0.01 µg/l	TM343		<0.02	<0.02
p,p'-DDD (TDE)	<0.01 µg/l	TM343		<0.01	<0.01
Endosulphan II	<0.02 µg/l	TM343		<0.02	<0.02
p,p'-DDT	<0.01 µg/l	TM343		<0.02	<0.02
o,p'-Methoxychlor	<0.01 µg/l	TM343		<0.02	<0.02
p,p'-Methoxychlor	<0.01 µg/l	TM343		<0.02	<0.02
Endosulphan Sulphate	<0.02 µg/l	TM343		<0.02	<0.02
Permethrin I	<0.01 µg/l	TM343		<0.01	<0.01
Permethrin II	<0.01 µg/l	TM343		<0.01	<0.01

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CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	10/06/2020	10/06/2020				
			Sample Time	.	.				
			Date Received	11/06/2020	11/06/2020				
			SDG Ref	200611-48	200611-48				
			Lab Sample No.(s)	22287201	22287216				
			AGS Reference						
1,3,5-Trichlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
Hexachlorobutadiene	<0.01 µg/l	TM344		<0.01	<0.01				
1,2,4-Trichlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
1,2,3-Trichlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
Dichlorvos	<0.01 µg/l	TM344		<0.01	<0.01				
Dichlobenil	<0.01 µg/l	TM344		<0.01	<0.01				
Mevinphos	<0.01 µg/l	TM344		<0.01	<0.01				
Tecnazene	<0.01 µg/l	TM344		<0.01	<0.01				
Hexachlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
Demeton-S-methyl	<0.01 µg/l	TM344		<0.01	<0.01				
Phorate	<0.01 µg/l	TM344		<0.01	<0.01				
Diazinon	<0.01 µg/l	TM344		<0.01	<0.01				
Triallate	<0.01 µg/l	TM344		<0.01	<0.01				
Atrazine	<0.01 µg/l	TM344		<0.01	<0.01				
Simazine	<0.01 µg/l	TM344		<0.01	<0.01				
Disulfoton	<0.01 µg/l	TM344		<0.01	<0.01				
Propetamphos	<0.01 µg/l	TM344		<0.01	<0.01				
Chlorpyriphos-methyl	<0.01 µg/l	TM344		<0.01	<0.01				
Dimethoate	<0.01 µg/l	TM344		<0.01	<0.01				
Pirimiphos-methyl	<0.01 µg/l	TM344		<0.01	<0.01				
Chlorpyriphos	<0.01 µg/l	TM344		<0.01	<0.01				
Methyl Parathion	<0.01 µg/l	TM344		<0.01	<0.01				
Malathion	<0.01 µg/l	TM344		<0.01	<0.01				
Fenthion	<0.01 µg/l	TM344		<0.01	<0.01				
Fenitrothion	<0.01 µg/l	TM344		<0.01	<0.01				
Triadimefon	<0.01 µg/l	TM344		<0.01	<0.01				
Pendimethalin	<0.01 µg/l	TM344		<0.01	<0.01				
Parathion	<0.01 µg/l	TM344		<0.01	<0.01				
Chlorfenvinphos	<0.01 µg/l	TM344		<0.01	<0.01				
trans-Chlordane	<0.01 µg/l	TM344		<0.01	<0.01				
cis-Chlordane	<0.01 µg/l	TM344		<0.01	<0.01				
Ethion	<0.01 µg/l	TM344		<0.01	<0.01				
Carbophenothion	<0.01 µg/l	TM344		<0.01	<0.01				

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CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

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			Date Sampled	10/06/2020	10/06/2020
			Sample Time	.	.
			Date Received	11/06/2020	11/06/2020
			SDG Ref	200611-48	200611-48
			Lab Sample No.(s)	22287201	22287216
			AGS Reference		
Triazophos	<0.01 µg/l	TM344		<0.01	<0.01
Phosalone	<0.01 µg/l	TM344		<0.01	<0.01
Azinphos methyl	<0.02 µg/l	TM344		<0.02	<0.02
Azinphos ethyl	<0.02 µg/l	TM344		<0.02	<0.02
Etridiazole	<0.01 µg/l	TM345		<0.01	<0.01
Pentachlorobenzene	<0.01 µg/l	TM345		<0.01	<0.01
Propachlor	<0.01 µg/l	TM345		<0.01	<0.01
Quintozene (PCNB)	<0.01 µg/l	TM345		<0.01	<0.01
Omethoate	<0.01 µg/l	TM345		<0.01	<0.01
Propazine	<0.01 µg/l	TM345		<0.01	<0.01
Propyzamide	<0.01 µg/l	TM345		<0.01	<0.01
Alachlor	<0.01 µg/l	TM345		<0.01	<0.01
Prometryn	<0.01 µg/l	TM345		<0.01	<0.01
Telodrin	<0.01 µg/l	TM345		<0.01	<0.01
Terbutryn	<0.01 µg/l	TM345		<0.01	<0.01
Chlorothalonil	<0.01 µg/l	TM345		<0.01	<0.01
Etrimphos	<0.01 µg/l	TM345		<0.01	<0.01
Metazachlor	<0.01 µg/l	TM345		<0.01	<0.01
Cyanazine	<0.01 µg/l	TM345		<0.01	<0.01
Trietazine	<0.01 µg/l	TM345		<0.01	<0.01
Coumaphos	<0.01 µg/l	TM345		<0.01	<0.01
Phosphamidon I	<0.01 µg/l	TM345		<0.01	<0.01
Phosphamidon II	<0.01 µg/l	TM345		<0.01	<0.01
Dinitro-o-cresol	<0.1 µg/l	TM411		<0.1	<0.1
Clopyralid	<0.04 µg/l	TM411		<0.04	<0.04
MCPA	<0.05 µg/l	TM411		<0.05	<0.05
Mecoprop	<0.04 µg/l	TM411		<0.04	<0.04
Dicamba	<0.04 µg/l	TM411		<0.04	<0.04
MCPB	<0.05 µg/l	TM411		<0.05	<0.05
2,4-DB	<0.1 µg/l	TM411		<0.1	<0.1
2,3,6-Trichlorobenzoic acid	<0.05 µg/l	TM411		<0.05	<0.05
Dichlorprop	<0.1 µg/l	TM411		<0.1	<0.1
Triclopyr	<0.05 µg/l	TM411		<0.05	<0.05

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CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	10/06/2020	10/06/2020				
			Sample Time	.	.				
			Date Received	11/06/2020	11/06/2020				
			SDG Ref	200611-48	200611-48				
			Lab Sample No.(s)	22287201	22287216				
			AGS Reference						
Fenoprop (Silvex)	<0.1 µg/l	TM411		<0.1	<0.1				
2,4-Dichlorophenoxyacetic acid	<0.05 µg/l	TM411		<0.05	<0.05				
2,4,5-Trichlorophenoxyacetic acid	<0.05 µg/l	TM411		<0.05	<0.05				
Bromoxynil	<0.04 µg/l	TM411		<0.04	<0.04				
Benazolin	<0.04 µg/l	TM411		<0.04	<0.04				
Ioxynil	<0.05 µg/l	TM411		<0.05	<0.05				
Pentachlorophenol	<0.04 µg/l	TM411		<0.04	<0.04				
Fluoroxypyr	<0.1 µg/l	TM411		0.314	0.415				

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CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2			
			Depth (m)	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Surface Water (SW)	Surface Water (SW)			
			Date Sampled	10/06/2020	10/06/2020			
			Sample Time	.	.			
			Date Received	11/06/2020	11/06/2020			
			SDG Ref	200611-48	200611-48			
			Lab Sample No.(s)	22287201	22287216			
			AGS Reference					
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #			
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #			
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #			
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #			
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176		<1 #	<1 #			
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176		<1 #	<1 #			
2,4-Dichlorophenol (aq)	<1 µg/l	TM176		<1 #	<1 #			
2,4-Dimethylphenol (aq)	<1 µg/l	TM176		<1 #	<1 #			
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176		<1 #	<1 #			
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176		<1 #	<1 #			
2-Chloronaphthalene (aq)	<1 µg/l	TM176		<1 #	<1 #			
2-Chlorophenol (aq)	<1 µg/l	TM176		<1 #	<1 #			
2-Methylnaphthalene (aq)	<1 µg/l	TM176		<1 #	<1 #			
2-Methylphenol (aq)	<1 µg/l	TM176		<1 #	<1 #			
2-Nitroaniline (aq)	<1 µg/l	TM176		<1 #	<1 #			
2-Nitrophenol (aq)	<1 µg/l	TM176		<1 #	<1 #			
3-Nitroaniline (aq)	<1 µg/l	TM176		<1 #	<1 #			
4-Bromophenylphenylether (aq)	<1 µg/l	TM176		<1 #	<1 #			
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176		<1 #	<1 #			
4-Chloroaniline (aq)	<1 µg/l	TM176		<1	<1			
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176		<1 #	<1 #			
4-Methylphenol (aq)	<1 µg/l	TM176		<1 #	<1 #			
4-Nitroaniline (aq)	<1 µg/l	TM176		<1 #	<1 #			
4-Nitrophenol (aq)	<1 µg/l	TM176		<1	<1			
Azobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #			
Acenaphthylene (aq)	<1 µg/l	TM176		<1 #	<1 #			
Acenaphthene (aq)	<1 µg/l	TM176		<1 #	<1 #			
Anthracene (aq)	<1 µg/l	TM176		<1 #	<1 #			
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176		<1 #	<1 #			
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176		<1 #	<1 #			
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176		<2 #	<2 #			
Butylbenzyl phthalate (aq)	<1 µg/l	TM176		<1 #	<1 #			
Benzo(a)anthracene (aq)	<1 µg/l	TM176		<1 #	<1 #			

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CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	10/06/2020	10/06/2020				
			Sample Time	.	.				
			Date Received	11/06/2020	11/06/2020				
			SDG Ref	200611-48	200611-48				
			Lab Sample No.(s)	22287201	22287216				
			AGS Reference						
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Benzo(a)pyrene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Carbazole (aq)	<1 µg/l	TM176		<1 #	<1 #				
Chrysene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Dibenzofuran (aq)	<1 µg/l	TM176		<1 #	<1 #				
n-Dibutyl phthalate (aq)	<1 µg/l	TM176		<1 #	<1 #				
Diethyl phthalate (aq)	<1 µg/l	TM176		<1 #	<1 #				
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Dimethyl phthalate (aq)	<1 µg/l	TM176		<1 #	<1 #				
n-Dioctyl phthalate (aq)	<5 µg/l	TM176		<5 #	<5 #				
Fluoranthene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Fluorene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Hexachlorobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Hexachlorobutadiene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Pentachlorophenol (aq)	<1 µg/l	TM176		<1	<1				
Phenol (aq)	<1 µg/l	TM176		<1	<1				
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176		<1 #	<1 #				
Hexachloroethane (aq)	<1 µg/l	TM176		<1 #	<1 #				
Nitrobenzene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Naphthalene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Isophorone (aq)	<1 µg/l	TM176		<1 #	<1 #				
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176		<1	<1				
Phenanthrene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176		<1 #	<1 #				
Pyrene (aq)	<1 µg/l	TM176		<1 #	<1 #				

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CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2			
			Depth (m)	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Surface Water (SW)	Surface Water (SW)			
			Date Sampled	10/06/2020	10/06/2020			
			Sample Time	.	.			
			Date Received	11/06/2020	11/06/2020			
			SDG Ref	200611-48	200611-48			
			Lab Sample No.(s)	22287201	22287216			
			AGS Reference					
Dibromofluoromethane**	%	TM208		115	113			
Toluene-d8**	%	TM208		103	103			
4-Bromofluorobenzene**	%	TM208		102	100			
Dichlorodifluoromethane	<1 µg/l	TM208		<1 #	<1 #			
Chloromethane	<1 µg/l	TM208		<1 #	<1 #			
Vinyl chloride	<1 µg/l	TM208		<1 #	<1 #			
Bromomethane	<1 µg/l	TM208		<1 #	<1 #			
Chloroethane	<1 µg/l	TM208		<1 #	<1 #			
Trichlorofluoromethane	<1 µg/l	TM208		<1 #	<1 #			
1,1-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #			
Carbon disulphide	<1 µg/l	TM208		<1 #	<1 #			
Dichloromethane	<3 µg/l	TM208		<3 #	<3 #			
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #			
trans-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #			
1,1-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #			
cis-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #			
2,2-Dichloropropane	<1 µg/l	TM208		<1	<1			
Bromochloromethane	<1 µg/l	TM208		<1 #	<1 #			
Chloroform	<1 µg/l	TM208		<1 #	<1 #			
1,1,1-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #			
1,1-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #			
Carbontetrachloride	<1 µg/l	TM208		<1 #	<1 #			
1,2-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #			
Benzene	<1 µg/l	TM208		<1 #	<1 #			
Trichloroethene	<1 µg/l	TM208		<1 #	<1 #			
1,2-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #			
Dibromomethane	<1 µg/l	TM208		<1 #	<1 #			
Bromodichloromethane	<1 µg/l	TM208		<1 #	<1 #			
cis-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #			
Toluene	<1 µg/l	TM208		<1 #	<1 #			
trans-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #			
1,1,2-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #			
1,3-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #			

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CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2
			Depth (m)	0.00 - 0.00	0.00 - 0.00
			Sample Type	Surface Water (SW)	Surface Water (SW)
			Date Sampled	10/06/2020	10/06/2020
			Sample Time	.	.
			Date Received	11/06/2020	11/06/2020
			SDG Ref	200611-48	200611-48
			Lab Sample No.(s)	22287201	22287216
			AGS Reference		
Tetrachloroethene	<1 µg/l	TM208		<1 #	<1 #
Dibromochloromethane	<1 µg/l	TM208		<1 #	<1 #
1,2-Dibromoethane	<1 µg/l	TM208		<1 #	<1 #
Chlorobenzene	<1 µg/l	TM208		<1 #	<1 #
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #
o-Xylene	<1 µg/l	TM208		<1 #	<1 #
Styrene	<1 µg/l	TM208		<1 #	<1 #
Bromoform	<1 µg/l	TM208		<1 #	<1 #
Isopropylbenzene	<1 µg/l	TM208		<1 #	<1 #
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #
1,2,3-Trichloropropane	<1 µg/l	TM208		<1 #	<1 #
Bromobenzene	<1 µg/l	TM208		<1 #	<1 #
Propylbenzene	<1 µg/l	TM208		<1 #	<1 #
2-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #
1,3,5-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #
4-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #
tert-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #
1,2,4-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #
sec-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #
4-iso-Propyltoluene	<1 µg/l	TM208		<1 #	<1 #
1,3-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #
1,4-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #
n-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #
1,2-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208		<1	<1
1,2,4-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #
Hexachlorobutadiene	<1 µg/l	TM208		<1 #	<1 #
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208		<1 #	<1 #
Naphthalene	<1 µg/l	TM208		<1 #	<1 #
1,2,3-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #
1,3,5-Trichlorobenzene	<1 µg/l	TM208		<1	<1

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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
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
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	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.	Determination of pH in Water and Leachate using the GLpH pH Meter
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
TM411	Acid_Herbs_GCMS	Acid Herbs in Water by GCMS

NA = not applicable.

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

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CERTIFICATE OF ANALYSIS

SDG:	200611-48	**Client Reference:**	P20-015	**Report Number:**	555813
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	22287201	22287216
Customer Sample Ref.	SW1	SW2
AGS Ref.		
Depth	0.00 - 0.00	0.00 - 0.00
Type	Surface Water	Surface Water
Acid Herbicides by GCMS	16-Jun-2020	16-Jun-2020
Ammonium Low	18-Jun-2020	18-Jun-2020
Anions by Kone (w)	11-Jun-2020	11-Jun-2020
BOD True Total	17-Jun-2020	17-Jun-2020
COD Unfiltered	18-Jun-2020	18-Jun-2020
Conductivity (at 20 deg.C)	16-Jun-2020	16-Jun-2020
Cyanide Comp/Free/Total/Thiocyanate	16-Jun-2020	16-Jun-2020
Dissolved Metals by ICP-MS	15-Jun-2020	15-Jun-2020
Dissolved Oxygen by Probe	17-Jun-2020	17-Jun-2020
Fluoride	12-Jun-2020	12-Jun-2020
Mercury Dissolved	12-Jun-2020	12-Jun-2020
Mineral Oil C10-40 Aqueous (W)	18-Jun-2020	18-Jun-2020
PCB Congeners - Aqueous (W)	17-Jun-2020	17-Jun-2020
Pesticides (Suite I) by GCMS	17-Jun-2020	17-Jun-2020
Pesticides (Suite II) by GCMS	17-Jun-2020	17-Jun-2020
Pesticides (Suite III) by GCMS	17-Jun-2020	17-Jun-2020
pH Value	17-Jun-2020	17-Jun-2020
Phosphate by Kone (w)	12-Jun-2020	12-Jun-2020
Suspended Solids	17-Jun-2020	17-Jun-2020
SVOC MS (W) - Aqueous	16-Jun-2020	16-Jun-2020
VOC MS (W)	17-Jun-2020	17-Jun-2020

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Appendix General

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

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

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

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. **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.

18. **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**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **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 (2005), 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

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials 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 (2005).

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, based on HSG 248 (2005).

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.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2017).*

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.

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EPA Export 22-10-2021:02:37:58

Unit 7-8 Hawarden Business Park
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email: hawardencustomerservices@alsglobal.com
Website: www.alsenvironmental.co.uk

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

Attention: Gary Lawlor

CERTIFICATE OF ANALYSIS

Date of report Generation:	10 July 2020
Customer:	Fehily Timoney
Sample Delivery Group (SDG):	200701-67
Your Reference:	P20-015
Location:	Thorpes Landfill
Report No:	558450

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We received 2 samples on Wednesday July 01, 2020 and 2 of these samples were scheduled for analysis which was completed on Thursday July 09, 2020. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

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

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

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

EPA Export 22-10-2021:02:37:58

CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
22402748	SW1		0.00 - 0.00	30/06/2020
22402761	SW2		0.00 - 0.00	30/06/2020

Maximum Sample/Coolbox Temperature (°C) : **12.6**

ISO5667-3 Water quality - Sampling - Part3 -
During Transportation samples shall be stored in a cooling device capable of maintaining a temperature of (5±3)°C.

ALS have data which show that a cool box with 4 frozen icepacks is capable of maintaining pre-chilled samples at a temperature of (5±3)°C for a period of up to 24hrs.

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

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

- X Test
- N No Determination Possible

Sample Types -

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

Lab Sample No(s)			22402748							22402761						
Customer Sample Reference			SW1							SW2						
AGS Reference																
Depth (m)			0.00 - 0.00							0.00 - 0.00						
Container			0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	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	SW	SW	SW	SW	SW	SW	SW
Acid Herbicides by GCMS	All	NDPs: 0 Tests: 2	X							X						
Ammonium Low	All	NDPs: 0 Tests: 2				X							X			
Anions by Kone (w)	All	NDPs: 0 Tests: 2	X							X						
BOD True Total	All	NDPs: 0 Tests: 2		X							X					
COD Unfiltered	All	NDPs: 0 Tests: 2		X							X					
Conductivity (at 20 deg.C)	All	NDPs: 0 Tests: 2			X							X				
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 2						X							X	
Dissolved Metals by ICP-MS	All	NDPs: 0 Tests: 2					X							X		
Dissolved Oxygen by Probe	All	NDPs: 0 Tests: 2			X							X				
Fluoride	All	NDPs: 0 Tests: 2			X							X				
Mercury Dissolved	All	NDPs: 0 Tests: 2					X							X		
Mineral Oil C10-40 Aqueous (W)	All	NDPs: 0 Tests: 2			X							X				
PCB Congeners - Aqueous (W)	All	NDPs: 0 Tests: 2			X							X				
Pesticides (Suite I) by GCMS	All	NDPs: 0 Tests: 2	X							X						
Pesticides (Suite II) by GCMS	All	NDPs: 0 Tests: 2	X							X						

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

X Test

N No Determination Possible

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

Lab Sample No(s)									22402748								22402761
Customer Sample Reference									SW1								SW2
AGS Reference																	
Depth (m)									0.00 - 0.00								0.00 - 0.00
Container									0.5l glass bottle (ALE227)	250ml BOD (ALE212)	500ml Plastic (ALE208)	H2SO4 (ALE244)	HNO3 Filtered (ALE204)	NaOH (ALE245)	Vial (ALE297)	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	SW	SW	SW	SW	SW	SW	SW
Pesticides (Suite III) by GCMS	All	NDPs: 0 Tests: 2							X							X						
pH Value	All	NDPs: 0 Tests: 2									X							X				
Phosphate by Kone (w)	All	NDPs: 0 Tests: 2							X							X						
Suspended Solids	All	NDPs: 0 Tests: 2									X							X				
SVOC MS (W) - Aqueous	All	NDPs: 0 Tests: 2													X	X						
VOC MS (W)	All	NDPs: 0 Tests: 2													X							X

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2			
			Depth (m)	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Surface Water (SW)	Surface Water (SW)			
			Date Sampled	30/06/2020	30/06/2020			
			Sample Time	.	.			
			Date Received	01/07/2020	01/07/2020			
			SDG Ref	200701-67	200701-67			
			Lab Sample No.(s)	22402748	22402761			
			AGS Reference					
Suspended solids, Total	<2 mg/l	TM022		<2 #	<2 #			
BOD, unfiltered	<1 mg/l	TM045		<1 #	<1 #			
Oxygen, dissolved	<0.3 mg/l	TM046		12.1	12.4			
Ammoniacal Nitrogen as N (low level)	<0.01 mg/l	TM099		0.0274 #	0.041 #			
Fluoride	<0.5 mg/l	TM104		<0.5	<0.5			
COD, unfiltered	<7 mg/l	TM107		<7 #	<7 #			
Conductivity @ 20 deg.C	<0.02 mS/cm	TM120		0.532 #	0.535 #			
Arsenic (diss.filt)	<0.5 µg/l	TM152		<0.5 #	0.511 #			
Barium (diss.filt)	<0.2 µg/l	TM152		24.7 #	26.2 #			
Boron (diss.filt)	<10 µg/l	TM152		21.2 #	22.8 #			
Cadmium (diss.filt)	<0.08 µg/l	TM152		<0.08 #	<0.08 #			
Chromium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #			
Copper (diss.filt)	<0.3 µg/l	TM152		0.777 #	0.735 #			
Lead (diss.filt)	<0.2 µg/l	TM152		<0.2 #	<0.2 #			
Manganese (diss.filt)	<3 µg/l	TM152		<3 #	<3 #			
Nickel (diss.filt)	<0.4 µg/l	TM152		0.575 #	0.52 #			
Phosphorus (diss.filt)	<10 µg/l	TM152		61.4 #	76.2 #			
Selenium (diss.filt)	<1 µg/l	TM152		<1 #	<1 #			
Thallium (diss.filt)	<2 µg/l	TM152		<2 #	<2 #			
Zinc (diss.filt)	<1 µg/l	TM152		7.7 #	4.64 #			
Sodium (Dis.Filt)	<0.076 mg/l	TM152		17.1 #	17.8 #			
Magnesium (Dis.Filt)	<0.036 mg/l	TM152		13.9 #	14.9 #			
Potassium (Dis.Filt)	<0.2 mg/l	TM152		3.2 #	3.01 #			
Calcium (Dis.Filt)	<0.2 mg/l	TM152		99.6 #	102 #			
Iron (Dis.Filt)	<0.019 mg/l	TM152		0.0289 #	<0.019 #			
Mineral oil >C10 C40 (aq)	<100 µg/l	TM172		<100	<100			
Mercury (diss.filt)	<0.01 µg/l	TM183		<0.01	<0.01			
Phosphate (Ortho as PO4)	<0.05 mg/l	TM184		0.114 #	0.146 #			
Chloride	<2 mg/l	TM184		22.7 #	20.4 #			
Sulphate (soluble) as S	<1 mg/l	TM184		5.13 #	4.87 #			
PCB congener 28	<0.015 µg/l	TM197		<0.015	<0.015			
PCB congener 52	<0.015 µg/l	TM197		<0.015	<0.015			
PCB congener 101	<0.015 µg/l	TM197		<0.015	<0.015			

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend	
#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	30/06/2020	30/06/2020				
			Sample Time	.	.				
			Date Received	01/07/2020	01/07/2020				
			SDG Ref	200701-67	200701-67				
			Lab Sample No.(s)	22402748	22402761				
			AGS Reference						
PCB congener 118	<0.015 µg/l	TM197		<0.015	<0.015				
PCB congener 138	<0.015 µg/l	TM197		<0.015	<0.015				
PCB congener 153	<0.015 µg/l	TM197		<0.015	<0.015				
PCB congener 180	<0.015 µg/l	TM197		<0.015	<0.015				
Sum of detected EC7 PCB's	<0.105 µg/l	TM197		<0.105	<0.105				
Cyanide, Total	<0.05 mg/l	TM227		<0.05	<0.05				
pH	<1 pH Units	TM256		8.25 #	8.28 #				
Trifluralin	<0.01 µg/l	TM343		<0.01	<0.01				
alpha-HCH	<0.01 µg/l	TM343		<0.01	<0.01				
gamma-HCH (Lindane)	<0.01 µg/l	TM343		<0.01	<0.01				
Heptachlor	<0.01 µg/l	TM343		<0.01	<0.01				
Aldrin	<0.01 µg/l	TM343		<0.01	<0.01				
beta-HCH	<0.01 µg/l	TM343		<0.01	<0.01				
Isodrin	<0.01 µg/l	TM343		<0.01	<0.01				
delta-HCH	<0.01 µg/l	TM343		<0.01	<0.01				
Heptachlor epoxide	<0.01 µg/l	TM343		<0.01	<0.01				
o,p'-DDE	<0.01 µg/l	TM343		<0.01	<0.01				
Endosulphan I	<0.01 µg/l	TM343		<0.01	<0.01				
trans-Chlordane	<0.01 µg/l	TM343		<0.01	<0.01				
cis-Chlordane	<0.01 µg/l	TM343		<0.01	<0.01				
p,p'-DDE	<0.01 µg/l	TM343		<0.01	<0.01				
Dieldrin	<0.01 µg/l	TM343		<0.01	<0.01				
o,p'-DDD (TDE)	<0.01 µg/l	TM343		<0.01	<0.01				
Endrin	<0.01 µg/l	TM343		<0.01	<0.01				
o,p'-DDT	<0.01 µg/l	TM343		<0.02	<0.02				
p,p'-DDD (TDE)	<0.01 µg/l	TM343		<0.01	<0.01				
Endosulphan II	<0.02 µg/l	TM343		<0.02	<0.02				
p,p'-DDT	<0.01 µg/l	TM343		<0.03	<0.03				
o,p'-Methoxychlor	<0.01 µg/l	TM343		<0.02	<0.02				
p,p'-Methoxychlor	<0.01 µg/l	TM343		<0.03	<0.03				
Endosulphan Sulphate	<0.02 µg/l	TM343		<0.02	<0.02				
Permethrin I	<0.01 µg/l	TM343		<0.01	<0.01				
Permethrin II	<0.01 µg/l	TM343		<0.01	<0.01				

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	30/06/2020	30/06/2020				
			Sample Time	.	.				
			Date Received	01/07/2020	01/07/2020				
			SDG Ref	200701-67	200701-67				
			Lab Sample No.(s)	22402748	22402761				
			AGS Reference						
1,3,5-Trichlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
Hexachlorobutadiene	<0.01 µg/l	TM344		<0.01	<0.01				
1,2,4-Trichlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
1,2,3-Trichlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
Dichlorvos	<0.01 µg/l	TM344		<0.01	<0.01				
Dichlobenil	<0.01 µg/l	TM344		<0.01	<0.01				
Mevinphos	<0.01 µg/l	TM344		<0.01	<0.01				
Tecnazene	<0.01 µg/l	TM344		<0.01	<0.01				
Hexachlorobenzene	<0.01 µg/l	TM344		<0.01	<0.01				
Demeton-S-methyl	<0.01 µg/l	TM344		<0.01	<0.01				
Phorate	<0.01 µg/l	TM344		<0.01	<0.01				
Diazinon	<0.01 µg/l	TM344		<0.01	<0.01				
Triallate	<0.01 µg/l	TM344		<0.01	<0.01				
Atrazine	<0.01 µg/l	TM344		<0.01	<0.01				
Simazine	<0.01 µg/l	TM344		0.0156	0.0165				
Disulfoton	<0.01 µg/l	TM344		<0.01	<0.01				
Propetamphos	<0.01 µg/l	TM344		<0.01	<0.01				
Chlorpyriphos-methyl	<0.01 µg/l	TM344		<0.01	<0.01				
Dimethoate	<0.01 µg/l	TM344		<0.01	<0.01				
Pirimiphos-methyl	<0.01 µg/l	TM344		<0.01	<0.01				
Chlorpyriphos	<0.01 µg/l	TM344		<0.01	<0.01				
Methyl Parathion	<0.01 µg/l	TM344		<0.01	<0.01				
Malathion	<0.01 µg/l	TM344		<0.01	<0.01				
Fenthion	<0.01 µg/l	TM344		<0.01	<0.01				
Fenitrothion	<0.01 µg/l	TM344		<0.01	<0.01				
Triadimefon	<0.01 µg/l	TM344		<0.01	<0.01				
Pendimethalin	<0.01 µg/l	TM344		<0.01	<0.01				
Parathion	<0.01 µg/l	TM344		<0.01	<0.01				
Chlorfenvinphos	<0.01 µg/l	TM344		<0.01	<0.01				
trans-Chlordane	<0.01 µg/l	TM344		<0.01	<0.01				
cis-Chlordane	<0.01 µg/l	TM344		<0.01	<0.01				
Ethion	<0.01 µg/l	TM344		<0.01	<0.01				
Carbophenothion	<0.01 µg/l	TM344		<0.01	<0.01				

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	30/06/2020	30/06/2020				
			Sample Time	.	.				
			Date Received	01/07/2020	01/07/2020				
			SDG Ref	200701-67	200701-67				
			Lab Sample No.(s)	22402748	22402761				
			AGS Reference						
Triazophos	<0.01 µg/l	TM344		<0.01	<0.01				
Phosalone	<0.01 µg/l	TM344		<0.02	<0.02				
Azinphos methyl	<0.02 µg/l	TM344		<0.04	<0.04				
Azinphos ethyl	<0.02 µg/l	TM344		<0.04	<0.04				
Etridiazole	<0.01 µg/l	TM345		<0.01	<0.01				
Pentachlorobenzene	<0.01 µg/l	TM345		<0.01	<0.01				
Propachlor	<0.01 µg/l	TM345		<0.01	<0.01				
Quintozene (PCNB)	<0.01 µg/l	TM345		<0.01	<0.01				
Omethoate	<0.01 µg/l	TM345		<0.01	<0.01				
Propazine	<0.01 µg/l	TM345		<0.01	<0.01				
Propyzamide	<0.01 µg/l	TM345		<0.01	<0.01				
Alachlor	<0.01 µg/l	TM345		<0.01	<0.01				
Prometryn	<0.01 µg/l	TM345		<0.01	<0.01				
Telodrin	<0.01 µg/l	TM345		<0.01	<0.01				
Terbutryn	<0.01 µg/l	TM345		<0.01	<0.01				
Chlorothalonil	<0.01 µg/l	TM345		<0.02	<0.02				
Etrimphos	<0.01 µg/l	TM345		<0.01	<0.01				
Metazachlor	<0.01 µg/l	TM345		<0.01	<0.01				
Cyanazine	<0.01 µg/l	TM345		<0.01	<0.01				
Trietazine	<0.01 µg/l	TM345		<0.01	<0.01				
Coumaphos	<0.01 µg/l	TM345		<0.01	<0.01				
Phosphamidon I	<0.01 µg/l	TM345		<0.01	<0.01				
Phosphamidon II	<0.01 µg/l	TM345		<0.01	<0.01				
Dinitro-o-cresol	<0.1 µg/l	TM411		<0.2	<0.2				
Clopyralid	<0.04 µg/l	TM411		<0.08	<0.08				
MCPA	<0.05 µg/l	TM411		<0.1	<0.1				
Mecoprop	<0.04 µg/l	TM411		<0.08	<0.08				
Dicamba	<0.04 µg/l	TM411		<0.08	<0.08				
MCPB	<0.05 µg/l	TM411		<0.1	<0.1				
2,4-DB	<0.1 µg/l	TM411		<0.2	<0.2				
2,3,6-Trichlorobenzoic acid	<0.05 µg/l	TM411		<0.1	<0.1				
Dichlorprop	<0.1 µg/l	TM411		<0.2	<0.2				
Triclopyr	<0.05 µg/l	TM411		<0.75	<0.75				

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	30/06/2020	30/06/2020				
			Sample Time	.	.				
			Date Received	01/07/2020	01/07/2020				
			SDG Ref	200701-67	200701-67				
			Lab Sample No.(s)	22402748	22402761				
			AGS Reference						
Fenoprop (Silvex)	<0.1 µg/l	TM411		<0.2	<0.2				
2,4-Dichlorophenoxyacetic acid	<0.05 µg/l	TM411		<0.1	<0.1				
2,4,5-Trichlorophenoxyacetic acid	<0.05 µg/l	TM411		<0.1	<0.1				
Bromoxynil	<0.04 µg/l	TM411		<0.08	<0.08				
Benazolin	<0.04 µg/l	TM411		<0.08	<0.08				
Ioxynil	<0.05 µg/l	TM411		<0.1	<0.1				
Pentachlorophenol	<0.04 µg/l	TM411		<0.08	<0.08				
Fluoroxypyr	<0.1 µg/l	TM411		<0.2	<0.2				

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+$@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	30/06/2020	30/06/2020				
			Sample Time	.	.				
			Date Received	01/07/2020	01/07/2020				
			SDG Ref	200701-67	200701-67				
			Lab Sample No.(s)	22402748	22402761				
			AGS Reference						
1,2,4-Trichlorobenzene (aq)	<1 µg/l	TM176		<2 #	<1 #				
1,2-Dichlorobenzene (aq)	<1 µg/l	TM176		<2 #	<1 #				
1,3-Dichlorobenzene (aq)	<1 µg/l	TM176		<2 #	<1 #				
1,4-Dichlorobenzene (aq)	<1 µg/l	TM176		<2 #	<1 #				
2,4,5-Trichlorophenol (aq)	<1 µg/l	TM176		<2 #	<1 #				
2,4,6-Trichlorophenol (aq)	<1 µg/l	TM176		<2 #	<1 #				
2,4-Dichlorophenol (aq)	<1 µg/l	TM176		<2 #	<1 #				
2,4-Dimethylphenol (aq)	<1 µg/l	TM176		<2 #	<1 #				
2,4-Dinitrotoluene (aq)	<1 µg/l	TM176		<2 #	<1 #				
2,6-Dinitrotoluene (aq)	<1 µg/l	TM176		<2 #	<1 #				
2-Chloronaphthalene (aq)	<1 µg/l	TM176		<2 #	<1 #				
2-Chlorophenol (aq)	<1 µg/l	TM176		<2 #	<1 #				
2-Methylnaphthalene (aq)	<1 µg/l	TM176		<2 #	<1 #				
2-Methylphenol (aq)	<1 µg/l	TM176		<2 #	<1 #				
2-Nitroaniline (aq)	<1 µg/l	TM176		<2 #	<1 #				
2-Nitrophenol (aq)	<1 µg/l	TM176		<2 #	<1 #				
3-Nitroaniline (aq)	<1 µg/l	TM176		<2 #	<1 #				
4-Bromophenylphenylether (aq)	<1 µg/l	TM176		<2 #	<1 #				
4-Chloro-3-methylphenol (aq)	<1 µg/l	TM176		<2 #	<1 #				
4-Chloroaniline (aq)	<1 µg/l	TM176		<2	<1				
4-Chlorophenylphenylether (aq)	<1 µg/l	TM176		<2 #	<1 #				
4-Methylphenol (aq)	<1 µg/l	TM176		<2 #	<1 #				
4-Nitroaniline (aq)	<1 µg/l	TM176		<2 #	<1 #				
4-Nitrophenol (aq)	<1 µg/l	TM176		<2	<1				
Azobenzene (aq)	<1 µg/l	TM176		<2 #	<1 #				
Acenaphthylene (aq)	<1 µg/l	TM176		<2 #	<1 #				
Acenaphthene (aq)	<1 µg/l	TM176		<2 #	<1 #				
Anthracene (aq)	<1 µg/l	TM176		<2 #	<1 #				
bis(2-Chloroethyl)ether (aq)	<1 µg/l	TM176		<2 #	<1 #				
bis(2-Chloroethoxy)methane (aq)	<1 µg/l	TM176		<2 #	<1 #				
bis(2-Ethylhexyl) phthalate (aq)	<2 µg/l	TM176		<4 #	<2 #				
Butylbenzyl phthalate (aq)	<1 µg/l	TM176		<2 #	<1 #				
Benzo(a)anthracene (aq)	<1 µg/l	TM176		<2 #	<1 #				

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

SVOC MS (W) - Aqueous

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2			
			Depth (m)	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Surface Water (SW)	Surface Water (SW)			
			Date Sampled	30/06/2020	30/06/2020			
			Sample Time	.	.			
			Date Received	01/07/2020	01/07/2020			
			SDG Ref	200701-67	200701-67			
			Lab Sample No.(s)	22402748	22402761			
			AGS Reference					
Benzo(b)fluoranthene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Benzo(k)fluoranthene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Benzo(a)pyrene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Benzo(g,h,i)perylene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Carbazole (aq)	<1 µg/l	TM176		<2 #	<1 #			
Chrysene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Dibenzofuran (aq)	<1 µg/l	TM176		<2 #	<1 #			
n-Dibutyl phthalate (aq)	<1 µg/l	TM176		<2 #	<1 #			
Diethyl phthalate (aq)	<1 µg/l	TM176		<2 #	<1 #			
Dibenzo(a,h)anthracene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Dimethyl phthalate (aq)	<1 µg/l	TM176		<2 #	<1 #			
n-Dioctyl phthalate (aq)	<5 µg/l	TM176		<10 #	<5 #			
Fluoranthene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Fluorene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Hexachlorobenzene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Hexachlorobutadiene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Pentachlorophenol (aq)	<1 µg/l	TM176		<2	<1			
Phenol (aq)	<1 µg/l	TM176		<2	<1			
n-Nitroso-n-dipropylamine (aq)	<1 µg/l	TM176		<2 #	<1 #			
Hexachloroethane (aq)	<1 µg/l	TM176		<2 #	<1 #			
Nitrobenzene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Naphthalene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Isophorone (aq)	<1 µg/l	TM176		<2 #	<1 #			
Hexachlorocyclopentadiene (aq)	<1 µg/l	TM176		<2	<1			
Phenanthrene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Indeno(1,2,3-cd)pyrene (aq)	<1 µg/l	TM176		<2 #	<1 #			
Pyrene (aq)	<1 µg/l	TM176		<2 #	<1 #			

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2				
			Depth (m)	0.00 - 0.00	0.00 - 0.00				
			Sample Type	Surface Water (SW)	Surface Water (SW)				
			Date Sampled	30/06/2020	30/06/2020				
			Sample Time	.	.				
			Date Received	01/07/2020	01/07/2020				
			SDG Ref	200701-67	200701-67				
			Lab Sample No.(s)	22402748	22402761				
			AGS Reference						
Dibromofluoromethane**	%	TM208		112	114				
Toluene-d8**	%	TM208		98.6	100				
4-Bromofluorobenzene**	%	TM208		94.9	93.4				
Dichlorodifluoromethane	<1 µg/l	TM208		<1 #	<1 #				
Chloromethane	<1 µg/l	TM208		<1 #	<1 #				
Vinyl chloride	<1 µg/l	TM208		<1 #	<1 #				
Bromomethane	<1 µg/l	TM208		<1 #	<1 #				
Chloroethane	<1 µg/l	TM208		<1 #	<1 #				
Trichlorofluoromethane	<1 µg/l	TM208		<1 #	<1 #				
1,1-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #				
Carbon disulphide	<1 µg/l	TM208		<1 #	<1 #				
Dichloromethane	<3 µg/l	TM208		<3 #	<3 #				
Methyl tertiary butyl ether (MTBE)	<1 µg/l	TM208		<1 #	<1 #				
trans-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #				
1,1-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #				
cis-1,2-Dichloroethene	<1 µg/l	TM208		<1 #	<1 #				
2,2-Dichloropropane	<1 µg/l	TM208		<1	<1				
Bromochloromethane	<1 µg/l	TM208		<1 #	<1 #				
Chloroform	<1 µg/l	TM208		<1 #	<1 #				
1,1,1-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #				
1,1-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #				
Carbontetrachloride	<1 µg/l	TM208		<1 #	<1 #				
1,2-Dichloroethane	<1 µg/l	TM208		<1 #	<1 #				
Benzene	<1 µg/l	TM208		<1 #	<1 #				
Trichloroethene	<1 µg/l	TM208		<1 #	<1 #				
1,2-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #				
Dibromomethane	<1 µg/l	TM208		<1 #	<1 #				
Bromodichloromethane	<1 µg/l	TM208		<1 #	<1 #				
cis-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #				
Toluene	<1 µg/l	TM208		<1 #	<1 #				
trans-1,3-Dichloropropene	<1 µg/l	TM208		<1 #	<1 #				
1,1,2-Trichloroethane	<1 µg/l	TM208		<1 #	<1 #				
1,3-Dichloropropane	<1 µg/l	TM208		<1 #	<1 #				

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

VOC MS (W)

Results Legend

#	ISO17025 accredited.
M	mCERTS accredited.
aq	Aqueous / settled sample.
diss.filt	Dissolved / filtered sample.
tot.unfilt	Total / unfiltered sample.
*	Subcontracted - refer to subcontractor report for accreditation status.
**	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery
(F)	Trigger breach confirmed
1-3+§@	Sample deviation (see appendix)

Component	LOD/Units	Method	Customer Sample Ref.	SW1	SW2			
			Depth (m)	0.00 - 0.00	0.00 - 0.00			
			Sample Type	Surface Water (SW)	Surface Water (SW)			
			Date Sampled	30/06/2020	30/06/2020			
			Sample Time	.	.			
			Date Received	01/07/2020	01/07/2020			
			SDG Ref	200701-67	200701-67			
			Lab Sample No.(s)	22402748	22402761			
			AGS Reference					
Tetrachloroethene	<1 µg/l	TM208		<1 #	<1 #			
Dibromochloromethane	<1 µg/l	TM208		<1 #	<1 #			
1,2-Dibromoethane	<1 µg/l	TM208		<1 #	<1 #			
Chlorobenzene	<1 µg/l	TM208		<1 #	<1 #			
1,1,1,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #			
Ethylbenzene	<1 µg/l	TM208		<1 #	<1 #			
m,p-Xylene	<1 µg/l	TM208		<1 #	<1 #			
o-Xylene	<1 µg/l	TM208		<1 #	<1 #			
Styrene	<1 µg/l	TM208		<1 #	<1 #			
Bromoform	<1 µg/l	TM208		<1 #	<1 #			
Isopropylbenzene	<1 µg/l	TM208		<1 #	<1 #			
1,1,2,2-Tetrachloroethane	<1 µg/l	TM208		<1 #	<1 #			
1,2,3-Trichloropropane	<1 µg/l	TM208		<1 #	<1 #			
Bromobenzene	<1 µg/l	TM208		<1 #	<1 #			
Propylbenzene	<1 µg/l	TM208		<1 #	<1 #			
2-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #			
1,3,5-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #			
4-Chlorotoluene	<1 µg/l	TM208		<1 #	<1 #			
tert-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #			
1,2,4-Trimethylbenzene	<1 µg/l	TM208		<1 #	<1 #			
sec-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #			
4-iso-Propyltoluene	<1 µg/l	TM208		<1 #	<1 #			
1,3-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #			
1,4-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #			
n-Butylbenzene	<1 µg/l	TM208		<1 #	<1 #			
1,2-Dichlorobenzene	<1 µg/l	TM208		<1 #	<1 #			
1,2-Dibromo-3-chloropropane	<1 µg/l	TM208		<1	<1			
1,2,4-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #			
Hexachlorobutadiene	<1 µg/l	TM208		<1 #	<1 #			
tert-Amyl methyl ether (TAME)	<1 µg/l	TM208		<1 #	<1 #			
Naphthalene	<1 µg/l	TM208		<1 #	<1 #			
1,2,3-Trichlorobenzene	<1 µg/l	TM208		<1 #	<1 #			
1,3,5-Trichlorobenzene	<1 µg/l	TM208		<1	<1			

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**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
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
TM120	Method 2510B, AWWA/APHA, 20th Ed., 1999 / BS 2690: Part 9:1970	Determination of Electrical Conductivity using a Conductivity Meter
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	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.	Determination of pH in Water and Leachate using the GLpH pH Meter
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
TM411	Acid_Herbs_GCMS	Acid Herbs in Water by GCMS

NA = not applicable.

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

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CERTIFICATE OF ANALYSIS

SDG:	200701-67	**Client Reference:**	P20-015	**Report Number:**	558450
Location:	Thorpes Landfill	**Order Number:**	Z2085	**Superseded Report:**	

Test Completion Dates

Lab Sample No(s)	22402748	22402761
Customer Sample Ref.	SW1	SW2
AGS Ref.		
Depth	0.00 - 0.00	0.00 - 0.00
Type	Surface Water	Surface Water
Acid Herbicides by GCMS	07-Jul-2020	07-Jul-2020
Ammonium Low	02-Jul-2020	07-Jul-2020
Anions by Kone (w)	03-Jul-2020	05-Jul-2020
BOD True Total	08-Jul-2020	08-Jul-2020
COD Unfiltered	05-Jul-2020	05-Jul-2020
Conductivity (at 20 deg.C)	03-Jul-2020	03-Jul-2020
Cyanide Comp/Free/Total/Thiocyanate	07-Jul-2020	07-Jul-2020
Dissolved Metals by ICP-MS	06-Jul-2020	06-Jul-2020
Dissolved Oxygen by Probe	03-Jul-2020	03-Jul-2020
Fluoride	03-Jul-2020	03-Jul-2020
Mercury Dissolved	02-Jul-2020	02-Jul-2020
Mineral Oil C10-40 Aqueous (W)	07-Jul-2020	07-Jul-2020
PCB Congeners - Aqueous (W)	08-Jul-2020	08-Jul-2020
Pesticides (Suite I) by GCMS	07-Jul-2020	07-Jul-2020
Pesticides (Suite II) by GCMS	07-Jul-2020	07-Jul-2020
Pesticides (Suite III) by GCMS	09-Jul-2020	09-Jul-2020
pH Value	02-Jul-2020	02-Jul-2020
Phosphate by Kone (w)	02-Jul-2020	02-Jul-2020
Suspended Solids	07-Jul-2020	07-Jul-2020
SVOC MS (W) - Aqueous	07-Jul-2020	05-Jul-2020
VOC MS (W)	06-Jul-2020	06-Jul-2020

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Appendix General

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

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

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

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

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

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

7. Results relate only to the items tested.

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

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

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

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

12. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

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. **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.

18. **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**
§	**Sampled on date not provided**
♦	**Sample holding time exceeded in laboratory**
@	**Sample holding time exceeded due to late arrival of instructions or samples**

19. **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 (2005), 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

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials 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 (2005).

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, based on HSG 248 (2005).

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.
Standing Committee of Analysts, *The Quantification of Asbestos in Soil (2017).*

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.

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CONSULTANTS IN ENGINEERING,
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