GEOENVIRONMENTAL GROUND INVESTIGATION ASSESSMENT AT PB LEINERS (PB GELATINS), CARDIFF, CF37 5SQ.

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ACRONYMS/TERMS USED IN THE TEXT

ACM	Asbestos Containing Materials
BH	Borehole
C4SLs	Category 4 Screening Levels
CIEH	Chartered Institute of Environmental Health
CLEA	Contaminated Land Assessment Criteria
CLR 11	Model Procedures for the Management of Land Contamination
COPC	Contaminants of Potential Concern
EA	Environment Agency
ECL	Environmental Compliance Limited
EQS	Environmental Quality Standards
GAC	Generic Assessment Criteria
GQRA	Generic Quantitative Risk Assessment
HDP	Hand-Dug Pit
LCRM	Land Contamination Risk Management
LOD	Limit of Detection
mbgl	Meters Below Ground Level
NaOH	Sodium hydroxide (caustic soda)
NRW	Natural Resources Wales
PAHs	Polycyclic Aromatic Hydrocarbons
S4ULs	Suitable 4 Use Levels
SGV	Soil Guideline Value
SOM	Soil and Organic Matter
SSV	Site Screening Value
sVOC	Semi-Volatile Organic Compound
TPH	Total Petroleum Hydrocarbons
VOC	Volatile Organic Compounds
VROM	Dutch Intervention Value for free cyanide
WS	Window Sample

1. INTRODUCTION

1.1. Overview

1.1.1. Environmental Compliance Limited ("ECL") has previously been appointed by Veolia to undertake a geo-environmental assessment at PB Gelatins (PB Leiners), Pontypridd, CF37 5SQ following an environmental incident on the 11th June 2020 involving the spillage of approximately 20 tonnes of liquid sodium hydroxide ("NaOH").

1.1.2. Following receipt of this report (ECL report reference ECL.095.01.01.GIR) and follow up groundwater monitoring report reference VEOL.01.01.GW (Dated January 2022), it is ECL's understanding that Natural Resources Wales ("NRW") requested a follow-up round of intrusive investigation to be undertaken to assess the present land condition and extent of any natural attenuation, if applicable.

1.1.3. This report summarises the findings of the follow-up intrusive site investigation, undertaken in accordance with ECL proposal letter reference VEOL.01.02/P which was submitted to NRW for approval by Veolia personnel. Analytical suites utilised for the assessment were submitted to the NRW site inspector Dale Padfield in December 2022 prior the siteworks commencing for comment and approval.

1.2. Background

1.2.1. The approximate location of the June 2020 spill is located on the site location presented below in Figure 1, with the spillage of approximately 20 tons of liquid sodium hydroxide (NaOH or Caustic Soda) covering approximately 25m^2.

1.2.2. Immediate measures taken by Veolia included the isolation of the NaOH supply pipeline at its source in the PB Gelatins factory, as well as locking the pipeline off at the delivery point to Veolia's site. Veolia has also requested that PB Gelatins removes the NaOH supply line at their earliest opportunity.

1.2.3. The initial clean-up process took place on the afternoon of Thursday the 11th June 2020 The surface liquid was removed by vacuum tanker, by specialist contractor, Egan Waste Services Limited. The area was then washed down and the resulting washings were again removed by vacuum tanker. All waste was disposed of through the PB Gelatins on-site trade effluent treatment plant.

1.2.4. The preliminary investigation by ECL found near surface soil materials within the immediate spill area contaminated with elevated levels of sodium and increased pH values. However, the impact of the spill, at time of investigation (2020), appeared constrained to the immediate spill location with limited downgradient migration.

1.2.5. Follow-up sampling of downgradient groundwaters by ECL in January 2022, ECL report VEOL.01.01.GW, indicated that some downgradient migration of contaminants may be occurring due to marginally increased sodium levels since those recorded at the time of the spill. However as this was a singular sampling event, no trend analysis could be undertaken on the results..

1.3. Scope of Works – December 2022 Investigation

1.3.1. The December 2022 site investigation works were undertaken in order to produce a Geo-Environmental assessment report, comparing the measured concentrations of contaminants found to those recorded during the initial 2020 site investigation.

1.3.2. This assessment has been undertaken in accordance with current guidance such as LCRM – 'Land contamination: risk management' (Environment Agency, 2021), BS10175-A2:2017 (Investigation of Potentially Contaminated Sites, Code of Practice) and BS5930-A3:2015 (Code of Practice for Site Investigation).

1.4. Existing Site Conditions

1.4.1. As per the specified requirements of BS10175, "Investigation of potentially contaminated sites, code of practice", a phase 1 desk study must be undertaken prior to a phase 2 intrusive investigation. This has been conducted by Integral Geotechnique (Wales) Limited, report reference 12588/PB/20/SCR, and ECL's conceptual understanding of the site is based on the information contained therein and from the data collected during the 2020 site investigation.

1.4.2. From report reference 12588/PB/20/SCR, it is understood the site is underlain by relatively homogenous 'Made Ground' comprising hardcore like materials and anthropogenic materials including brick, ash, clinker, metal, concrete and pottery. The presence of cobbles and boulders was noted in the Made Ground. It is understood the Made Ground extends to a maximum depth of 1.6mbgl.

1.4.3. Historic site use included a metal alloy works and heavy and light industrial uses including gelatin manufacture.

1.4.4. Groundwater flow direction is anticipated to be north/easterly toward the River Taff some 370m north (at its closest point) from the spill location. The site is underlain by shallow Secondary A aquifer and deeper secondary A bedrock aquifer (permeable layers capable of supporting water supplies at a local rather than strategic scale).

1.4.5. The Made Ground was immediately underlain by a thin mantle of superficial clay which was in turn underlain by superficial deposits comprising sands, gravels and cobbles. These are variable however, predominantly cohesive alluvial soils were recorded to a proven depth of between 19.7 to 27mbgl.

2. INVESTIGATION AND SAMPLING STRATEGY

2.1. General

2.1.1. A Dynamic Sampling (window sampling) rig was utilised to obtain the near surface soil samples and install two new shallow groundwater monitoring wells both within and downgradient of the spill impacted area. The total number of groundwater monitoring points installed by ECL is now three.

2.1.2. A fourth unmarked historic borehole was located during the siteworks. The groundwater from this installation were also sampled, however, no geological logs or installation details for this monitoring point are available. This borehole has been given the designation BH0.

2.1.3. Soil screening tests for the purposes of assessing the risk to human health and ascertaining the degree of natural attenuation were scheduled on samples obtained from the spill impacted area and downgradient.

2.1.4. All works were undertaken on the 16th December 2022 in accordance with BS5930:2015, BS10175:A2 (2017). All works were supervised by suitably experienced personnel from ECL.

2.2. Baseline Condition

2.2.1. A site baseline condition was established by the 2020 site investigation, by the progression of one upgradient borehole, in the surrounding site area which was not impacted by the spill.

2.2.2. The remaining intrusive locations progressed in 2020 were all located within areas of the site directly impacted by the spill and/or downgradient. All exploratory hole locations are presented in Appendix I and the reasoning behind each investigation location is provided in Table 1.

Table 1: Historic Exploratory Hole Rationale

Location	Notes	Location Rationale
BH01	Upgradient borehole	Upgradient borehole, not known to be impacted by the recent spill, for establishment of site baseline conditions, against which relevant contaminant concentrations will be compared.
BH02	Central spill area	Borehole progressed for the collection of environmental samples and the determination of depth to which ground materials were contaminated by the spill.
BH03	Downgradient borehole	Downgradient borehole progressed for the collection of environmental samples and assessment of groundwater quality at a location downgradient of the spill location.

Table 1: Exploratory Hole Rationale (Cont.)

Location	Notes	Location Rationale
HDP1	Spill area	Hand-augered trial pit for the collection of environmental samples in an area of the site inaccessible to the sampling rig. The trial pit is located between the green boiler house structures in main spill impacted area.
HDP2	NW site boundary	Hand augered trial pit on the north-west site boundary with 'Western Power' for the purpose of assessing whether materials beyond the site boundary may have been impacted by the spill.
HDP3	Spill area	Hand-augered location between the green boiler house structured for the purpose of collecting environmental samples. It should be noted that ground materials within this area were between 5-10cm thick. The trial pit was terminated on concrete encountered at between 0.05 to 0.1mbgl, assumed concrete footing/pad foundation for the boiler house structures. It was not possible to obtain samples from beneath this depth.

Key to Table:
BH = Borehole
HDP = Hand Dug Pit

2.2.3. A 'quick check' field test using a 'Digital Instruments' Lutron PH-220S soil pH meter was conducted to gain a preliminary understanding of the depth to which soils had been contaminated by NaOH. Whilst the field measurement was useful for a 'quick-check' method when determining sampling frequency and location, official soil pH values obtained by the UKAS/MCERTS accredited laboratory were utilised for the purposes of the 2020 assessment.

2.2.4. Disturbed soil samples were collected from the recovered cores using a stainless-steel trowel, wiped clean between sampling locations. Near surface soil samples were also collected using a stainless-steel hand auger, again, wiped clean between sampling locations. Soil samples were collected directly into pre-labelled sample containers. Care was taken to minimise head space of the sample containers. Once filled sample containers were placed within cool boxes containing ice packs to maintain as cool a temperature as possible, nominally 4°C.

2.2.5. Laboratory testing was scheduled based on ECL's comprehensive soil screening suite, amended as appropriate to cover the chemicals stored on site, outlined in report reference 12588/PB/20/SCR. Samples were collected by courier, and delivered to the i2 Analytical UKAS/MCERTS accredited laboratory. All test methods were conducted in accordance with ISO17025 and all samples were accompanied by detailed chain of custody sheets.

2.2.6. A summary of the analytical suites utilised was as follows;

- **Soils Suite:** screening for heavy metals, semi-metals, pH, phenols, cyanide, sulphide, speciated polycyclic aromatic hydrocarbons ("PAHs"), mineral oil, total petroleum hydrocarbons ("TPH") including product ID, asbestos screen, VOC and sVOC.

- **Waters Suite:** Screening for heavy metals, semi metals, pH, cyanide, sulphide, speciated polycyclic aromatic hydrocarbons ("PAHs"), total petroleum hydrocarbons ("TPH: CWG"), VOC, sVOC. Calcium, magnesium, potassium and sodium are covered by this analytical suite.

2.3. Encountered materials summary

2.3.1. The encountered materials were predominantly Made Ground underlain by superficial deposits comprising sands, silts and gravels. The generalised ground profile encountered at the site is summarised in Table 2 below.

Table 2: Generalised Ground Profile

Depth (mbgl)	Encountered Material
0.0 - 1.6	**Made Ground:** Brown/black and yellowish-brown medium to coarse, medium dense, angular GRAVEL of limestone, some coal, occasional wood fragments and anthropogenic materials (observed brick, metal, plastic). Matrix of brownish-black coarse sand. Ash/clinker/industrial slag encountered within BH01.
1.6 - 3.6	**Silty, Gravelly, Sand (superficial alluvial deposits):** Greyish-brown and reddish-brown (mottled orange), loose, soft, firming towards base, stiff at 3.5mbgl, slightly silty, slightly clayey fine to medium sand with occasional medium to coarse gravel of sandstone.
3.6- 4.7	**Sandy Gravel (superficial alluvial deposits):** Greyish-brown becoming yellowish brown, medium to coarse, loose, sub-angular to sub-rounded gravel, becoming increasingly coarse to base, coarse sand matrix/infill.

2.3.2. A mild hydrocarbon odour was noted at 2.2-2.3mbgl within BH03. Black staining and strong hydrocarbon odour were encountered within BH02 at a depth of 0.5-0.75mbgl. The hydrocarbon within BH02 was highly viscous, presumed diesel/fuel oil.

2.3.3. White staining (dried NaOH), was observed on the surface within the building the sodium hydroxide spill had originated in. No white staining was observed within ground materials; however, this was likely due to the ground materials being saturated with infiltrated rainwater.

2.3.4. All borehole logs are enclosed within Appendix II of this report.

2.3.5. Following completion of the site works, groundwater monitoring and sampling was undertaken from BH03 and WS201 and WS202. Groundwater was measured at 1.89mbgl with the base of the borehole measured to be 3.97mbgl. The effective water column height within the 50mm diameter monitoring standpipe at the time of monitoring was 2.08m.

2.4. Repeat Site Investigation – December 2022

2.4.1. The site investigation undertaken on 16th December 2022 aimed to repeat the scope of works undertaken by ECL in 2020, with the installation of additional downgradient monitoring boreholes.

2.4.2. Two new monitoring boreholes were installed as part of these works, WS202, installed within the spill impacted area and WS201, installed downgradient of the spill area. The rationale behind each borehole location is provided in Table 3.

Table 3: Exploratory Hole Rationale

Location	Notes	Location Rationale
WS202	Spill impacted area	Borehole progressed for the collection of environmental samples and the determination of extent of natural attenuation.
WS201	Concrete hardstanding area - downgradient	Borehole progressed for the collection of environmental samples and analysis of downgradient groundwater conditions.
BH0	Unknown Borehole Downgradient.	Existing, unknown borehole, sampled as an additional downgradient monitoring location.

2.4.3. The approximate locations of these boreholes is shown on Figure 1 below.

Figure 1: Borehole Location Plan

2.4.4. The encountered ground materials confirmed the findings of the 2020 site investigation presented within Table 2. Borehole logs are enclosed within Appendix II of this report.

2.4.5. Soil samples were collected from the recovered cores and scheduled for laboratory analysis under the repeat analytical suite from 2020. The analytical results for both soil and groundwater samples are discussed in Section 3.

3. CONTAMINATION CHARACTERISATION

3.1. Legislation

3.1.1. Contaminated Land is defined in Part IIA of the Environmental Protection Act (1990) as: "Any land which appears to the Local Authority in whose area it is situated to be in such a condition, by reasons of substances in, on or under the land that:

- Significant harm is being caused or there is a significant possibility of such harm being caused; or
- *[1]significant pollution of controlled waters is being caused or there is a significant possibility of such pollution being caused."

3.2. Generic Quantitative Risk Assessment

Human Health Screening

3.2.1. Current legislation and guidance on the assessment of contaminated land promotes a tiered risk approach (LCRM). The generic quantitative risk assessment ("GQRA") comprises screening of identified contaminants against generic guideline values that are appropriate to the site setting and the receptors concerned. For risks to human health, the basis for these generic guideline values are the methodologies set out by the Environment Agency's Contaminated Land Exposure Assessment ("CLEA") guidelines.

3.2.2. The following regulatory and industry guidance has been utilised for the selection of Generic Assessment Criteria ("GAC") utilised as part of the GQRA. The order of the guidance listed is in terms of hierarchy for selection of GACs (where the land uses and parameters are considered most applicable), namely

i. Category 4 Screen Levels ("C4SLs") – DEFRA (2014);
ii. Soil Guidance Values ("SGVs") – Environment Agency (2009);
iii. Suitable for Use Levels ("S4Uls") – LQM/CIEH (2015); and
iv. CL:AIRE GAC (2009).

3.2.3. In the absence of a published UK derived GAC for cyanide, the GQRA for total cyanide is based upon comparison of recorded values against the Dutch Intervention Value for free cyanide (VROM 2000).

3.2.4. The current site use is industrial. Therefore, the standard land use for the site, for use in the assessment has been defined as "Commercial" in accordance with current guidance.

Controlled Waters Screening

3.2.5. Risks to controlled waters have been assessed following current Environment Agency guidance such as "Remedial Targets Methodology – Hydrological Risk Assessment for Land Contamination". This guidance describes a tiered approach to the assessment and, if necessary, derivation of remedial targets for soils and groundwater with the emphasis on

[1] *Section 86 of the Water Act 2003 amends section 78A of Environmental Protection Act 1990 for Controlled Waters

the protection of controlled waters.

3.2.6. In accordance with EA guidance a Level 2 soil and Level 2 groundwater screening assessment has been undertaken, to identify the contaminants of concern that may pose a risk to controlled waters namely groundwaters and the River Taff. This assessment has been undertaken by the comparison of groundwater contaminant concentrations with criteria applicable to the long-term protection of water quality.

3.2.7. Analytical results have been assessed against Environment Agency EQSs for surface waters as presented within online guidance 'Surface water pollution risk assessment for your environmental permit'[2], River Basin Districts Typology, Standards and Groundwater Threshold Values (Water Framework Directive) (England and Wales) 2010, where available. Where such standards are not available, analytical results have been assessed against The Water Supply (Water Quality) Regulations 2010.

3.3. Soil Analysis- Human Health

3.3.1. Soil samples were collected and analysed from both Made Ground and natural soils. Certificates of analysis for the samples are contained within Appendix III.

3.3.2. Current guidance for the statistical assessment of environmental data within a contaminated land context is detailed within the CIEH and CL:AIRE joint publication titled 'Guidance on Comparing Soil Concentration Data with a Critical Concentration' (2008). However, as judgemental sampling has been undertaken, statistical assessment as detailed in CL:AIRE (2008) has not been carried out as part of this assessment. Therefore, to identify Contaminants of Potential Concern ("COPC") as part of this assessment, the analytical results for the ground materials sampled have been assessed by the screening of individual analyses against the relevant Tier 1 Site Screening Values ("SSVs") adopted.

3.3.3. For generic assessment purposes, SSVs have been conservatively selected, where appropriate, based upon a sandy soil and Soil Organic Matter ("SOM") of 1%.

Site Background Data

3.3.4. During the 2020 site investigation, two samples from the Made Ground (Sample BH01a) and natural strata (BH01b) were scheduled for analysis from the site in order to gain a preliminary understanding of the likely background concentrations, within an area of the site not impacted by the recent sodium hydroxide spillage.

3.3.5. The analytical results for downgradient borehole, BH03, were also included in the site background analysis given the similarity between the analytical results when compared to the upgradient soil analysis. The downgradient soils did not appear to have been impacted by the sodium hydroxide spill and appear representative of the site background values.

3.3.6. It should be noted that no exceedances of the relevant threshold values, for the protection

[2] EA online guidance, available on line at https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit, accessed January 2023

of human health, were identified in BH01 or BH03 when screening against a 'commercial' land use. Notwithstanding this, asbestos (chrysotile and amosite), likely remnants of historic land use (foundry), in the form of loose fibres and sheeting board debris has been identified within the near surface 'Made Ground' materials.

3.3.7. Table 4 summarises the elevated background concentrations from 2020 which were considered as COPCs in relation to the protection of human health and controlled waters. The measured concentrations of parameters used to identify materials that have been contaminated by NaOH (sodium and pH) are also presented within Table 3, below.

Table 4: 2020 Site Background Soil Concentration Values

Contaminant	BH01a (mg/kg) 0.3-0.4 (mbgl)	BH01b (mg/kg) 2.2-2.5 (mbgl)	BH03a (mg/kg) 0.4-0.5 (mbgl)	BH03b (mg/kg) 2.2-2.4 (mbgl)	Comment
Asbestos	Detected	Not detected	Detected	Not detected	Loose Fibres, Amosite-Sheeting/Board Debris
pH	8.7	7.8	8.3	7.8	Heavy metals and metalloids are likely to have originated from the historical usage of the site as a foundry. Although low levels of PAHs are present, no product is identifiable owing to the low levels.
Total Sulphate as SO_4	1,700	1,700	1,300	410	
Sulphide	20	4.9	8.8	< 1.0	
Aluminium	6,600	5,900	15,000	8,600	
Arsenic	24	2.2	17	13	
Barium	440	68	590	61	
Iron	130,000	6,300	33,000	38,000	
Manganese	1,500	96	780	990	
Phosphorus	1,000	420	3,100	690	
Zinc	250	27	1,100	99	
Sodium	310	140	**470**	**210**	
TPH C10 - C40	120	< 10	30	39	

Sodium hydroxide Spill Area

3.3.8. Table 5 summarises determinands from within the sodium hydroxide spill area, recorded as elevated by the 2020 site investigation. These are predominantly heavy metals and metalloids, likely to be associated with historic land usage of the site (foundry). It is noted that the concentrations identified are broadly consistent with the site background identified in Table 4.

3.3.9. It should be noted that for the parameters for which SSV are available, no exceedances of the relevant threshold values, for the protection of human health, were identified when screening against a 'commercial' land use. Notwithstanding this, asbestos (chrysotile and amosite) in the form of loose fibrous debris and sheeting board debris has been identified within the near surface Made Ground materials. No large fragments of asbestos containing material ("ACM") were observed on the site surface, it is considered likely that the asbestos contained within Made Ground materials is likely remnant of historic land use.

Table 5: Soil Analysis Summary – Sodium Hydroxide Spill Area result from 2020 investigation

Contaminant	BH02a (mg/kg) 0.3-0.4 (mbgl)	BH02b (mg/kg) 0.6-0.7 (mbgl)	BH02c (mg/kg) 1.4-1.6 (mbgl)	BH02d (mg/kg) 2.5-2.7 (mbgl)	HDP1 (mg/kg) 0.0-0.3 (mbgl)	HDP2 (mg/kg) 0.0-0.4 (mbgl)	HDP3 (mg/kg) 0.0-0.1 (mbgl)	SSV (mg/kg)
Asbestos	Detected	Detected	Not detected	Not detected	Detected	Detected	Detected	-
pH	**10.0**	**9.7**	**9.7**	**9.3**	**9.8**	**9.7**	**10.6**	-
Total Sulphate as SO4	2,200	1,200	1,600	320	650	6,600	2,200	-
Sulphide	1.7	99	67	1.3	15	1.6	18	-
Aluminium	3,700	7,100	14,000	6,800	4,000	6,300	22,000	-
Arsenic	12	39	19	7.8	18	110	95	640 [(c)]
Barium	270	230	98	36	1,300	680	1,200	22,000[(d)]
Iron	32,000	32,000	38,000	36,000	59,000	150,000	140,000	-
Manganese	460	350	770	250	1,300	1,200	1,100	-
Phosphorus	650	1,400	810	200	1,500	4,900	7,100	-
Zinc	88	290	83	94	550	270	1600	730,000[(c)]
Sodium	**750**	**2,100**	**3,400**	**840**	**1,900**	**2,800**	**14,000**	-
TPH C10 - C40	290	2,400	430	< 10	210	71	900	-

Notes to Table 5:

a) DEFRA C4SLs (2014) based on "Commercial" end use
b) Environment Agency SGVs (2009) based on "Commercial" end use
c) LQM/CIEH S4ULs (2015) based on "Commercial" end use
d) CL:AIRE, AGS & EIS (2009) based on "Commercial" end use
e) Dutch Intervention Value for free cyanide (VROM 2000)

3.3.10. During the 2022 investigation, eleven soil samples from within the spill contaminated area were scheduled for chemical testing. Analytical results for the soil sampling undertaken during are provided as Appendix III of this report.

3.3.11. Table 6 below summarises the December 2022 measured concentrations for those parameters which were noted as elevated during the 2020 site investigation.

3.3.12. If released to soil, sodium hydroxide will separate into sodium cations and hydroxide anions when it comes into contact with moisture. During the 2020 site investigation, higher pH values, when compared to the observed site background, were identified within all intrusive locations within the spill area.

3.3.13. The pH values from the follow up sampling during December 2022, with the exception of samples WS202a (downgradient) and WS201d (spill area) have dropped towards the neutral range. Sodium concentrations have also substantially decreased from thousands of mg/kg to sub 420mg/kg within the spill impacted soils.

3.3.14. This would indicate that any remaining liquid phase contamination has either migrated down-gradient or has been attenuated and / or is no longer present within the spill.

Table 6: Soil Analysis Summary – Current Sodium Hydroxide Spill investigation Area

Contaminant	WS202a (mg/kg)	WS202b (mg/kg)	WS202C (mg/kg)	WS202D (mg/kg)	WS202E (mg/kg)	WS202F (mg/kg)	WS201a (mg/kg)	WS201b (mg/kg)	WS202c (mg/kg)	WS201d (mg/kg)	WS201e (mg/kg)	SSV (mg/kg)
	0.2-0.4 (mbgl)	0.75-0.9 (mbgl)	1.2-1.3 (mbgl)	1.5-1.7 (mbgl)	2.3-2.6 (mbgl)	3-3.3 (mbgl)	0.2-0.4 (mbgl)	0.7-0.9 (mbgl)	1.4-1.6 (mbgl)	2.1-2.3 (mbgl)	2.9-3.2 (mbgl)	
Asbestos	Not Detected	Detected	Not Detected	Detected	Not Detected	Not detected	Not Detected	Not Detected	Not Detected	Not Detected	Detected	
pH	**10.5**	**8.4**	**7.2**	**9.4**	**8.6**	**9.1**	**8.7**	**8.3**	**8.4**	**10.5**	**9.5**	
Total sulphate as SO_4	2,200	120	440	120	57	73	1,200	680	260	1,400	660	
Sulphide	6.3	1.2	14	4.2	< 1.0	1.9	65	8	< 1.0	8	28	
Aluminium	6,800	2,800	8,900	5,500	5,600	5,500	3,600	6,600	7,700	7,800	7,000	
Arsenic	6.4	4.5	6.3	5.2	5.2	7.8	9.5	9.9	18	15	11	640 [c]
Barium	32	130	45	30	27	27	380	640	50	71	57	22,000[d]
Iron	25,000	5,700	28,000	20,000	22,000	45,000	20,000	38,000	54,000	33,000	40,000	
Manganese	650	60	1,800	250	240	460	400	1,400	1,600	1,100	880	
Phosphorus	240	420	300	210	270	480	710	330	600	410	470	
Zinc	44	130	57	39	38	58	240	61	92	61	63	730,000[c]
Sodium	**370**	**240**	**310**	**780**	**410**	**350**	**420**	**240**	**170**	**290**	**250**	
TPH C10 - C40	< 10	20	< 10	< 10	< 10	< 10	48	19	75	38	32	

Notes to Table

a) DEFRA C4SLs (2014) based on "Commercial" end use
b) Environment Agency SGVs (2009) based on "Commercial" end use
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d) CL:AIRE, AGS & EIS (2009) based on "Commercial" end use
e) Dutch Intervention Value for free cyanide (VROM 2000)

3.4. Controlled Waters – Groundwater Analysis

3.4.1. Groundwater samples were taken from WS201, WS202, BH03 and BH0 following completion of siteworks. The certificate of analysis is contained within Appendix III and results above the LOD are summarised below in Table 6. All exceedances of the relevant EQS are highlighted in bold.

3.4.2. BH03* shaded in grey are the historic 2020 analytical results for the borehole.

Table 6: Groundwater Analysis Summary

Contaminant	WS201 (µg/l)	WS202 (µg/l)	WS0 (µg/l)	BH03 (µg/l)	BH03* (µg/l)	SSV (µg/l)
pH	8.3	8.4	7.5	7.3	7.1	n/a
Sulphate as SO4	45.3	35.6	26.2	40.4	18,100	250,000[(b)]
Chloride	170	180	23	260	56,000	250,000[(b)]
Ammonium as NH_4	**13,000**	**3,000**	**1200**	**15,000**	**2,700**	**500[(b)]**
Nitrite as N	0.09	0.65	0.95	0.02	91	n/a
Aluminium	18	43	31	1.2	72	200[(b)]
Antimony	5.2	1.2	1	0.5	0.8	5[(b)]
Arsenic	2.78	7.09	0.37	3.95	0.84	10[(b)]
Barium	93	27	45	100	150	700[(c)]
Boron	54	190	30	30	66	1000
Cadmium	<.02	0.03	<.02	0.02	0.04	5
Calcium	98,000	17,000	64,000	97,000	71,000	n/a
Copper	3.6	1.8	1.6	0.7	1.8	2000[(b)]
Iron	24	170	7	77	**350**	200[(b)]
Magnesium	18,000	1,600	9,700	10,000	17,000	n/a
Manganese	**300**	**110**	**580**	**850**	**3,400**	**50[(b)]**
Molybdenum	20	30	0.8	2.7	3.2	70
Nickel	**22**	4.3	4.2	7.3	3.2	20[(b)]
Phosphorus	726	899	905	531	22.9	n/a
Potassium	24,000	5,600	5,300	5,400	7,800	n/a
Selenium	1.2	1.3	<0.6	<0.6	0.7	10[(a)]
Sodium	130,000	**350,000**	24,000	150,000	38,000	200,000 [(b)]
Tin	1.1	0.31	0.36	0.3	0.42	25
Vanadium	0.8	55	<0.2	0.3	0.4	60[(a)]
Zinc	1.7	2.6	11	3.7	7.8	10.9[(a)]

Notes:

a) EQS for Surface Waters (Environment Agency 'H1 Annex D1: Assessment of Hazardous Pollutants within Surface Water Discharges V2.0' (October 2014))
b) Water Supply (Water Quality Regulations) 2010
c) Guidelines for Drinking-water Quality (WHO) 2011
d) SSV based upon Groundwater Threshold Values from The Water Framework Directive (England and Wales)(2010), unless

otherwise stated.

e) Annual Average ("AA") and Maximum Allowable Concentration ("MAC")

3.4.3. Sodium and pH have been used as marker compounds to assess the impact on groundwaters within and downgradient of the sodium hydroxide spill location.

3.4.4. The greatest concentrations of sodium have been recorded within WS202, downgradient of the historic spill location (WS201). However, whilst sodium levels are elevated, and in excess of the relevant SSV, the pH levels of the downgradient waters are recorded within 0.1 pH units of those within the historic spill location.

3.4.5. Concentrations of sodium within the groundwater of BH03 have also increased since the initial 2022 investigation. However, BH0 located further downgradient than BH03 measured lower concentrations of sodium, potentially indicating downgradient migration of contaminants has not yet reached this location, or contaminants are preferentially migrating towards the location of WS202.

3.4.6. Further sampling of groundwaters would be required to identify trends within contaminant migration direction, if occurring.

3.4.7. It is noted that ammonium and manganese are in exceedance of the relevant EQS. However, this is considered resultant of historic contamination and not as a result of the recent spill of sodium hydroxide, which is the focus of this report.

3.5. Conceptual Site Model

Hazard Identification

3.5.1. The potential hazards are identified in Table 7.

Table 7: Identified Potential Hazards

Identified Hazard/Source	Location	Details
Made Ground and natural strata contaminated by the recent sodium hydroxide spill	WS201, WS202, BH03	Whilst no exceedances of human health criteria for a 'commercial' land use were identified. The ground materials are being further considered due to the potential risk to construction workers and controlled waters. Asbestos has also been identified within three samples.
Risk to Controlled Waters (Level 2, leachate and groundwater)	WS202, WS201, BH03, BH0	Concentrations in excess of the relevant EQS for sodium, manganese and ammonium as NH_4 have been measured in groundwater. Whilst these are noted to be predominantly associated with historic land use. Exceedances of electrical conductivity limits in WS202, WS201 and BH03 could potentially be associated with aqueous sodium hydroxide.

Identified Potential Receptors and Pathways

3.5.2. Potential receptors identified as part of the generic risk assessment are:

- current/future site users;
- construction workers; and
- controlled waters (secondary aquifer and surface waters)

3.5.3. Potential contaminant pathways identified as part of the generic risk assessment include:

- dermal contact – contact with soil, dust or water;
- ingestion - ingestion of soil, dust or water;
- inhalation – inhalation of soil, dust or vapours; and
- vertical and horizontal migration of contaminants through the unsaturated and saturated zones – contaminants leached from ground materials by infiltrated rainwater, migrating along preferential pathways.

Hazard Assessment and Risk Estimation

3.5.4. Potential significant pollutant linkages identified following completion of the 2022 intrusive works are summarised in the Site Conceptual Model presented in Table 8.

Table 8: Site Conceptual Model

Identified Hazard/Source	Identified Receptor	Potential Pathway to Receptor	Associated Hazard	Scale of Impact	Potential Likelihood for and Significance of Significant Source-Receptor Linkage
Historically contaminated Made Ground and natural strata contaminated and materials contaminated by hydrocarbons and the recent sodium hydroxide spill	Current and future site users and workers	Ingestion, inhalation and dermal contact	Risk of harm to human health	Local	Likely – **Moderate Risk**
	Controlled Waters (Secondary A Aquifer and the River Taff)	Contaminants leached from ground materials by infiltrated surface waters, migrating vertically and horizontally through the unsaturated zone via preferential pathways	Risk of harm to controlled waters	Local to Regional	Low Likelihood to Likely – **Moderate Risk**

4. CONTAMINATION SUMMARY

4.1. Summary

4.1.1. Eleven soil samples from within the spill contaminated area were scheduled for chemical testing. For the parameters for which assessment criteria (SSVs) are available, no exceedances of the threshold values, for the protection of human health, were identified when screening against a 'commercial' land use. Notwithstanding this, asbestos has been identified within the Made Ground materials across all intrusive locations, concurrent with the findings of the 2020 site investigation.

4.1.2. Sodium and pH have been used as marker compounds for the presence of sodium hydroxide within near surface soil materials. The concentrations recorded by the December 2022 investigation were significantly reduced when compared to the historic results. Sodium was recorded at concentrations of sub 420mg/kg, decreasing from the range of 750mg/kg to 14,000mg/kg.

4.1.3. Groundwater samples were taken from four locations, BH03 installed by ECL in 2020 downgradient of the spill impacted area, WS201 installed December 2022 within the spill zone, WS202 downgradient and WS0 an unknown borehole located at the time of siteworks.

4.1.4. Groundwater sampling indicated the most elevated concentrations of sodium (350,000µg/l), in breach of the relevant EQS, within WS202 downgradient of the spill location. Concentrations within WS201 (spill impacted area) were recorded at 130,000µg/l. Concentrations within BH03 are also noted to be elevated since the 2020 monitoring period.

5. CONCLUSIONS

5.1. Prior Remedial Recommendations

5.1.1. Remedial recommendations provided by the 2020 report included the excavation of sodium hydroxide impacted soils and their disposal. Following this was the subsequent installation of concrete hardstanding across the operational site area to break the source-pathway-receptor model for current site users and prevent any future uncontrolled releases to land.

5.1.2. Whilst the contaminant concentrations in soils have significantly attenuated since the original recommendation, and excavation would no longer be deemed required, the installation of an impervious concrete hardstanding would be prudent to protect against any future environmental incidents within the operational site area.

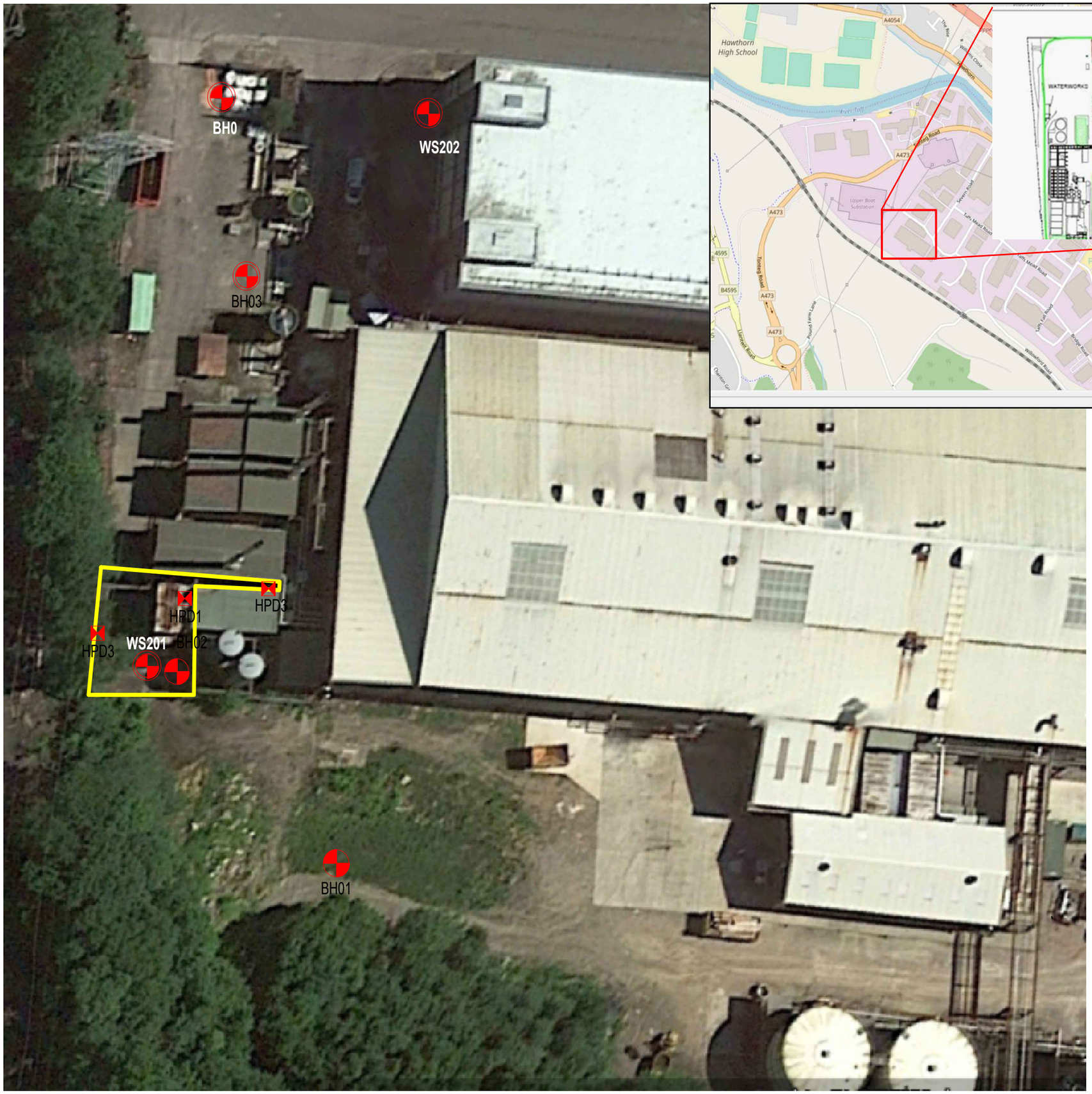
5.1.3. The greatest concentrations of sodium in groundwater have been recorded within WS202, downgradient of the historic spill location (WS201). Concentrations of sodium within the groundwater of BH03 have also increased since the initial 2022 investigation. Potentially indicating downgradient migration of contaminants towards the location of WS202. However, further sampling of groundwaters would be required to identify trends within contaminant migration direction, if occurring.

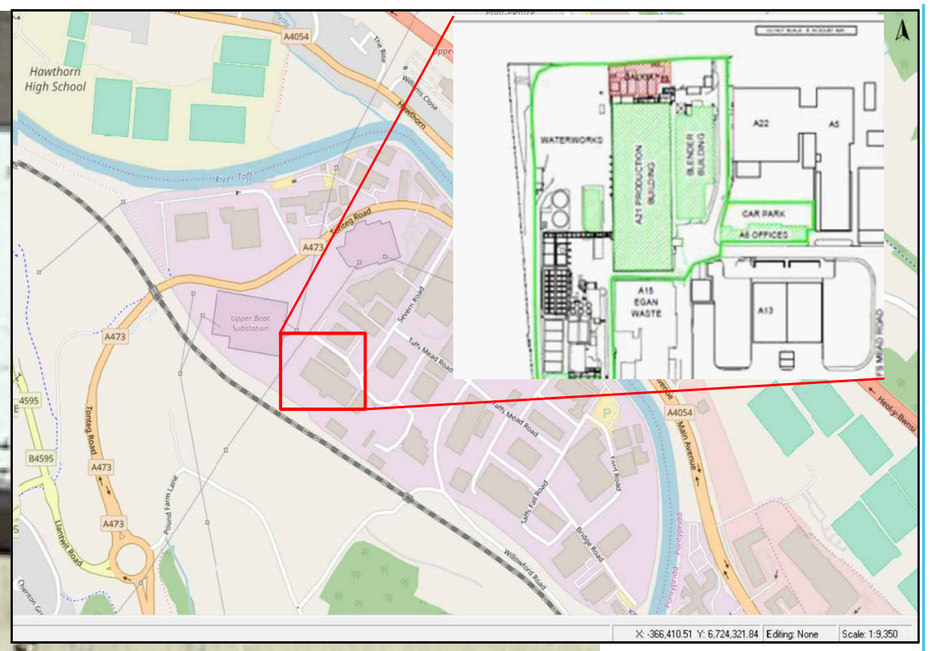
5.2. Conclusions

5.2.1. The EQS for sodium was breached at downgradient location WS202, however concentrations within the spill impacted area were recorded at approximately half the downgradient concentration. Whilst the preliminary conclusion is that sodium hydroxide may be migrating downgradient toward WS202, the volume spilt is finite and soils within the spill impacted area are showing concentrations back within range of the previous site 'baseline'.

5.2.2. It is considered that further attenuation of both soil and groundwater concentrations will occur, however, sampling of groundwaters on a monthly basis would be required in order to comment further on any trends and behaviours.

APPENDIX I – BOREHOLE LOCATION PLAN





Exploratory Hole Location:

Exploratory Hole with Installation Location:

Exploratory Hole Location:

*All Locations are Approximate

**The approximate NaOH spill area is outlined by the yellow boundary.

Rev	Date	Details	Chkd

Environmental Compliance Ltd.
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Main Avenue
Treforest Industrial Estate
Pontypridd.
CF37 5YL
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Fax: 01443 841761
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Client

Date	Scale	Drawn by	Checked by	Approved by
24/01/2023	NTS	FT	SB	CB

Drawing Status
Issue 1

Project Title
VEOL.01.02

Drawing Title
Intrusive Investigation Locations Plan

Drawing Number	Rev
VEOL.01.02 -01	-

APPENDIX II – BOREHOLE LOGS

WS201 VEOL.01.02

PROJECT NUMBER VEOL.01.02
PROJECT NAME Veolia NaOH SI
CLIENT Veolia
ADDRESS CF37 5SQ

DRILLING DATE 16/12/2022
TOTAL DEPTH 3.2mbgl
INSTALL DEPTH 3.10mbgl
SCREEN 1.1m Plain and 2m (50mm) Slotted Pipe
GROUNDWATER 1.24mbgl

COORDINATES (X,Y) 310058, 186843

COMMENTS Groundwater monitoring borehole - spill area

LOGGED BY FT
CHECKED BY SB

Samples	Depth (m)	Graphic Log	Material Description	Well Diagram
201A	0.2		MADE GROUND: Yellowish-brown and grey, medium to coarse, medium dense to dense, angular GRAVEL of various lithologies, with red-brick fragments being observed. Some black staining at 0.7mbgl. Matrix of grey-brown coarse, slightly silty sand.	Concrete cement grout
	0.4			
	0.6			Bentonite
201B	0.8			
	1			
	1.2			
	1.4			
201C	1.6		SILTY SAND: Yellowish-brown mottled orange, slightly silty, fine to medium sand. Firm 1.4 to 2.0mbgl becoming soft, very loose at 2.0 - 3.2mblg with occasional coarse sandstone gravel fragments.	
	1.8			
	2			Filter Pack
201D	2.2			
	2.4			
	2.6			
	2.8			
201F	3			
	3.2		Refusal at 3.2mbgl	Collapse
	3.4			
	3.6			
	3.8			
	4			
	4.2			
	4.4			
	4.6			
	4.8			

WS202 VEOL.01.02

PROJECT NUMBER VEOl.01.02
PROJECT NAME Veolia NaOH SI
CLIENT Veolia
ADDRESS CF37 5SQ

DRILLING DATE 16/12/2022
TOTAL DEPTH 3.3mbgl
INSTALL DEPTH 3.15mbgl
SCREEN 1.15m Plain and 2m (50mm) Slotted Pip
GROUNDWATER 1.76mbgl

COORDINATES (X,Y) 310112, 186883

COMMENTS Downgradient, groundwater monitoring borehole

LOGGED BY FT
CHECKED BY SB

Samples	Depth (m)	Graphic Log	Material Description	Well Diagram
	0		Concrete	Concrete cement grout
202A	0.2		MADE GROUND: Brown/black medium to coarse medium dense angular GRAVEL of limestone and anthropogenic materials (observed brick, metal, plastic). Matrix of brownish-black coarse sand.	
	0.4			
	0.6			Bentonite
202B	0.8			
	1			
	1.2			
202C	1.4			
	1.6			
202D	1.8			
	2			Filter Pack
	2.2			
	2.4			
202F	2.6		GRAVELLY SAND: Yellowish-brown, loose to medium-dense, slightly silty coarse sand with frequent fine to medium gravel and occasional cobble sized fragments of sandstone. [Superficial deposits].	
	2.8			
	3			
202E	3.2			Collapse
	3.4		Refusal at 3.3mbgl	
	3.6			
	3.8			
	4			
	4.2			
	4.4			
	4.6			
	4.8			

Groundwater Monitoring - BH03 095.01.01

PROJECT NUMBER 095.01.01
PROJECT NAME PB Leiner
CLIENT Veolia
ADDRESS CF37 5SQ

DRILLING DATE 14/07/2020
TOTAL DEPTH 4.7mbgl
INSTALL DEPTH 4.0mbgl
SCREEN 1m Plain and 3m (50mm) Slotted Pipe
GROUNDWATER 1.89mbgl

COORDINATES (X,Y) 310088,186873

COMMENTS Downgradient, groundwater monitoring borehole

LOGGED BY FT
CHECKED BY SB

Samples	pH (field measurement)	Sample Type	Depth (m)	Graphic Log	Material Description	Additional Observations	Well Diagram
			0.2		MADE GROUND: Brown/black medium to coarse medium dense angular GRAVEL of limestone, some coal, occasional wood fragments and anthropogenic materials (observed brick, metal, plastic). Matrix of brownish-black coarse sand.		concrete cement grout
BH03a		S	0.4				
			0.6				Bentonite
			0.8				
			1				
			1.2				
			1.4				
			1.6			Very wet, water saturated, between 2.2-2.3mbgl, very soft, very loose. Very mild hydrocarbon odour at 2.2mbgl.	
			1.8		SILTY SAND: Brown, slightly clayey, silty, medium sand (stiff, loose), occasional fine gravel of sandstone. [Superficial deposits]		
BH03		GW	2				
	6.47		2.2				
BH03b		S	2.4		GRAVELLY SAND: Yellowish-brown, mottled black at 2.8mbgl, soft to firm, loose to medium-dense, slightly silty coarse sand with frequent fine to medium gravel and occasional cobbles of sandstone. [Superficial deposits].		filter pack
	6.48		2.6				
			2.8				
			3			Groundwater strike within Gravel between 2.6 and 3.2mbgl, rising to 1.9mbgl following completion of drilling.	
			3.2				
			3.4				
			3.6				
			3.8		GRAVEL: Greyish-brown becoming yellowish brown, medium to coarse, loose, sub-angular to sub-rounded gravel, becoming increasingly coarse to base, with coarse sand matrix.		
			4				
			4.2				
			4.4				Collapse
			4.6				
			4.8				
			5		Refusal at 4.7mbgl		
			5.2				

This bore log is intended for environmental not geotechnical purposes.
produced by ESlog.ESdat.net on 15 Jul 2020

APPENDIX III – I2 ANALYTICAL CERTIFICATES OF CHEMICAL ANALYSIS

Filip Taylor
Environmental Compliance Ltd
Unit G1, The Willowford
Treforest Industrial Estate
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CF37 5BF

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i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
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e: reception@i2analytical.com

Analytical Report Number : 22-14826

Project / Site name:		**Samples received on:**	20/12/2022
Your job number:	VEOL.01.02	**Samples instructed on/ Analysis started on:**	23/12/2022
Your order number:		**Analysis completed by:**	11/01/2023
Report Issue Number:	1	**Report issued on:**	11/01/2023
Samples Analysed:	11 soil samples		

Signed:

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 22-14826

Lab Sample Number				2543158	2543159	2543160	2543161	2543162
Sample Reference				WS202A	WS202B	WS202C	WS202D	WS202E
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.40	0.75-0.90	1.20-1.30	1.50-1.70	2.30-2.60
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	6.6	15	25	15	14
Total mass of sample received	kg	0.001	NONE	0.3	0.3	0.3	0.3	0.3
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile- Loose Fibres	-	Crocidolite- Loose Fibres	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	WEM	WEM	WEM	WEM	WEM
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	10.5	8.4	7.2	9.4	8.6
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	2200	120	440	120	57
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	950	32	470	58	23
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.48	0.016	0.23	0.029	0.011
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	477	16	233	29.1	11.4
Sulphide	mg/kg	1	MCERTS	6.3	1.2	14	4.2	< 1.0
Ammoniacal Nitrogen as NH4	mg/kg	0.5	MCERTS	< 0.5	< 0.5	5.9	6.7	2.8
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.7	5	1.1	0.9	0.7
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs*								
Naphthalene	mg/kg	0.05	NONE	0.19	2.1	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	0.19	< 0.05
Fluorene	mg/kg	0.05	NONE	< 0.05	0.44	< 0.05	0.13	< 0.05
Phenanthrene	mg/kg	0.05	NONE	0.34	2.2	< 0.05	0.88	< 0.05
Anthracene	mg/kg	0.05	NONE	< 0.05	0.12	< 0.05	0.17	< 0.05
Fluoranthene	mg/kg	0.05	NONE	0.13	0.68	< 0.05	1.1	< 0.05
Pyrene	mg/kg	0.05	NONE	0.09	0.6	< 0.05	0.8	< 0.05
Benzo(a)anthracene	mg/kg	0.05	NONE	0.07	0.59	< 0.05	0.59	< 0.05
Chrysene	mg/kg	0.05	NONE	0.16	1.1	< 0.05	0.6	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	NONE	0.14	1.1	< 0.05	0.71	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	NONE	< 0.05	0.21	< 0.05	0.18	< 0.05
Benzo(a)pyrene	mg/kg	0.05	NONE	< 0.05	0.45	< 0.05	0.37	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	< 0.05	0.31	< 0.05	0.21	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	< 0.05	0.12	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	NONE	< 0.05	0.34	< 0.05	0.23	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	NONE	1.12	10.3	< 0.80	6.16	< 0.80

Analytical Report Number: 22-14826

Lab Sample Number				2543158	2543159	2543160	2543161	2543162
Sample Reference				WS202A	WS202B	WS202C	WS202D	WS202E
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.40	0.75-0.90	1.20-1.30	1.50-1.70	2.30-2.60
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Aluminium (aqua regia extractable)	mg/kg	30	ISO 17025	6800	2800	8900	5500	5600
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	2.3	1.6	2.7	1.5	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	6.4	4.5	6.3	5.2	5.2
Barium (aqua regia extractable)	mg/kg	1	MCERTS	32	130	45	30	27
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.57	0.66	0.51	0.51	0.66
Boron (water soluble)	mg/kg	0.2	MCERTS	2.6	0.4	0.6	1.6	0.5
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	14	15	11	9
Cobalt (aqua regia extractable)	mg/kg	0.15	MCERTS	7.3	5.2	14	6.7	11
Copper (aqua regia extractable)	mg/kg	1	MCERTS	11	34	18	11	10
Iron (aqua regia extractable)	mg/kg	40	MCERTS	25000	5700	28000	20000	22000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	9.4	34	14	7.8	9.3
Lithium (aqua regia extractable)	mg/kg	0.1	NONE	21	18	31	25	24
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	650	60	1800	250	240
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.45	1	0.69	0.3	0.69
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	18	19	18	16	17
Phosphorus (aqua regia extractable)	mg/kg	20	ISO 17025	240	420	300	210	270
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tin (aqua regia extractable)	mg/kg	1	MCERTS	1.4	1.8	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	16	14	20	25	14
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	44	130	57	39	38
Calcium (aqua regia extractable)	mg/kg	20	ISO 17025	75000	1600	1600	8800	710
Magnesium (aqua regia extractable)	mg/kg	20	ISO 17025	11000	490	1900	1900	1800
Potassium (aqua regia extractable)	mg/kg	20	ISO 17025	570	500	700	490	510
Sodium (aqua regia extractable)	mg/kg	20	ISO 17025	370	240	310	780	410
Monoaromatics & Oxygenates								
Benzene	µg/kg	5	MCERTS	< 5.0	< 5.0*	< 5.0*	< 5.0*	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0	< 5.0*	< 5.0*	< 5.0*	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0	< 5.0*	< 5.0*	< 5.0*	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0*	< 5.0*	< 5.0*	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0	< 5.0*	< 5.0*	< 5.0*	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Analytical Report Number: 22-14826

Lab Sample Number				2543158	2543159	2543160	2543161	2543162
Sample Reference				WS202A	WS202B	WS202C	WS202D	WS202E
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.40	0.75-0.90	1.20-1.30	1.50-1.70	2.30-2.60
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Petroleum Hydrocarbons								
Mineral Oil (C10 - C40) EH_CU_1D_AL	mg/kg	10	NONE	< 10	20	< 10	< 10	< 10
TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	1.6	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	7.1	< 2.0	< 2.0	< 2.0
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	< 8.0	< 8.0	< 8.0
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	20	< 10	< 10	< 10
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	4.5	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	< 2.0	9	< 2.0	< 2.0	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	NONE	< 10	26	< 10	< 10	< 10
VOCs								
Chloromethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Chloroethane	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
Bromomethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Vinyl Chloride	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
Trichlorofluoromethane	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
1,1-Dichloroethene	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
1,1-Dichloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
2,2-Dichloropropane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Trichloromethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
1,2-Dichloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
1,1-Dichloropropene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Trans-1,2-dichloroethene	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
Benzene	µg/kg	5	NONE	-	< 5.0*	< 5.0*	< 5.0*	-
Tetrachloromethane	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
1,2-Dichloropropane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Trichloroethene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Dibromomethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Bromodichloromethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Toluene	µg/kg	5	NONE	-	< 5.0*	< 5.0*	< 5.0*	-
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
1,3-Dichloropropane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Dibromochloromethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Tetrachloroethene	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
1,2-Dibromoethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Chlorobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-

Analytical Report Number: 22-14826

Lab Sample Number				2543158	2543159	2543160	2543161	2543162
Sample Reference				WS202A	WS202B	WS202C	WS202D	WS202E
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.40	0.75-0.90	1.20-1.30	1.50-1.70	2.30-2.60
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Ethylbenzene	µg/kg	5	NONE	-	< 5.0*	< 5.0*	< 5.0*	-
p & m-Xylene	µg/kg	5	NONE	-	< 5.0*	< 5.0*	< 5.0*	-
Styrene	µg/kg	5	NONE	-	< 5.0*	< 5.0*	< 5.0*	-
Tribromomethane	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
o-Xylene	µg/kg	5	NONE	-	< 5.0*	< 5.0*	< 5.0*	-
1,1,2,2-Tetrachloroethane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Isopropylbenzene	µg/kg	5	NONE	-	< 5.0*	< 5.0*	< 5.0*	-
Bromobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
n-Propylbenzene	µg/kg	5	NONE	-	< 5.0*	< 5.0*	< 5.0*	-
2-Chlorotoluene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
4-Chlorotoluene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
tert-Butylbenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
1,2,4-Trimethylbenzene	µg/kg	5	NONE	-	< 5.0*	< 5.0*	< 5.0*	-
sec-Butylbenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
p-Isopropyltoluene	µg/kg	5	NONE	-	< 5.0*	< 5.0*	< 5.0*	-
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Butylbenzene	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	-	< 5.0	< 5.0	< 5.0	-
Hexachlorobutadiene	µg/kg	5	NONE	-	< 5.0	< 5.0	< 5.0	-
1,2,3-Trichlorobenzene	µg/kg	5	NONE	-	< 5.0*	< 5.0*	< 5.0*	-
SVOCs*								
Aniline	mg/kg	0.1	NONE	-	1.2	< 0.1	2.4	-
Phenol	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
2-Chlorophenol	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1	-
Bis(2-chloroethyl)ether	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
1,3-Dichlorobenzene	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
1,2-Dichlorobenzene	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1	-
1,4-Dichlorobenzene	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1	-
2-Methylphenol	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
Hexachloroethane	mg/kg	0.05	NONE	-	< 0.05	< 0.05	< 0.05	-
Nitrobenzene	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
Isophorone	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
2-Nitrophenol	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
2,4-Dimethylphenol	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
Naphthalene	mg/kg	0.05	NONE	-	2.1	< 0.05	< 0.05	-
2,4-Dichlorophenol	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1	-
Hexachlorobutadiene	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1	-
2,4,6-Trichlorophenol	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1	-
2,4,5-Trichlorophenol	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	4.1	< 0.1	< 0.1	-
2-Chloronaphthalene	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1	-

Analytical Report Number: 22-14826

Lab Sample Number				2543158	2543159	2543160	2543161	2543162
Sample Reference				WS202A	WS202B	WS202C	WS202D	WS202E
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.20-0.40	0.75-0.90	1.20-1.30	1.50-1.70	2.30-2.60
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Dimethylphthalate	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1	-
2,6-Dinitrotoluene	mg/kg	0.1	NONE	-	< 0.1	< 0.1	< 0.1	-
Acenaphthylene	mg/kg	0.05	NONE	-	< 0.05	< 0.05	< 0.05	-
Acenaphthene	mg/kg	0.05	NONE	-	< 0.05	< 0.05	0.19	-
2,4-Dinitrotoluene	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
Dibenzofuran	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
Diethyl phthalate	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
4-Nitroaniline	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
Fluorene	mg/kg	0.05	NONE	-	0.44	< 0.05	0.13	-
Azobenzene	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
Bromophenyl phenyl ether	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
Hexachlorobenzene	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
Phenanthrene	mg/kg	0.05	NONE	-	2.2	< 0.05	0.88	-
Anthracene	mg/kg	0.05	NONE	-	0.12	< 0.05	0.17	-
Carbazole	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
Dibutyl phthalate	mg/kg	0.2	NONE	-	< 0.2	< 0.2	< 0.2	-
Anthraquinone	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
Fluoranthene	mg/kg	0.05	NONE	-	0.68	< 0.05	1.1	-
Pyrene	mg/kg	0.05	NONE	-	0.6	< 0.05	0.8	-
Butyl benzyl phthalate	mg/kg	0.3	NONE	-	< 0.3	< 0.3	< 0.3	-
Benzo(a)anthracene	mg/kg	0.05	NONE	-	0.59	< 0.05	0.59	-
Chrysene	mg/kg	0.05	NONE	-	1.1	< 0.05	0.6	-
Benzo(b)fluoranthene	mg/kg	0.05	NONE	-	1.1	< 0.05	0.71	-
Benzo(k)fluoranthene	mg/kg	0.05	NONE	-	0.21	< 0.05	0.18	-
Benzo(a)pyrene	mg/kg	0.05	NONE	-	0.45	< 0.05	0.37	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	-	0.31	< 0.05	0.21	-
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	-	0.12	< 0.05	< 0.05	-
Benzo(ghi)perylene	mg/kg	0.05	NONE	-	0.34	< 0.05	0.23	-

Miscellaneous Organics

Product ID		N/A	NONE	-	See Appendix	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

*Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and therefore may be unreliable.

Analytical Report Number: 22-14826

Lab Sample Number				2543163	2543164	2543165	2543166	2543167
Sample Reference				WS202F	WS201A	WS201B	WS201C	WS201D
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.00-3.30	0.20-0.40	0.70-0.90	1.40-1.60	2.10-2.30
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	8.4	6.3	5	8.9	16
Total mass of sample received	kg	0.001	NONE	0.3	0.3	0.3	0.3	0.3
Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	-	Chrysotile - Loose Fibres	-	-	-
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Detected	Not-detected	Not-detected	Not-detected
Asbestos Analyst ID	N/A	N/A	N/A	SCA	SCA	SCA	SCA	SCA
General Inorganics								
pH - Automated	pH Units	N/A	MCERTS	9.1	8.7	8.3	8.4	10.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	73	1200	680	260	1400
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	26	440	110	110	400
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.013	0.22	0.055	0.056	0.2
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	12.9	219	55.1	56.3	200
Sulphide	mg/kg	1	MCERTS	1.9	65	8	< 1.0	8
Ammoniacal Nitrogen as NH4	mg/kg	0.5	MCERTS	1.6	1.1	< 0.5	< 0.5	4.6
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.4	1.1	2.2	2.2	1
Total Phenols								
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Speciated PAHs*								
Naphthalene	mg/kg	0.05	NONE	< 0.05	0.91	0.47	0.21	< 0.05
Acenaphthylene	mg/kg	0.05	NONE	< 0.05	< 0.05	< 0.05	0.45	< 0.05
Acenaphthene	mg/kg	0.05	NONE	< 0.05	0.95	< 0.05	0.53	< 0.05
Fluorene	mg/kg	0.05	NONE	< 0.05	1	0.26	0.57	< 0.05
Phenanthrene	mg/kg	0.05	NONE	0.08	2.3	1	3.2	0.08
Anthracene	mg/kg	0.05	NONE	< 0.05	0.89	< 0.05	0.86	< 0.05
Fluoranthene	mg/kg	0.05	NONE	< 0.05	3.7	0.17	7.1	0.05
Pyrene	mg/kg	0.05	NONE	0.05	3	0.14	6.7	< 0.05
Benzo(a)anthracene	mg/kg	0.05	NONE	< 0.05	1.2	0.1	4.5	< 0.05
Chrysene	mg/kg	0.05	NONE	< 0.05	0.87	0.36	3.9	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	NONE	< 0.05	0.93	0.13	7.4	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	NONE	< 0.05	0.25	< 0.05	1.6	< 0.05
Benzo(a)pyrene	mg/kg	0.05	NONE	< 0.05	0.64	< 0.05	4.5	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	< 0.05	0.3	< 0.05	3.1	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	< 0.05	0.09	< 0.05	0.73	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	NONE	< 0.05	0.33	< 0.05	3.8	< 0.05
Total PAH								
Speciated Total EPA-16 PAHs	mg/kg	0.8	NONE	< 0.80	17.3	2.66	49.2	< 0.80

Analytical Report Number: 22-14826

Lab Sample Number				2543163	2543164	2543165	2543166	2543167
Sample Reference				WS202F	WS201A	WS201B	WS201C	WS201D
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.00-3.30	0.20-0.40	0.70-0.90	1.40-1.60	2.10-2.30
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Heavy Metals / Metalloids								
Aluminium (aqua regia extractable)	mg/kg	30	ISO 17025	5500	3600	6600	7700	7800
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	< 1.0	3.4	2.8	7.5	< 1.0
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.8	9.5	9.9	18	15
Barium (aqua regia extractable)	mg/kg	1	MCERTS	27	380	640	50	71
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.99	0.33	0.91	1.3	0.66
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	0.5	0.3	0.4	0.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8	< 1.8	< 1.8	< 1.8	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	11	15	14	17	67
Cobalt (aqua regia extractable)	mg/kg	0.15	MCERTS	7	4.7	17	27	10
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	66	14	18	18
Iron (aqua regia extractable)	mg/kg	40	MCERTS	45000	20000	38000	54000	33000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	8.3	67	16	24	31
Lithium (aqua regia extractable)	mg/kg	0.1	NONE	21	17	27	30	29
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	460	400	1400	1600	1100
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	0.49	1.3	0.53	0.84	2.1
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	21	14	35	54	18
Phosphorus (aqua regia extractable)	mg/kg	20	ISO 17025	480	710	330	600	410
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tin (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	4.8	< 1.0	< 1.0	1.5
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	15	17	15	21	20
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	58	240	61	92	61
Calcium (aqua regia extractable)	mg/kg	20	ISO 17025	1100	76000	53000	2600	44000
Magnesium (aqua regia extractable)	mg/kg	20	ISO 17025	2000	13000	22000	4100	3600
Potassium (aqua regia extractable)	mg/kg	20	ISO 17025	530	460	950	940	950
Sodium (aqua regia extractable)	mg/kg	20	ISO 17025	350	420	240	170	290
Monoaromatics & Oxygenates								
Benzene	µg/kg	5	MCERTS	< 5.0*	< 5.0	< 5.0*	< 5.0*	< 5.0
Toluene	µg/kg	5	MCERTS	< 5.0*	< 5.0	< 5.0*	< 5.0*	< 5.0
Ethylbenzene	µg/kg	5	MCERTS	< 5.0*	< 5.0	< 5.0*	< 5.0*	< 5.0
p & m-xylene	µg/kg	5	MCERTS	< 5.0*	< 5.0	< 5.0*	< 5.0*	< 5.0
o-xylene	µg/kg	5	MCERTS	< 5.0*	< 5.0	< 5.0*	< 5.0*	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0

Analytical Report Number: 22-14826

Lab Sample Number				2543163	2543164	2543165	2543166	2543167
Sample Reference				WS202F	WS201A	WS201B	WS201C	WS201D
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.00-3.30	0.20-0.40	0.70-0.90	1.40-1.60	2.10-2.30
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Petroleum Hydrocarbons								
Mineral Oil (C10 - C40) EH_CU_1D_AL	mg/kg	10	NONE	< 10	48	19	75	38
TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	0.14
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	9.2**
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0	< 1.0	1.2	4.3	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	< 2.0	2	5.7	23	6.3
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	< 8.0	9.3	22	9.6
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	< 8.0	30	< 8.0	20	19
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	NONE	< 10	37	19	70	44
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	NONE	< 0.001	< 0.001	< 0.001	< 0.001	0.42
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	4.2	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	< 2.0	5	4.6	16	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	17	< 10	18	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10	47	< 10	23	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	NONE	< 10	69	15	61	< 10
VOCs								
Chloromethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Chloroethane	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
Bromomethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Vinyl Chloride	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
2,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Trichloromethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Trans-1,2-dichloroethene	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
Benzene	µg/kg	5	NONE	< 5.0*	-	< 5.0*	< 5.0*	-
Tetrachloromethane	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Trichloroethene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Dibromomethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Toluene	µg/kg	5	NONE	< 5.0*	-	< 5.0*	< 5.0*	-
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Tetrachloroethene	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-

Analytical Report Number: 22-14826

Lab Sample Number				2543163	2543164	2543165	2543166	2543167
Sample Reference				WS202F	WS201A	WS201B	WS201C	WS201D
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.00-3.30	0.20-0.40	0.70-0.90	1.40-1.60	2.10-2.30
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Ethylbenzene	µg/kg	5	NONE	< 5.0*	-	< 5.0*	< 5.0*	-
p & m-Xylene	µg/kg	5	NONE	< 5.0*	-	< 5.0*	< 5.0*	-
Styrene	µg/kg	5	NONE	< 5.0*	-	< 5.0*	< 5.0*	-
Tribromomethane	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
o-Xylene	µg/kg	5	NONE	< 5.0*	-	< 5.0*	< 5.0*	-
1,1,2,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Isopropylbenzene	µg/kg	5	NONE	< 5.0*	-	< 5.0*	< 5.0*	-
Bromobenzene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
n-Propylbenzene	µg/kg	5	NONE	< 5.0*	-	< 5.0*	< 5.0*	-
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
1,2,4-Trimethylbenzene	µg/kg	5	NONE	< 5.0*	-	< 5.0*	< 5.0*	-
sec-Butylbenzene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
p-Isopropyltoluene	µg/kg	5	NONE	< 5.0*	-	< 5.0*	< 5.0*	-
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Butylbenzene	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0	-	< 5.0	< 5.0	-
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0	-	< 5.0	< 5.0	-
1,2,3-Trichlorobenzene	µg/kg	5	NONE	< 5.0*	-	< 5.0*	< 5.0*	-
SVOCs*								
Aniline	mg/kg	0.1	NONE	0.8	-	0.1	1.9	-
Phenol	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
2-Chlorophenol	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-
Bis(2-chloroethyl)ether	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
1,3-Dichlorobenzene	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
1,2-Dichlorobenzene	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-
1,4-Dichlorobenzene	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-
2-Methylphenol	mg/kg	0.3	NONE	< 0.3	-	< 0.3	< 0.3	-
Hexachloroethane	mg/kg	0.05	NONE	< 0.05	-	< 0.05	< 0.05	-
Nitrobenzene	mg/kg	0.3	NONE	< 0.3	-	< 0.3	< 0.3	-
4-Methylphenol	mg/kg	0.2	NONE	< 0.2	-	< 0.2	2.1	-
Isophorone	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
2-Nitrophenol	mg/kg	0.3	NONE	< 0.3	-	< 0.3	< 0.3	-
2,4-Dimethylphenol	mg/kg	0.3	NONE	< 0.3	-	< 0.3	0.4	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	NONE	< 0.3	-	< 0.3	< 0.3	-
1,2,4-Trichlorobenzene	mg/kg	0.3	NONE	< 0.3	-	< 0.3	< 0.3	-
Naphthalene	mg/kg	0.05	NONE	< 0.05	-	0.47	0.21	-
2,4-Dichlorophenol	mg/kg	0.3	NONE	< 0.3	-	< 0.3	< 0.3	-
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-
Hexachlorobutadiene	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-
2,4,6-Trichlorophenol	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-
2,4,5-Trichlorophenol	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
2-Methylnaphthalene	mg/kg	0.1	NONE	< 0.1	-	2	0.8	-
2-Chloronaphthalene	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-

Analytical Report Number: 22-14826

Lab Sample Number				2543163	2543164	2543165	2543166	2543167
Sample Reference				WS202F	WS201A	WS201B	WS201C	WS201D
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				3.00-3.30	0.20-0.40	0.70-0.90	1.40-1.60	2.10-2.30
Date Sampled				Deviating	Deviating	Deviating	Deviating	Deviating
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Dimethylphthalate	mg/kg	0.1	NONE	< 0.1	-	< 0.1	0.3	-
2,6-Dinitrotoluene	mg/kg	0.1	NONE	< 0.1	-	< 0.1	< 0.1	-
Acenaphthylene	mg/kg	0.05	NONE	< 0.05	-	< 0.05	0.45	-
Acenaphthene	mg/kg	0.05	NONE	< 0.05	-	< 0.05	0.53	-
2,4-Dinitrotoluene	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
Dibenzofuran	mg/kg	0.2	NONE	< 0.2	-	< 0.2	0.5	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	NONE	< 0.3	-	< 0.3	< 0.3	-
Diethyl phthalate	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
4-Nitroaniline	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
Fluorene	mg/kg	0.05	NONE	< 0.05	-	0.26	0.57	-
Azobenzene	mg/kg	0.3	NONE	< 0.3	-	< 0.3	< 0.3	-
Bromophenyl phenyl ether	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
Hexachlorobenzene	mg/kg	0.3	NONE	< 0.3	-	< 0.3	< 0.3	-
Phenanthrene	mg/kg	0.05	NONE	0.08	-	1	3.2	-
Anthracene	mg/kg	0.05	NONE	< 0.05	-	< 0.05	0.86	-
Carbazole	mg/kg	0.3	NONE	< 0.3	-	< 0.3	0.3	-
Dibutyl phthalate	mg/kg	0.2	NONE	< 0.2	-	< 0.2	< 0.2	-
Anthraquinone	mg/kg	0.3	NONE	< 0.3	-	< 0.3	0.6	-
Fluoranthene	mg/kg	0.05	NONE	< 0.05	-	0.17	7.1	-
Pyrene	mg/kg	0.05	NONE	0.05	-	0.14	6.7	-
Butyl benzyl phthalate	mg/kg	0.3	NONE	< 0.3	-	< 0.3	< 0.3	-
Benzo(a)anthracene	mg/kg	0.05	NONE	< 0.05	-	0.1	4.5	-
Chrysene	mg/kg	0.05	NONE	< 0.05	-	0.36	3.9	-
Benzo(b)fluoranthene	mg/kg	0.05	NONE	< 0.05	-	0.13	7.4	-
Benzo(k)fluoranthene	mg/kg	0.05	NONE	< 0.05	-	< 0.05	1.6	-
Benzo(a)pyrene	mg/kg	0.05	NONE	< 0.05	-	< 0.05	4.5	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	< 0.05	-	< 0.05	3.1	-
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	< 0.05	-	< 0.05	0.73	-
Benzo(ghi)perylene	mg/kg	0.05	NONE	< 0.05	-	< 0.05	3.8	-

Miscellaneous Organics

Product ID		N/A	NONE	-	-	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

*Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and therefore may be unreliable.

Analytical Report Number: 22-14826

Lab Sample Number				2543168
Sample Reference				WS201E
Sample Number				None Supplied
Depth (m)				2.90-3.20
Date Sampled				Deviating
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Stone Content	%	0.1	NONE	< 0.1
Moisture Content	%	0.01	NONE	12
Total mass of sample received	kg	0.001	NONE	0.3

Asbestos in Soil Screen / Identification Name	Type	N/A	ISO 17025	Amosite - Loose Fibrous Debris
Asbestos in Soil	Type	N/A	ISO 17025	Detected
Asbestos Analyst ID	N/A	N/A	N/A	SCA

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	9.5
Total Cyanide	mg/kg	1	MCERTS	< 1.0
Complex Cyanide	mg/kg	1	MCERTS	< 1.0
Free Cyanide	mg/kg	1	MCERTS	< 1.0
Total Sulphate as SO4	mg/kg	50	MCERTS	660
Water Soluble Sulphate as SO4 16hr extraction (2:1)	mg/kg	2.5	MCERTS	400
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.2
Water Soluble SO4 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	200
Sulphide	mg/kg	1	MCERTS	28
Ammoniacal Nitrogen as NH4	mg/kg	0.5	MCERTS	1.5
Total Organic Carbon (TOC) - Automated	%	0.1	MCERTS	0.8

Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0

Speciated PAHs*

Naphthalene	mg/kg	0.05	NONE	0.07
Acenaphthylene	mg/kg	0.05	NONE	< 0.05
Acenaphthene	mg/kg	0.05	NONE	< 0.05
Fluorene	mg/kg	0.05	NONE	< 0.05
Phenanthrene	mg/kg	0.05	NONE	0.1
Anthracene	mg/kg	0.05	NONE	< 0.05
Fluoranthene	mg/kg	0.05	NONE	< 0.05
Pyrene	mg/kg	0.05	NONE	< 0.05
Benzo(a)anthracene	mg/kg	0.05	NONE	< 0.05
Chrysene	mg/kg	0.05	NONE	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	NONE	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	NONE	< 0.05
Benzo(a)pyrene	mg/kg	0.05	NONE	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	NONE	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	NONE	< 0.80

Analytical Report Number: 22-14826

Lab Sample Number				2543168
Sample Reference				WS201E
Sample Number				None Supplied
Depth (m)				2.90-3.20
Date Sampled				Deviating
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Heavy Metals / Metalloids				
Aluminium (aqua regia extractable)	mg/kg	30	ISO 17025	7000
Antimony (aqua regia extractable)	mg/kg	1	ISO 17025	2
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	11
Barium (aqua regia extractable)	mg/kg	1	MCERTS	57
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	0.76
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2
Chromium (hexavalent)	mg/kg	1.8	MCERTS	< 1.8
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	32
Cobalt (aqua regia extractable)	mg/kg	0.15	MCERTS	10
Copper (aqua regia extractable)	mg/kg	1	MCERTS	14
Iron (aqua regia extractable)	mg/kg	40	MCERTS	40000
Lead (aqua regia extractable)	mg/kg	1	MCERTS	20
Lithium (aqua regia extractable)	mg/kg	0.1	NONE	28
Manganese (aqua regia extractable)	mg/kg	1	MCERTS	880
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3
Molybdenum (aqua regia extractable)	mg/kg	0.25	MCERTS	1.2
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23
Phosphorus (aqua regia extractable)	mg/kg	20	ISO 17025	470
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0
Tin (aqua regia extractable)	mg/kg	1	MCERTS	1.3
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	17
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	63
Calcium (aqua regia extractable)	mg/kg	20	ISO 17025	14000
Magnesium (aqua regia extractable)	mg/kg	20	ISO 17025	3000
Potassium (aqua regia extractable)	mg/kg	20	ISO 17025	750
Sodium (aqua regia extractable)	mg/kg	20	ISO 17025	250
Monoaromatics & Oxygenates				
Benzene	µg/kg	5	MCERTS	< 5.0*
Toluene	µg/kg	5	MCERTS	< 5.0*
Ethylbenzene	µg/kg	5	MCERTS	16*
p & m-xylene	µg/kg	5	MCERTS	58*
o-xylene	µg/kg	5	MCERTS	65*
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0

Analytical Report Number: 22-14826

Lab Sample Number				2543168
Sample Reference				WS201E
Sample Number				None Supplied
Depth (m)				2.90-3.20
Date Sampled				Deviating
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Petroleum Hydrocarbons				
Mineral Oil (C10 - C40) EH_CU_1D_AL	mg/kg	10	NONE	32
TPH-CWG - Aliphatic >EC5 - EC6 HS_1D_AL	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aliphatic >EC6 - EC8 HS_1D_AL	mg/kg	0.001	NONE	0.036
TPH-CWG - Aliphatic >EC8 - EC10 HS_1D_AL	mg/kg	0.001	NONE	2.7
TPH-CWG - Aliphatic >EC10 - EC12 EH_CU_1D_AL	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aliphatic >EC12 - EC16 EH_CU_1D_AL	mg/kg	2	MCERTS	8.8
TPH-CWG - Aliphatic >EC16 - EC21 EH_CU_1D_AL	mg/kg	8	MCERTS	11
TPH-CWG - Aliphatic >EC21 - EC35 EH_CU_1D_AL	mg/kg	8	MCERTS	12
TPH-CWG - Aliphatic (EC5 - EC35) EH_CU+HS_1D_AL	mg/kg	10	NONE	34
TPH-CWG - Aromatic >EC5 - EC7 HS_1D_AR	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aromatic >EC7 - EC8 HS_1D_AR	mg/kg	0.001	NONE	< 0.001
TPH-CWG - Aromatic >EC8 - EC10 HS_1D_AR	mg/kg	0.001	NONE	0.14
TPH-CWG - Aromatic >EC10 - EC12 EH_CU_1D_AR	mg/kg	1	MCERTS	< 1.0
TPH-CWG - Aromatic >EC12 - EC16 EH_CU_1D_AR	mg/kg	2	MCERTS	< 2.0
TPH-CWG - Aromatic >EC16 - EC21 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic >EC21 - EC35 EH_CU_1D_AR	mg/kg	10	MCERTS	< 10
TPH-CWG - Aromatic (EC5 - EC35) EH_CU+HS_1D_AR	mg/kg	10	NONE	< 10
VOCs				
Chloromethane	µg/kg	5	ISO 17025	< 5.0
Chloroethane	µg/kg	5	NONE	< 5.0
Bromomethane	µg/kg	5	ISO 17025	< 5.0
Vinyl Chloride	µg/kg	5	NONE	< 5.0
Trichlorofluoromethane	µg/kg	5	NONE	< 5.0
1,1-Dichloroethene	µg/kg	5	NONE	< 5.0
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	5	NONE	< 5.0
Cis-1,2-dichloroethene	µg/kg	5	ISO 17025	< 5.0
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	5	NONE	< 5.0
1,1-Dichloroethane	µg/kg	5	ISO 17025	< 5.0
2,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0
Trichloromethane	µg/kg	5	ISO 17025	< 5.0
1,1,1-Trichloroethane	µg/kg	5	ISO 17025	< 5.0
1,2-Dichloroethane	µg/kg	5	ISO 17025	< 5.0
1,1-Dichloropropene	µg/kg	5	ISO 17025	< 5.0
Trans-1,2-dichloroethene	µg/kg	5	NONE	< 5.0
Benzene	µg/kg	5	NONE	< 5.0*
Tetrachloromethane	µg/kg	5	NONE	< 5.0
1,2-Dichloropropane	µg/kg	5	ISO 17025	< 5.0
Trichloroethene	µg/kg	5	ISO 17025	< 5.0
Dibromomethane	µg/kg	5	ISO 17025	< 5.0
Bromodichloromethane	µg/kg	5	ISO 17025	< 5.0
Cis-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0
Trans-1,3-dichloropropene	µg/kg	5	ISO 17025	< 5.0
Toluene	µg/kg	5	NONE	< 5.0*
1,1,2-Trichloroethane	µg/kg	5	ISO 17025	< 5.0
1,3-Dichloropropane	µg/kg	5	ISO 17025	< 5.0
Dibromochloromethane	µg/kg	5	ISO 17025	< 5.0
Tetrachloroethene	µg/kg	5	NONE	< 5.0
1,2-Dibromoethane	µg/kg	5	ISO 17025	< 5.0
Chlorobenzene	µg/kg	5	ISO 17025	< 5.0

Analytical Report Number: 22-14826

Lab Sample Number				2543168
Sample Reference				WS201E
Sample Number				None Supplied
Depth (m)				2.90-3.20
Date Sampled				Deviating
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
1,1,1,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0
Ethylbenzene	µg/kg	5	NONE	16*
p & m-Xylene	µg/kg	5	NONE	58*
Styrene	µg/kg	5	NONE	< 5.0*
Tribromomethane	µg/kg	5	NONE	< 5.0
o-Xylene	µg/kg	5	NONE	65*
1,1,2,2-Tetrachloroethane	µg/kg	5	ISO 17025	< 5.0
Isopropylbenzene	µg/kg	5	NONE	32*
Bromobenzene	µg/kg	5	ISO 17025	< 5.0
n-Propylbenzene	µg/kg	5	NONE	14*
2-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0
4-Chlorotoluene	µg/kg	5	ISO 17025	< 5.0
1,3,5-Trimethylbenzene	µg/kg	5	ISO 17025	49
tert-Butylbenzene	µg/kg	5	ISO 17025	< 5.0
1,2,4-Trimethylbenzene	µg/kg	5	NONE	79*
sec-Butylbenzene	µg/kg	5	ISO 17025	15
1,3-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0
p-Isopropyltoluene	µg/kg	5	NONE	< 5.0*
1,2-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0
1,4-Dichlorobenzene	µg/kg	5	ISO 17025	< 5.0
Butylbenzene	µg/kg	5	NONE	< 5.0
1,2-Dibromo-3-chloropropane	µg/kg	5	ISO 17025	< 5.0
1,2,4-Trichlorobenzene	µg/kg	5	ISO 17025	< 5.0
Hexachlorobutadiene	µg/kg	5	NONE	< 5.0
1,2,3-Trichlorobenzene	µg/kg	5	NONE	< 5.0*

SVOCs*

Aniline	mg/kg	0.1	NONE	0.8
Phenol	mg/kg	0.2	NONE	< 0.2
2-Chlorophenol	mg/kg	0.1	NONE	< 0.1
Bis(2-chloroethyl)ether	mg/kg	0.2	NONE	< 0.2
1,3-Dichlorobenzene	mg/kg	0.2	NONE	< 0.2
1,2-Dichlorobenzene	mg/kg	0.1	NONE	< 0.1
1,4-Dichlorobenzene	mg/kg	0.2	NONE	< 0.2
Bis(2-chloroisopropyl)ether	mg/kg	0.1	NONE	< 0.1
2-Methylphenol	mg/kg	0.3	NONE	< 0.3
Hexachloroethane	mg/kg	0.05	NONE	< 0.05
Nitrobenzene	mg/kg	0.3	NONE	< 0.3
4-Methylphenol	mg/kg	0.2	NONE	< 0.2
Isophorone	mg/kg	0.2	NONE	< 0.2
2-Nitrophenol	mg/kg	0.3	NONE	< 0.3
2,4-Dimethylphenol	mg/kg	0.3	NONE	< 0.3
Bis(2-chloroethoxy)methane	mg/kg	0.3	NONE	< 0.3
1,2,4-Trichlorobenzene	mg/kg	0.3	NONE	< 0.3
Naphthalene	mg/kg	0.05	NONE	0.07
2,4-Dichlorophenol	mg/kg	0.3	NONE	< 0.3
4-Chloroaniline	mg/kg	0.1	NONE	< 0.1
Hexachlorobutadiene	mg/kg	0.1	NONE	< 0.1
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	< 0.1
2,4,6-Trichlorophenol	mg/kg	0.1	NONE	< 0.1
2,4,5-Trichlorophenol	mg/kg	0.2	NONE	< 0.2
2-Methylnaphthalene	mg/kg	0.1	NONE	0.1
2-Chloronaphthalene	mg/kg	0.1	NONE	< 0.1

Analytical Report Number: 22-14826

Lab Sample Number				2543168
Sample Reference				WS201E
Sample Number				None Supplied
Depth (m)				2.90-3.20
Date Sampled				Deviating
Time Taken				None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Dimethylphthalate	mg/kg	0.1	NONE	< 0.1
2,6-Dinitrotoluene	mg/kg	0.1	NONE	< 0.1
Acenaphthylene	mg/kg	0.05	NONE	< 0.05
Acenaphthene	mg/kg	0.05	NONE	< 0.05
2,4-Dinitrotoluene	mg/kg	0.2	NONE	< 0.2
Dibenzofuran	mg/kg	0.2	NONE	< 0.2
4-Chlorophenyl phenyl ether	mg/kg	0.3	NONE	< 0.3
Diethyl phthalate	mg/kg	0.2	NONE	< 0.2
4-Nitroaniline	mg/kg	0.2	NONE	< 0.2
Fluorene	mg/kg	0.05	NONE	< 0.05
Azobenzene	mg/kg	0.3	NONE	< 0.3
Bromophenyl phenyl ether	mg/kg	0.2	NONE	< 0.2
Hexachlorobenzene	mg/kg	0.3	NONE	< 0.3
Phenanthrene	mg/kg	0.05	NONE	0.1
Anthracene	mg/kg	0.05	NONE	< 0.05
Carbazole	mg/kg	0.3	NONE	< 0.3
Dibutyl phthalate	mg/kg	0.2	NONE	< 0.2
Anthraquinone	mg/kg	0.3	NONE	< 0.3
Fluoranthene	mg/kg	0.05	NONE	< 0.05
Pyrene	mg/kg	0.05	NONE	< 0.05
Butyl benzyl phthalate	mg/kg	0.3	NONE	< 0.3
Benzo(a)anthracene	mg/kg	0.05	NONE	< 0.05
Chrysene	mg/kg	0.05	NONE	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	NONE	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	NONE	< 0.05
Benzo(a)pyrene	mg/kg	0.05	NONE	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	NONE	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	NONE	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	NONE	< 0.05

Miscellaneous Organics

Product ID		N/A	NONE	-

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

*Data reported unaccredited due to quality control parameter failure associated with this result; other checks applied prior to reporting the data have been accepted. The result should be considered as being deviating and therefore may be unreliable.

Analytical Report Number : 22-14826
Project / Site name:

* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
2543158	WS202A	None Supplied	0.20-0.40	Brown sand with gravel.
2543159	WS202B	None Supplied	0.75-0.90	Brown clay and sand with gravel and coal.
2543160	WS202C	None Supplied	1.20-1.30	Brown clay and sand.
2543161	WS202D	None Supplied	1.50-1.70	Brown clay and sand with gravel.
2543162	WS202E	None Supplied	2.30-2.60	Brown clay and sand with gravel.
2543163	WS202F	None Supplied	3.00-3.30	Brown clay and sand with gravel.
2543164	WS201A	None Supplied	0.20-0.40	Brown sand with gravel.
2543165	WS201B	None Supplied	0.70-0.90	Brown sand with gravel.
2543166	WS201C	None Supplied	1.40-1.60	Brown clay and sand with gravel.
2543167	WS201D	None Supplied	2.10-2.30	Brown clay and sand with gravel.
2543168	WS201E	None Supplied	2.90-3.20	Brown clay and sand with gravel.

Analytical Report Number : 22-14826
Project / Site name:

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Cations in soil by ICP-OES	Determination of cations in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with dispersion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Complex Cyanide in soil	Determination of complex cyanide by calculation.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS

Analytical Report Number : 22-14826
Project / Site name:

Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS. Individual components MCERTS accredited	In-house method based on USEPA8260	L073B-PL	W	MCERTS
Ammonium as NH4 in soil	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method, 10:1 water extraction.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	MCERTS
Product ID in soil	Determination of product ID by interpretation against standard chromatograms - Soil.	In-house method	L064-PL/UK	W	NONE
TPHCWG (Soil)	Determination of hexane extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L088/76-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in NaOH and addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Sulphate, water soluble, in soil	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Information in Support of Analytical Results

List of HWOL Acronyms and Operators

Acronym	Descriptions
HS	Headspace Analysis
MS	Mass spectrometry
FID	Flame Ionisation Detector
GC	Gas Chromatography
EH	Extractable Hydrocarbons (i.e. everything extracted by the solvent(s))
CU	Clean-up - e.g. by Florisil®, silica gel
1D	GC - Single coil/column gas chromatography
2D	GC-GC - Double coil/column gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics
AR	Aromatics
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - understore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total

Sample Deviation Report

Analytical Report Number : 22-14826

Project / Site name:

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS201A	None Supplied	S	2543164	a	None Supplied	None Supplied	None Supplied
WS201B	None Supplied	S	2543165	a	None Supplied	None Supplied	None Supplied
WS201C	None Supplied	S	2543166	a	None Supplied	None Supplied	None Supplied
WS201D	None Supplied	S	2543167	a	None Supplied	None Supplied	None Supplied
WS201E	None Supplied	S	2543168	a	None Supplied	None Supplied	None Supplied
WS202A	None Supplied	S	2543158	a	None Supplied	None Supplied	None Supplied
WS202B	None Supplied	S	2543159	a	None Supplied	None Supplied	None Supplied
WS202C	None Supplied	S	2543160	a	None Supplied	None Supplied	None Supplied
WS202D	None Supplied	S	2543161	a	None Supplied	None Supplied	None Supplied
WS202E	None Supplied	S	2543162	a	None Supplied	None Supplied	None Supplied
WS202F	None Supplied	S	2543163	a	None Supplied	None Supplied	None Supplied

UKAS TESTING
4041

Environmental Science

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Analytical Report Number : 23-11581

Project / Site name:	VEOL.01.02	**Samples received on:**	20/12/2022
Your job number:		**Samples instructed on/ Analysis started on:**	13/01/2023
Your order number:	C0106	**Analysis completed by:**	20/01/2023
Report Issue Number:	1	**Report issued on:**	20/01/2023
Samples Analysed:	4 water samples		

Signed:

Joanna Wawrzeczko
Reporting Specialist
For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

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Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement.
Application of uncertainty of measurement would provide a range within which the true result lies.
An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 23-11581
Project / Site name: VEOL.01.02

Your Order No: C0106

Lab Sample Number				2552848	2552849	2552850	2552851
Sample Reference				WS201	WS202	WS0	BH03
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				16/12/2022	16/12/2022	16/12/2022	16/12/2022
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
General Inorganics							
pH	pH Units	N/A	ISO 17025	8.3	8.4	7.5	7.3
Electrical Conductivity at 20 °C (L031B)	µS/cm	10	ISO 17025	1200	1300	440	1200
Sulphate as SO4	mg/l	0.045	ISO 17025	45.3	35.6	26.2	40.4
Sulphide	µg/l	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Chloride	mg/l	0.15	ISO 17025	170	180	23	260
Total Phosphate as P	µg/l	20	ISO 17025	< 20	130	< 20	78
Ammoniacal Nitrogen as NH4	µg/l	15	ISO 17025	13000	3000	1200	15000
Nitrate as N	mg/l	0.01	ISO 17025	0.09	0.65	0.95	0.02
Nitrate as NO3	mg/l	0.05	ISO 17025	0.42	2.86	4.21	0.1
Alkalinity as CaCO3	mg/l	3	ISO 17025	380	390	200	190
Heavy Metals / Metalloids							
Boron (dissolved)	µg/l	10	ISO 17025	54	190	30	30
Calcium (dissolved)	mg/l	0.012	ISO 17025	98	17	64	97
Iron (dissolved)	mg/l	0.004	ISO 17025	0.024	0.17	0.007	0.077
Magnesium (dissolved)	mg/l	0.005	ISO 17025	18	1.6	9.7	10
Phosphorus (dissolved)	µg/l	20	ISO 17025	726	899	905	531
Potassium (dissolved)	mg/l	0.025	ISO 17025	24	5.6	5.3	5.4
Sodium (dissolved)	mg/l	0.01	ISO 17025	130	350	24	150
Aluminium (dissolved)	µg/l	1	ISO 17025	18	43	31	1.2
Antimony (dissolved)	µg/l	0.4	ISO 17025	5.2	1.2	1	0.5
Arsenic (dissolved)	µg/l	0.15	ISO 17025	2.78	7.09	0.37	3.95
Barium (dissolved)	µg/l	0.06	ISO 17025	93	27	45	100
Beryllium (dissolved)	µg/l	0.1	ISO 17025	< 0.1	< 0.1	< 0.1	< 0.1
Cadmium (dissolved)	µg/l	0.02	ISO 17025	< 0.02	0.03	< 0.02	0.02
Chromium (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	< 0.2	< 0.2
Copper (dissolved)	µg/l	0.5	ISO 17025	3.6	1.8	1.6	0.7
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	1.4	0.3	< 0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	300	110	580	850
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05
Molybdenum (dissolved)	µg/l	0.05	ISO 17025	20	30	0.8	2.7
Nickel (dissolved)	µg/l	0.5	ISO 17025	22	4.3	4.2	7.3
Selenium (dissolved)	µg/l	0.6	ISO 17025	1.2	1.3	< 0.6	< 0.6
Tin (dissolved)	µg/l	0.2	ISO 17025	1.1	0.31	0.36	0.3
Vanadium (dissolved)	µg/l	0.2	ISO 17025	0.8	55	< 0.2	0.3
Zinc (dissolved)	µg/l	0.5	ISO 17025	1.7	2.6	11	3.7

U/S = Unsuitable Sample I/S = Insufficient Sample ND = Not detected

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Water matrix abbreviations:
Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Waters (PrW) Final Sewage Effluent (FSE) Landfill Leachate (LL)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron in water	Determination of boron in water by acidification followed by ICP-OES. Accredited matrices: SW PW GW	In-house method based on MEWAM	L039-PL	W	ISO 17025
Electrical conductivity at 20oC of water	Determination of electrical conductivity in water by electrometric measurement. Accredited Matrices SW, GW, PW	In-house method	L031-PL	W	ISO 17025
Nitrate in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Sulphide in water	Determination of sulphide in water by ion selective electrode.	In-house method	L029-PL	W	NONE
Sulphate in water	Determination of sulphate in water after filtration by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Ammonium as NH4 in water	Determination of Ammonium/Ammonia/ Ammoniacal Nitrogen by the colorimetric salicylate/nitroprusside method. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L082-PL	W	ISO 17025
Nitrate as N in water	Determination of nitrate by reaction with sodium salicylate and colorimetry. Accredited matrices SW, GW, PW.	In-house method based on Examination of Water and Wastewatern & Polish Standard Method PN-82/C-04579.08,	L078-PL	W	ISO 17025
Total Phosphate as P in water	Determination of ortho phosphate in water by addition of ammonium molybdate, potassium antimonyl tartrate and ascorbic acid followed by colorimetry.Accredited matrices: SW, PW, GW.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton, analysis by discreet analyser.	L082-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025
Chloride in water	Determination of Chloride (diissolved) colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260. Accredited matrices: SW, PW, GW.	L082-PL	W	ISO 17025
Alkalinity in Water (by discreet analyser)	Determination of Alkalinity by discreet analyser (colorimetry). Accredited matrices: SW, PW, GW.	In house method based on MEWAM & USEPA Method 310.2.	L082-PL	W	ISO 17025

For method numbers ending in 'UK or A' analysis have been carried out in our laboratory in the United Kingdom (WATFORD).
For method numbers ending in 'F' analysis have been carried out in our laboratory in the United Kingdom (East Kilbride).
For method numbers ending in 'PL or B' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC
Unless otherwise indicated, site information, order number, project number, sampling date, time, sample reference and depth are provided by the client. The instructed on date indicates the date on which this information was provided to the laboratory.

Sample Deviation Report

Analytical Report Number : 23-11581

Project / Site name: VEOL.01.02

This deviation report indicates the sample and test deviations that apply to the samples submitted for analysis.Please note that the associated result(s) may be unreliable and should be interpreted with care.

Key: a - No sampling date b - Incorrect container c - Holding time d - Headspace e - Temperature

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
BH03	None Supplied	W	2552851	c	Alkalinity in Water (by discreet analyser)	L082-PL	c
BH03	None Supplied	W	2552851	c	Ammoniacal Nitrogen as N in water	L082-PL	c
BH03	None Supplied	W	2552851	c	Ammonium as NH4 in water	L082-PL	c
BH03	None Supplied	W	2552851	c	Boron in water	L039-PL	c
BH03	None Supplied	W	2552851	c	Electrical conductivity at 20oC of water	L031-PL	c
BH03	None Supplied	W	2552851	c	Metals in water by ICP-MS (dissolved)	L012-PL	c
BH03	None Supplied	W	2552851	c	Metals in water by ICP-OES (dissolved)	L039-PL	c
BH03	None Supplied	W	2552851	c	Nitrate as N in water	L078-PL	c
BH03	None Supplied	W	2552851	c	Nitrate in water	L078-PL	c
BH03	None Supplied	W	2552851	c	Sulphate in water	L039-PL	c
BH03	None Supplied	W	2552851	c	Sulphide in water	L029-PL	c
BH03	None Supplied	W	2552851	c	pH at 20oC in water (automated)	L099-PL	c
WS0	None Supplied	W	2552850	c	Alkalinity in Water (by discreet analyser)	L082-PL	c
WS0	None Supplied	W	2552850	c	Ammoniacal Nitrogen as N in water	L082-PL	c
WS0	None Supplied	W	2552850	c	Ammonium as NH4 in water	L082-PL	c
WS0	None Supplied	W	2552850	c	Boron in water	L039-PL	c
WS0	None Supplied	W	2552850	c	Electrical conductivity at 20oC of water	L031-PL	c
WS0	None Supplied	W	2552850	c	Metals in water by ICP-MS (dissolved)	L012-PL	c
WS0	None Supplied	W	2552850	c	Metals in water by ICP-OES (dissolved)	L039-PL	c
WS0	None Supplied	W	2552850	c	Nitrate as N in water	L078-PL	c
WS0	None Supplied	W	2552850	c	Nitrate in water	L078-PL	c
WS0	None Supplied	W	2552850	c	Sulphate in water	L039-PL	c
WS0	None Supplied	W	2552850	c	Sulphide in water	L029-PL	c
WS0	None Supplied	W	2552850	c	pH at 20oC in water (automated)	L099-PL	c
WS201	None Supplied	W	2552848	c	Alkalinity in Water (by discreet analyser)	L082-PL	c
WS201	None Supplied	W	2552848	c	Ammoniacal Nitrogen as N in water	L082-PL	c
WS201	None Supplied	W	2552848	c	Ammonium as NH4 in water	L082-PL	c
WS201	None Supplied	W	2552848	c	Boron in water	L039-PL	c
WS201	None Supplied	W	2552848	c	Electrical conductivity at 20oC of water	L031-PL	c
WS201	None Supplied	W	2552848	c	Metals in water by ICP-MS (dissolved)	L012-PL	c
WS201	None Supplied	W	2552848	c	Metals in water by ICP-OES (dissolved)	L039-PL	c
WS201	None Supplied	W	2552848	c	Nitrate as N in water	L078-PL	c
WS201	None Supplied	W	2552848	c	Nitrate in water	L078-PL	c
WS201	None Supplied	W	2552848	c	Sulphate in water	L039-PL	c
WS201	None Supplied	W	2552848	c	Sulphide in water	L029-PL	c
WS201	None Supplied	W	2552848	c	pH at 20oC in water (automated)	L099-PL	c
WS202	None Supplied	W	2552849	c	Alkalinity in Water (by discreet analyser)	L082-PL	c
WS202	None Supplied	W	2552849	c	Ammoniacal Nitrogen as N in water	L082-PL	c
WS202	None Supplied	W	2552849	c	Ammonium as NH4 in water	L082-PL	c
WS202	None Supplied	W	2552849	c	Boron in water	L039-PL	c
WS202	None Supplied	W	2552849	c	Electrical conductivity at 20oC of water	L031-PL	c
WS202	None Supplied	W	2552849	c	Metals in water by ICP-MS (dissolved)	L012-PL	c
WS202	None Supplied	W	2552849	c	Metals in water by ICP-OES (dissolved)	L039-PL	c
WS202	None Supplied	W	2552849	c	Nitrate as N in water	L078-PL	c
WS202	None Supplied	W	2552849	c	Nitrate in water	L078-PL	c
WS202	None Supplied	W	2552849	c	Sulphate in water	L039-PL	c
WS202	None Supplied	W	2552849	c	Sulphide in water	L029-PL	c
WS202	None Supplied	W	2552849	c	pH at 20oC in water (automated)	L099-PL	c