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South Tyneside College

SOUTH TYNESIDE COLLEGE – MAIN CAMPUS

Ground Investigation Report & Land Quality Assessment

70084288-GIR-FINAL ISSUE
FEBRUARY 2024

CONFIDENTIAL

South Tyneside College

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CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 TERMS OF REFERENCE

WSP UK Ltd (WSP) was instructed by Atkins Realis on behalf of the South Tyneside College (the Client), to design and monitor an intrusive ground investigation and prepare a combined *Ground Investigation Report and Land Quality Assessment* of land located between King Street and Coronation Street in South Shields ('the site'). A site location plan is provided as Figure 1 in **Appendix A**.

The intrusive ground investigation was designed by WSP and was carried out by Allied Exploration & Geotechnics Ltd (AEG) trading as IGNE Ltd, referred to in this report as AEG.

1.2 DEVELOPMENT PROPOSALS

It is understood that the site is proposed to be redeveloped into the new South Tyneside College Main Campus. The proposed development comprises the following works, (the Grade II listed building is to remain in the south of the site):

- Site clearance and removal of relict foundations from previous structures where required.
- Construction of a multi-story college campus building composed of classrooms, workshops, storage and plantrooms to the north of the Grade II listed building.
- An area of soft and hard landscaping to the west of the Grade II listed building (interim use – to be subject to future public realm development).
- Carparking area proposed to the east of the listed building.

A site location plan showing the red line site boundary of the proposed development is provided in **Appendix A**.

1.3 AIMS AND OBJECTIVES

The aim of the intrusive ground investigation and the combined *Geotechnical and Land Quality Assessment* is to provide the following:

- Outline the ground investigation works undertaken at the site and summarise the results of the fieldwork and laboratory testing;
- Provide an interpretation of the geological sequence and ground model below the proposed development;
- Provide geotechnical parameters for use in design of the works;
- Identify geotechnical and geo-environmental ground constraints to the proposed development;
- Undertake assessment of potential soil and groundwater contamination on the site including hazardous ground gases, to refine the Conceptual Site Model developed in the WSP Phase 1 Preliminary Geo-environmental Appraisal; and,
- Make recommendations for managing geotechnical and geo-environmental risks for the proposed development. This includes provision of a *Geotechnical Risk Register* in **Appendix D** of this report.

This report is based on information contained within the AEG Factual Report: '*AEG, South Tyneside College – Main Campus Ground Investigation, Ref. 4466, dated 30 January 2024'*.

1.4 SOURCES OF INFORMAITON

The following sources of information have been reviewed as part of the production of this report. Information included within these sources are summarised in Section 2 of this report.

- WSP - Phase 1 Preliminary Geo-environmental Appraisal South Tyneside College - Main Campus - 70084288_12073
- Groundsure Report Ref. WSP-9407226
- British Geological Survey (BGS) 1:50,000 scale geological map sheet 015 Tynemouth
- British Geological Survey (BGS) 1:50,000 scale geological map sheet 021 Coast from South Shields to Seaham Harbour; Sunderland
- British Geological Survey (BGS) 1:10,560 scale geological map sheet NZ36NE
- British Geological Survey (BGS) publicly available historical borehole records
- Coal Authority CON29M Coal Mining Report, Ref. WSP-9407225 dated 08 March 2023
- UK Indicative Atlas of Radon in England and Wales accessed on 08 March 2023 via
- Zetica Ltd Unexploded Bomb (UXB) Risk Maps accessed on 08 March 2023 via
- Zetica Ltd Pre-Desk Study Assessment dated 15 March 2023
- Castle Keep Surveys Ltd, topographical survey of Tyne Coast College, Ref. CKS-1361A, dated November 2022.
- Safelane Global Ltd, Detailed Unexploded Ordnance Risk Assessment, Main Campus Ground Investigation, Report Ref. 9851 RA
- AEG, South Tyneside College – Main Campus Ground Investigation, Ref. 4466, dated 30 January 2024

1.5 LIMITATIONS AND CONDITIONS

Note that where this report summarises information provided from external sources, WSP cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon. General limitations of this assessment are included in **Appendix B**.

This assessment was undertaken with due consideration of the Environment Agency's guidance 'Land Contamination Risk Management (LCRM, October 2020), and in general accordance with BS5930:2015+A1:2020 'Code of Practice for Ground Investigations', BS EN 10175 (2017) 'Investigation of Potentially Contaminated Sites – Code of Practice', and Eurocode 7.

1.6 RELIANCE

This report is for the sole use of:

- Atkins Realis acting on behalf of South Tyneside College

The report shall not be relied upon by, or transferred to, any other parties without the express written consent of WSP. If an unauthorised third party comes into possession of this report, they rely on its contents at their own risk and WSP owes them no duty of care or skill.

2 SUMMARY OF EXISTING INFORMATION

2.1 SITE SETTING

The information summarised in this section is based on sources of information as listed in Section 1.4. More detailed assessment is provided within the previously issued *Phase 1 Preliminary Geo-environmental Appraisal* listed in section 1.4. A summary of the site setting is presented in Table 2-1 below:

Table 2-1 – Summary of Site Setting based on Existing Information

Subject	Summary Description
Site address	Land between King Street and Coronation Street, South Shields, NE33 1DH
National Grid Reference	436200, 567115
Site Location and Current site use	The site is an irregularly shaped plot of land located in South Shields town centre, South Tyneside. The site boundaries are formed by King Street in the north, Waterloo Square in the south-east, Coronation Street in the south, and Cornwallis Street in the south-west. The site is subdivided by East Street, Chapter Row, and Barrington Street which cross the site from west to east. Wallis Street and Nelson Street lead south from Barrington Street. A Grade II listed building (16 Barrington Street) is located between Wallis Street and Nelson Street. It is understood that the listed building is to be retained as part of the proposed development of the site. The 2023 Ordnance Survey (OS) map included in the Groundsure report shows eight buildings along the southern site boundary, and one building to the east of the listed building. These buildings were found demolished at the time of the site walkover, with basement structures visible along Cornwallis Street and Coronation Street. The area to the east of the listed building was found to be covered with gravel and fenced off with timber fencing. A disused building (former Job Centre) occupies the centre of the site. At the time of the site walkover the building was being demolished. A substation is located to the west of the former Job Centre building. A public square and a grassed field are located to the west and east of the former Job Centre building respectively. A car park and paved area are located between East Street and Chapter Row. From East Street the site extends north through a gap between buildings along King Street. The part of the site to the north of East Street is shown on the 2023 OS map to have been occupied by five buildings (81 to 99 King Street). These buildings were also found demolished at the time of the site walkover and the area noted as covered with gravel and fenced off.
Topography	Site elevations on the Castle Keep Surveys Ltd topographic survey, dated 2022, are recorded to decrease from approximately 10.50m above Ordnance Datum (OD) on King Street in the north to approximately 6.75m above OD on Coronation Street in the south.
Surrounding Land Use	The site is located within a predominantly commercial / retail setting. Surrounding land uses comprise the following: ■ North: King Street (pedestrian zone) and commercial / retail units to the north

Subject	Summary Description
	▪ East: Commercial / retail units south of King Street (77 King Street), Waterloo Square, and retail building (B&M) beyond ▪ South: Coronation Street and supermarket (Asda) with carpark beyond ▪ South-west: Cornwallis Street, with a bank building (TSB) to the west ▪ West: St. Hilda's Church ▪ North-west: Market Place.
Site History	A review of historical OS maps and aerial photographs included in the Groundsure report has been undertaken to identify historical land uses on and near the site. The site and surrounding area were previously developed with a number of buildings and was historically used for residential, commercial, and industrial purposes.
Potentially Contaminative Land Uses	From the Groundsure report and historical mapping, potentially contaminative land uses include the on-site printing works and an on-site electricity substation, with off-site features including an engineering works, glass works, battery factory, a gas works and a colliery, plus tanks, and a fuel station. On-site and off-site areas of Made Ground (including ships' ballast) also represent potential sources of contamination.
Geology	The geology anticipated to underly the site is based on BGS 1:50,000 scale geological map, sheets 015 and 021, and the BGS 1:10,000 scale geological map, sheet NZ36NE. The geology is anticipated to comprise the following: <u>MADE GROUND</u> The southern part of the site, approximately between Barrington Street and Coronation Street, is shown to comprise Made Ground of ships' ballast. Made Ground is also anticipated at surface across other areas of the site based on the history of residential, commercial, and industrial use. <u>SUPERFICIAL DEPOSITS</u> The BGS mapping shows the entire site to be underlain by Glacial Till below the anticipated Made Ground. The Glacial Till is indicated to be underlain by laminated clay (Glaciolacustrine Deposits). Glaciofluvial Deposits are recorded at the surface of the superficial strata approximately 300m to the north-east of the site. The natural superficial soils in the south-east of the site are recorded to comprise silty sandy clay overlying clayey sand and gravel in the available BGS borehole records. <u>BEDROCK</u> The site is underlain by the Pennine Middle Coal Measures. Rock contours shown on BGS map NZ36NE indicate rockhead approximately between 15m below OD in the south and 23m below OD in the centre of the site. Given the anticipated ground levels, depths to rockhead are anticipated to range between 22m bgl in the south and >33m in the north. No faults are recorded beneath the site; the nearest fault to the site is a north-east to south-west trending fault approximately 60m to the south of the site (St Hilda Fault).
Hydrogeology	The superficial Glacial Till deposits are classified as a Secondary Undifferentiated Aquifer, indicating this has previously been designated as both minor and non-aquifer in different locations due to the variability. The Glaciolacustrine Deposits are classified as Unproductive Strata, indicating 'rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow'. The strata of the Pennine Middle Coal Measures are classified as a Secondary A aquifer, indicating 'permeable layers capable of supporting water supplies at a local

Subject	Summary Description
	rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers'. There are no licensed groundwater abstractions recorded on or within 2km of the site. There are no source protection zones recorded on or within 500m of the site.
Hydrology	The River Tyne flows north-easterly approximately 210m to the west of the site. The water quality was last rated in 2019 as 'fail' for chemical, and 'moderate' for ecological and overall water quality. There are no licensed surface water abstractions recorded on or with 2km of the site.
Geohazards/ Mining	The Groundsure Report Ref. WSP-9407226, dated 08 May 2023, records the following geohazards and associated risks on site: ▪ Shrink Swell Clays – Low ▪ Running Sands - Negligible in centre of site, low in north and south ▪ Compressible deposits - Moderate in centre of site, negligible in north, low south ▪ Collapsible deposits - Very Low ▪ Landslides - Very Low ▪ Ground dissolution of soluble rocks - Negligible The site is within a Coal Authority (CA) Coal Mining Reporting Area but not within a Development High Risk Area as defined by the CA. The site is shown to be underlain by past underground coal mine workings. The site is not indicated to be underlain by past shallow coal mine workings or probable unrecorded shallow workings. There are no mine entries recorded on the site. The closest mine entries are shown ca. 200m to the south. The CON29M coal mining report obtained for the site records historical coal mine workings in two seams between 120m and 205m bgl. The coal seams are recorded as last worked in 1916. No active coal mine workings are recorded beneath the site. The recorded workings are of sufficient depth that they do not represent a risk of surface instability. The geological mapping indicates the subcrop of the High Main Coal seam close to the site, expected at shallow depth below rock head. The Coal Authority have confirmed that they do not consider this coal seam to have been worked in the area due to low thickness. Nonetheless it was considered that there is a slight risk of unrecorded workings in this seam if it was thicker than expected and further investigation was considered prudent.
Radon	The UK Indicative Atlas of Radon in England and Wales and the Groundsure report indicate the site to be within a Low Probability Radon Area, where less than 1% of homes are estimated to be at or above the action level for radon gas.
UXO	A review of the Zetica Unexploded Bomb (UXB) Risk Map indicates the site to be in an area of **High Risk** for unexploded bombs (areas indicated as having a bombing density of 50 bombs per 1000 acre or higher). A pre-desk study assessment (PDSA) was obtained from Zetica Ltd to assess the risk from unexploded ordnance (UXO). The PDSA states that readily available records have been found to indicate that several HE bombs fell in close proximity to the site. The PDSA recommended a detailed desk based UXO assessment of the site prior to any intrusive ground investigation or earthworks. A detailed desk based UXO Risk Assessment was carried out by Safelane Global Ltd for the site in preparation for the Ground Investigation Contractor works. The detailed UXO Risk Assessment is included in the AEG Factual Report in **Appendix C**. The risk assessment identified a **Medium Risk** from encountering UXO (high explosive and anti-aircraft ordnance) during intrusive works i.e. excavations, drilling of

Subject	Summary Description
	boreholes or piling. The risk assessment recommended the following measures to mitigate the risk from encountering UXO during intrusive ground works: ■ Site specific explosive ordnance safety and awareness briefings (UXO toolbox briefings) to all personnel conducting intrusive works. ■ Site specific safety instructions (SSSI) training course. ■ Explosive ordnance disposal (EOD) engineer on-site support (watching brief). ■ EOD engineer support during borehole drilling. ■ Intrusive magnetometer survey of all pile locations down to the maximum bomb penetration depth.

3 INITIAL CONCEPTUAL SITE MODEL

3.1 INTRODUCTION

Risks from contamination within soils and groundwater have been assessed based on the environmental setting of the site, anticipated ground conditions, potential sources of contamination associated with current and former on-site and off-site land uses, and the proposed future use of the site.

The source-pathway-receptor model forms the basis of the risk assessment; potential risks are only considered to exist where there is a credible source (e.g., chemical substance capable of causing harm); a viable pathway for migration of source to reception, and a sensitive receptor that could be affected (e.g., aquifer or site users). A source-pathway-receptor contaminant linkage assessment is termed a conceptual site model (CSM). An initial CSM is produced prior to intrusive ground investigation and is updated following collection of site-specific data where appropriate.

An initial CSM has been prepared based on an assumed redevelopment of the site with a multi-storey college building and landscaped recreational areas.

3.2 PRELIMINARY GROUND MODEL

Heterogenous Made Ground comprising mixed cohesive and granular deposits associated with the historical placement of ships' ballast are anticipated in the south of the site.

Made Ground and remnant in-ground obstructions such as basements, floor slabs or foundations are likely still present in areas of former development. Any basement structures encountered during the demolition of former buildings on the site are likely to have been infilled with granular demolition arisings, although the inclusion of other materials cannot be ruled out.

The BGS mapping shows the entire site to be underlain by Glacial Till, this is indicated to be underlain by laminated clay (Glaciolacustrine Deposits). The natural superficial soils in the south-east of the site are recorded to comprise silty sandy clays overlying clayey sand and gravel in the available BGS borehole records.

Solid strata beneath the site likely comprise mudstone, siltstone, and sandstone. Depths to bedrock are anticipated to range between 22m bgl in the south and >33m in the north.

Groundwater is recorded at 3.96m bgl in an available BGS borehole located in the south-eastern corner of the site and is anticipated to be present at similar depth across the site. The groundwater may be tidally influenced by the River Tyne.

3.3 POTENTIAL SOURCES

The identified potential sources of contamination are summarised in **Table 3-1.**

Table 3-1 - Summary of Potential Sources of Contamination

Potential Source	Location	Potential Contaminants of Concern
Made Ground from existing/ former development and placement of ships' ballast	On site and off site (directly adjacent)	Heavy metals, petroleum hydrocarbons (TPH), polycyclic aromatic hydrocarbons (PAH), asbestos, hazardous ground gases (principally methane and carbon dioxide)
Residual contamination from historical industrial land uses (print works)	On site	In addition to the above, volatile (VOC) and semi-volatile organic compounds (SVOC)
Existing substation	On site	Polychlorinated biphenyls
Made Ground from historical industrial land uses (principally former gas works, but also engineering works etc)	Off site (70m south)	Heavy metals, TPH, PAH, benzene, toluene, ethylbenzene and xylenes (BTEX), phenols, cyanides, sulphate and sulphides, ammonia

3.4 POTENTIAL EXPOSURE PATHWAYS

Relevant potential exposure pathways are considered to be:

- Direct contact, ingestion or inhalation of soil-bound contaminants of concern.
- Inhalation of dust-bound or airborne contaminants of concern.
- Migration of leachable or mobile contaminants through soil and groundwater.
- Permeation of organic contaminants into potable water supply pipes and ingestion.
- Migration of hazardous ground gases through unsaturated pore spaces within superficial strata, followed by accumulation in enclosed spaces and inhalation or ignition.

Migration of mine gases from historical coal mine workings beneath the site to the surface is considered unlikely given the recorded depths of the workings of >120m bgl.

3.5 POTENTIAL RECEPTORS

Based on the environmental setting and the proposed future land use of the site the following receptors have been identified:

HUMAN HEALTH

- Construction workers during redevelopment
- Adjacent land/ land users during redevelopment
- Future site users (i.e. students, visitors and maintenance workers).
- At this stage the use of the proposed landscaped areas by future users has been assumed to include recreational use of landscaped areas only, and plant uptake of contaminants of concern through consumption of plants grown on the site has been excluded.

CONTROLLED WATERS

- Surface watercourses (River Tyne)
- Secondary Undifferentiated aquifer (Glacial Till)
- Unproductive Aquifer (Glaciolacustrine Deposits)
- Secondary A aquifer (Pennine Middle Coal Measures).

3.6 POTENTIAL CONTAMINANT LINKAGES

The identified potential source-pathway-receptor contaminant linkages are summarised in **Table 3-2**.

A qualitative risk ranking has been applied to the potentially complete contaminant linkages in accordance with CIRIA C552 ‘Contaminated Land Risk Assessment: A Guide to Good Practice’, (2001), which considers a combination of the potential severity of the harm and the likelihood of the harm occurring.

Table 3-2 – Potential Source-Pathway-Receptor Linkages (Initial CSM)

Potential Source	Potential Pathway	Potential Receptor	Likelihood of Complete Linkage	Severity	Risk	Comment
Contaminants of concern within soil and/ or groundwater associated with Made Ground or historical land uses	Direct contact or ingestion	Future site users	Low	Medium	Moderate/ low	Contamination of soil or groundwater originating from past land uses may be present on the site; however, the likelihood of widespread contamination being present is considered as low at this stage. Exposure to the anticipated contaminants may cause chronic damage to human health over a long period. Acute risks to human health are not considered likely.
		Construction workers	Likely	Medium	Moderate	
	Inhalation of dust-bound or airborne contaminants (particularly asbestos)	Future site users	Unlikely	Medium	Low	Asbestos fibres or asbestos containing materials may be present within Made Ground in areas of former development and demolition fill. Where present, exposure of construction workers to airborne asbestos fibres during earthworks is likely. Future site users being exposed to asbestos following redevelopment of the site is considered to be unlikely at this stage.
		Construction workers	Likely	Medium	Moderate	
		Adjacent site users	Low	Medium	Moderate/ low	The likelihood of significant impact on adjacent site users (predominantly airborne asbestos fibres) during earthworks is considered as low at this stage.

Potential Source	Potential Pathway	Potential Receptor	Likelihood of Complete Linkage	Severity	Risk	Comment
Contaminants of concern within soil or groundwater associated with historical land uses	Migration of leachable or mobile contaminants through soil and groundwater	Surface watercourses (River Tyne)	Low	Medium	Moderate/ low	Leachable or mobile contaminants of concern may be present on the site; however, the likelihood of migration of significant contamination towards surface watercourses and the bedrock aquifer is considered to be low. If present, contamination of soil or groundwater is likely to have migrated into the Glacial Till underlying the site.
		Secondary Undifferentiated aquifer (Glacial Till)	Likely	Medium	Moderate	
		Secondary A aquifer (Pennine Middle Coal Measures)	Low	Medium	Moderate/ low	
	Permeation of organic contaminants into potable water supply pipes	Future site users	Low	Medium	Moderate/ low	Organic contaminants may be present within Made Ground on the site with the potential to enter the potable water supply of the proposed development where conventional pipes are installed within contaminated soils.
Hazardous ground gases/ arising from on-site or off-site Made Ground deposits	Migration of hazardous ground gases, followed by accumulation in enclosed and inhalation or ignition	Future site users	Low	Severe	Moderate	Made Ground deposits with the potential to generate hazardous gases may be present on, or within close proximity of, the site; although the potential for high gas concentrations and sustained gas flows that could cause severe harm to human health or explosion is considered to be low at this stage.
		Construction workers	Likely	Severe	High	Workers entering excavations or other confined spaces could be at risk if ground gases are present and accumulate.

Classification	Definition
Very High Risk	Severe harm to a receptor may already be occurring, or a high likelihood severe harm will arise to a receptor, unless immediate remedial works / mitigation measures are undertaken.
High Risk	Harm is likely to arise to a receptor, and is likely to be severe, unless appropriate remedial actions / mitigation measures are undertaken. Remedial works may be required in the short-term, but likely to be required over the long-term.
Moderate Risk	Possible that harm could arise to a receptor, but low likelihood that such harm would be severe. Harm is likely to be mild. Some remedial works may be required in the long-term.
Moderate / Low Risk	Possible that harm could arise to a receptor, but where a combination of likelihood and consequence results in a risk that is above low, but is not of sufficient concern to be classified as mild. Limited further investigation may be required to clarify the risk. If necessary, remediation works are likely to be limited in extent.
Low Risk	Possible that harm could arise to a receptor. Such harm, at worst, would normally be mild.
Very Low Risk	Low likelihood that harm could arise to a receptor. Such harm is unlikely to be any worse than mild.

Figure 3-1 - CIRIA Risk Ranking for Source-Pathway-Receptor Linkages

4 GROUND INVESTIGATION WORKS

4.1 GENERAL

The investigation was carried out by AEG between the 25th of September and the 3rd of November 2023. The approximate locations of the exploratory holes are shown on Figure 2 included in **Appendix A,** and on figures within the AEG Factual Report. The exploratory hole records and subsequent laboratory testing results are presented in the AEG Factual Report, included as **Appendix C**, which should be read in conjunction with this report.

4.2 RATIONALE

WSP scoped and specified the ground investigation based on the design and construction requirements for the current development proposal. The ground investigation set out to determine:

- The sequence, nature, and thickness of Made Ground and superficial deposits present across the site;
- The material properties of the superficial deposits and bedrock;
- The groundwater regime beneath the site; and,
- The presence or otherwise of contamination, including ground gas, within the site extents.

The investigation also included excavations to expose and record foundation dimensions to several buildings on the site boundaries.

4.3 FIELDWORK

The investigation comprised; ten boreholes progressed with cable percussion until rockhead or 20m depending on position, three then continued with rotary drilling (rotary core and open hole) to obtain rock cores, and two of those (BH101 & BH102) continuing to drill with rotary open holing for the purpose of identifying potential shallow coal seams. Dynamic sampling was carried out to assess shallow conditions (with four including rotary open follow-on). Machine excavated trial pits, foundation inspection pits, and hand excavated inspection pits to assess pavement subgrade were also conducted. A summary of the intrusive ground investigation works undertaken is provided as **Table 4-1**.

Table 4-1 – Summary of Ground Investigation Works Undertaken

Exploratory Method	Number of Positions	Final Depth Range (m below ground level)
Cable Percussion Boreholes CP	10	1.10 – 38.50
Boreholes with Rotary Core follow-on	2	43.2 – 58.5
Boreholes with Rotary Core then Open holed follow-On (RC) / (RO)	2	57.6
Dynamic Samples (DS)*	8	1.10 – 6.0
Machine Excavated Trial Pits (TP)	4	3.5 – 4.10
Machine Excavated Foundation Pits (FP)	6	2.0 – 3.0

Exploratory Method	Number of Positions	Final Depth Range (m below ground level)
Hand Excavated Inspection Pits (IP)	2	1.0 - 1.50

* Four of the dynamic sample positions where further advanced to 6.0m depth using rotary open hole drilling techniques.

All works were carried out in accordance with BS 1377:1990, BS 5930:2015+A1:2020, BS EN ISO 14689-1:2018, BS EN ISO 14688-1:2018 & 14688-2:2018, BS 10175:2011+A2:2017, and BS EN ISO 22476-3:2005. Copies of the logs for the exploratory positions are presented in the AEG Factual Report.

An Explosive Ordnance Disposal (EOD) Engineer was on site during the ground investigation works to monitor and manage the risk of encountering UXOs. This mitigation was recommended in the Safelane Global Ltd detailed UXO Risk Assessment as discussed in Section 2.1.

4.4 IN-SITU TESTING

Standard Penetration Tests (SPTs) were undertaken in cable percussive boreholes and dynamic samples at nominal 1.0m intervals to 5m below ground level (bgl) and 1.5m intervals from 5m bgl, with these tests alternating with undisturbed samples within fine soils. The tests were undertaken in accordance with BS EN ISO 22476-3. The SPT 'N' values recorded as well as the corrected N_{60} values corrected and are presented in the AEG Factual Report.

Hand Shear Vane (HSV) tests were undertaken in trial pits on recovered samples. Nine HSVs were attempted on recovered cohesive samples, only three of the recovered samples were suitable for HSV testing.

Further discussion of the in-situ testing results is provided in Section 6.

4.5 LABORATORY TESTING

4.5.1 GEOTECHNICAL

Geotechnical laboratory testing was scheduled by WSP to aid in classification of materials, development of the ground model, and to support derivation of geotechnical parameters. The laboratory testing was undertaken by AEG, and the results are presented within the AEG Factual Report. All testing is UKAS accredited. Details of the geotechnical testing scheduled is provided as **Table 4-2.**

Table 4-2 – Summary of Geotechnical Tests Undertaken

Geotechnical Test	No. Tests Scheduled	No. Tests Undertaken
Moisture Content from direct and indirect testing	54	54
Plasticity Index (Atterberg Limits)	50	50
Particle Size Distribution (PSD) by Sieve	18	18
Particle Size Distribution (PSD) by Pipette*	18	10[1]

Geotechnical Test	No. Tests Scheduled	No. Tests Undertaken
2.5kg Compaction	4	3[1]
Soaked California Bearing Ratio (CBR)	4	4
Consolidation Testing	12	12
Undrained Triaxial Testing (102mm)	16	10[1]
BRE Special Digest 1 – Suite C (Brownfield Site – Pyrite Absent)	25	25
Point Load Testing	14	14
Unconfined Compressive Strength (UCS) Testing	1	1

[1] Testing results received differ from those scheduled due to the unsuitability of some of the samples for testing.

4.5.2 ENVIRONMENTAL

Thirty six soil samples were obtained from soils recovered from the exploratory holes during the ground investigation. The soil samples were analysed to target the potential contaminant linkages identified in the preliminary CSM, and to support the detailed design of the proposed development. The laboratory chemical analysis undertaken is summarised in **Table 4-3**.

Table 4-3 – Summary of Chemical Tests Undertaken

Chemical Analysis	Number of Samples Tested		
	Soils	Soil Leachate	Groundwater
Asbestos identification	29	n/a	n/a
Asbestos quantification	1	n/a	n/a
Metals and metalloids, incl. arsenic, barium, beryllium, boron, cadmium, chromium III, chromium VI, copper, lead, mercury, nickel, selenium, vanadium and zinc	36	5	7
Polycyclic aromatic hydrocarbons (PAH) (USEPA 16)	36	5	7
Speciated total petroleum hydrocarbons (TPH)	27	5	7
Benzene, toluene, ethylbenzene, xylene (BTEX) and Methyl tertiary butyl ether (MTBE)	27	5	7
Total phenols (monohydric	36	5	7
Volatile organic compounds (VOC)	27	-	7

Chemical Analysis	Number of Samples Tested		
	Soils	Soil Leachate	Groundwater
Semi volatile organic compounds (SVOC)	27	-	7
Polychlorinated biphenyls (PCB)	27	-	-
Soil organic matter (SOM)	36	n/a	n/a
pH value	36	5	7
Free and total cyanide	27	5	7
Ammoniacal nitrogen as NH4	5*	5	7
Water soluble sulphate	36	5	7
Dissolve organic carbon (DOC)	n/a	n/a	7
Water hardness as CaCO3	n/a	n/a	7

4.6 MONITORING WELL INSTALLATIONS

Nine exploratory boreholes were installed with a 50mm diameter standpipe. Installation details are summarised in **Table 4-4** and are included on the logs provided in the AEG Factual Report (**Appendix C**).

Table 4-4 – Summary of Monitoring Well Installation Details

Location	Depth of Well Response Zone (m bgl)	Response Zone Strata
BH101	5.00-19.50	Superficial - Glacial Till
BH102	39.00-58.50	Bedrock - Pennine Middle Coal Measures
BH104	2.00-16.00	Superficial - Glacial Till
BH108	3.00-17.00	Superficial - Glacial Till
BH201A	0.50-2.00	Made Ground
BH202	1.00-2.50	Made Ground
BH203	3.00-6.00	Superficial - Glacial Till
BH204	0.70-2.20	Made Ground
BH207	1.60-2.20	Made Ground

4.7 GROUNDWATER AND GAS MONITORING

Following completion of the intrusive ground investigation fieldwork monitoring of ground gases and groundwater was undertaken in the installed monitoring wells on six occasions between 22 November 2023 and 30 January 2024.

The monitoring results are included in the AEG Factual Report (**Appendix C**).

5 GROUND CONDITIONS ASSESSMENT

5.1 SUMMARY OF ENCOUNTERED GROUND CONDITIONS

The ground conditions encountered during the intrusive ground investigation are summarised in **Table 5-1**. The exploratory hole logs are included in the AEG Factual Report (**Appendix C**). An interpretive geological section is provided in **Appendix A**. The general descriptions of the ground conditions and interpreted ground model presented in this report is an interpretation based on available published geological information and the findings of the ground investigation. Groundwater levels are subject to seasonal and other fluctuations and cognisance of this should be taken whilst reviewing the water levels reported in this assessment.

Table 5-1 – Summary of Strata Encountered During Investigation

Stratum	Depth to Base (m bgl) [1]	Thickness (m)*	Typical Description*
Granular Made Ground	0.05 – 3.00 (1.2)	0.05 – 3.00 (1.2)	Brown clayey sandy gravel with cobbles. Gravel of concrete, macadam, brick, clinker, sandstone, and mudstone. Localised glass, tile, wood.
Cohesive Made Ground	0.10 – 4.30 (3.0)	0.10 – 4.15 (1.8)	Soft to firm sandy gravelly clay with localised fragments of glass, wood, and tile. Gravel of concrete, clinker, brick, and sandstone and rare slag.
Glacial Till [2]	14.00 – 21.20 (20.0)	9.70 – 17.30 (17.0)	Firm to stiff gravelly Clay.
Glaciofluvial Deposits [3] [4]	20.20 – 36.50 (34.0)	2.20 – 15.60 (14.0)	Dense to very dense in places thinly laminated grey, brown silty/clayey Sand. Sand is fine. Occasional interbeds of sandy gravelly clay Becomes sandy gravelly clay of low plasticity in places. Layers of brown sandy Gravel in BH103 and BH107A.
Glaciofluvial Gravel Deposits [3]	33.50 – 37.50 (37.0)	1.00 – 4.00 (3.0)	Brown sandy Gravel with cobbles. Sand is fine to coarse. Gravel is fine to coarse subangular to rounded and includes sandstone and mudstone
Bedrock - Pennine Middle Coal Measures	Not proven, maximum depth of 58.50m recorded in BH102	Not proven, maximum thickness of 21.0m recorded in BH102	Extremely weak to weak, grey, thinly laminated to very thinly bedded slightly silty Mudstone partially to distinctly weathered. 5cm distinctly weathered coal present in BH101

Notes

[1] Figure in brackets represent the values adopted in geotechnical ground model

[2] Depth to base of stratum proven in Boreholes BH101 to BH108, excluding BH105 and BH107.

Stratum	Depth to Base (m bgl) [1]	Thickness (m)*	Typical Description*

[3] Depth to base of stratum proven in Boreholes BH101, BH102, and BH105A only.

[4] The log descriptor for the glaciofluvial deposits is not always identical to the soil grading indicated by laboratory tests on specific samples due to inherit natural variability. It is considered that this stratum prominently comprises granular Glaciofluvial Deposits with interbedded cohesive deposits, potentially representing the Glaciolacustrine clays recorded on the available BGS mapping.

5.2 MATERIAL DESCRIPTIONS

5.2.1 GRANULAR MADE GROUND

Granular Made Ground comprising brown clayey sandy gravel with cobbles. Gravel is fine to coarse angular to subrounded and includes concrete, macadam, brick, clinker, sandstone, and mudstone. Gravel of slag was recorded in BH103. Glass, tile, and wood were recorded locally. The thickness of Granular Made Ground ranged from 0.05m to 3.00m.

5.2.2 COHESIVE MADE GROUND

Cohesive Made Ground comprising soft to firm sandy gravelly clay. Gravel is fine to coarse angular to subrounded and includes brick, chert, mudstone, sandstone, and clinker. Fragments of glass, tile, and wood were recorded locally. Gravel of slag was recorded in BH103. The thickness of Cohesive Made Ground ranged from 0.10m to 4.15m.

5.2.3 GLACIAL TILL

Glacial Till comprising firm to stiff gravelly clay, with fine to coarse gravel of subangular to subrounded mudstone and sandstone, was recorded in all exploratory holes and ranged in thickness from 9.7m to 17.3m.

5.2.4 GLACIOFLUVIAL DEPOSITS

Glaciofluvial deposits were recorded underlying the Glacial Till in all locations, typically encountered from 15m to 20m below ground level (bgl) until rockhead. The proven thickness of these deposits ranged from 14.7m to 15.6m. Deposits were typically Granular, composed of dense to very dense brown slightly silty sand. Occasional interbeds of sandy gravelly clay were present within the sand. The material also became cohesive in places, transitioning into a silty sandy clay. At BH103 and BH107A, a layer sandy gravel with cobbles circa 3.0m thick was present at the base of the Glacial Till and above the silty sand stratum.

5.2.5 GLACIOFLUVIAL DEPOSITS - GRAVEL

A layer of dense gravel was encountered immediately overlying rockhead 1.0m to 4.0m thick (BH101, BH102, BH105A). Based on the descriptor, roundness and weathering evidence, it is interpreted that this gravel represents Glaciofluvial deposits, not completely weathered bedrock, and are distinct in composition from the overlying silty sand material. These are typically described as sandy gravel with cobbles, sand is fine to coarse, gravel is fine to coarse subangular to rounded and includes sandstone and mudstone.

5.2.6 BEDROCK

Rockhead was encountered in three exploratory holes (BH101, BH102, BH105A) from 33.5 to 37.5m bgl and was typically recorded as extremely weak to weak, grey, thinly laminated to very thinly bedded slightly silty Mudstone, partially to distinctly weathered. BH101 encountered a 5cm band of extremely weak black Coal at a depth of 38.1m bgl.

5.3 GROUNDWATER

The following ground water observations were made during the site works:

Exploratory Hole	Depth of water (m)	Depth of casing (m)	Depth sealed (m)	Final Depth (m)	Total monitoring time (mins)	Comments
BH101	19.0	11.5	21.5	18.2	N/A	Water strike (slow inflow)
BH106	3.0 4.0 14.0	2.80 3.90 12.07	3.60 4.57 10.20	2.50 4.30	20 20 -	Groundwater seepage Water strike Water strike
BH108	1.80 10.10	1.57 9.07	2.00 10.57	1.60 9.80	20 20	Water Strike Water Strike
FP402	1.30	Groundwater seepage (moderate inflow)				
FP403	1.00	Groundwater seepage – between 1.00-2.30m bgl (slow inflow)				
FP405	2.20	Groundwater seepage – heavy inflow				
FP406	2.40	Groundwater seepage – moderate inflow				

The groundwater monitoring results to date are provided in the AEG Factual Report, included as **Appendix C**

5.4 VISUAL AND OLFACTORY EVIDENCE OF POTENTIAL CONTAMINATION

The following visual and olfactory evidence of potential contamination was encountered during the ground investigation:

- Fragment of potentially asbestos containing material (ACM) at 2.00m bgl in TP301.
- Slight hydrocarbon odour noted between 2.90m and 3.50m bgl in TP304.

6 GEOTECHNICAL PROPERTIES

This section summarises the results of the in-situ and laboratory testing; and derives the material properties and global derived characteristic geotechnical parameters of the strata encountered.

6.1 GRANULAR MADE GROUND

A summary of the in-situ and laboratory test results for the Granular Made Ground is presented in **Table 6-1**.

Table 6-1 – Summary of Testing in Granular Made Ground

Test	No. Tests	Results (mean)	Comment
In-Situ Testing			
Standard Penetration N_{60} Value	10	6 – 50+ (29)	Corrected SPT N values (N_{60} values) have been calculated using corrected energy ratios and corrected rod lengths, in accordance with BS EN ISO 22476-3.
Laboratory Testing			
Soaked California Bearing Ratio (%)	4	12 – 20 (15)	
Moisture Content (%)	5	6.9 – 19.7 (13)	
Atterberg Limits	2	Non Plastic	
Optimum Moisture Content through 2.5kg Compaction (%)	3	14 – 18 (16)	
Particle Size Distribution	1	The sample of Granular Made Ground comprised ‘cobbles with much gravel some sand and little fines’.	
pH	3	10.8 – 11.8	As the site is a brownfield location and assuming potentially mobile groundwater, these results record a Design Sulphate Class of **DS-2** and an ACEC Class of **AC-2**.
SO_4	3	260 – 1200	
Derived Parameters			
The soil descriptions and laboratory test results for the Granular Made Ground record a high degree of variability across the site, and, as such, it is not considered appropriate to derive site-wide geotechnical parameters for this material. Localised Made Ground parameters for specified site areas should be derived during detailed design stage where appropriate. General guidance for formations within Made Ground is provided in Section 7 of this GIR			

6.2 COHESIVE MADE GROUND

A summary of the in-situ and laboratory test results for the Cohesive Made Ground is presented in **Table 6-2**.

Table 6-2 – Summary of Testing in Cohesive Made Ground

Test		No. Tests	Results (mean)	Comment
In-Situ Testing				
Standard Penetration N_{60} Value		15	3 – 50+ (19)	Corrected SPT N values (N_{60} values) have been calculated using corrected energy ratios and corrected rod lengths, in accordance with BS EN ISO 22476-3.
Laboratory Testing				
Moisture Content (%)		7	9.0 – 37.3 (23)	
Atterberg Limits	Liquid Limit (%)	7	29 – 51 (39)	On the Casagrande Plasticity Chart the samples of Cohesive Made Ground are classified as either low or intermediate plasticity clay or silt. One sample was classified as a high plasticity clay.
	Plastic Limit (%)	7	13 – 23 (19)	
	Plasticity Index	7	13 – 29 (21)	
Particle Size Distribution		2	As per BS 5930:2015, the samples of Cohesive Made Ground should be described as 'very silty very gravelly sand with some clay'.	
pH (1)		1	10.9	As the site is a brownfield location and assuming potentially mobile groundwater, these results record a Design Sulphate Class of **DS-1** and an ACEC Class of **AC-1**.
SO_4		1	170	
Derived Parameters				
The soil descriptions and laboratory test results for the Cohesive Made Ground record variability across the site, and, as such, it is not considered appropriate to derive site-wide geotechnical parameters for this material. Localised Made Ground parameters for specified site areas should be derived during detailed design stage where appropriate. General guidance for formations within Made Ground is provided in Section 7 of this GIR.				

6.3 GLACIAL TILL

A summary of the in-situ and laboratory test results for the Glacial Till is presented in **Table 6-3**.

Table 6-3 – Summary of Testing in Glacial Till

Test		No. Tests	Results (mean)	Comment
In-Situ Testing				
Standard Penetration N_{60} Value		66	6 – 50+ (34)	Corrected SPT N values (N_{60} values) have been calculated using corrected energy ratios and corrected rod lengths, in accordance with BS EN ISO 22476-3.
Hand Shear Vane (kPa)		2	77 – 85 (81)	Only two samples were tested as the other 7 No. did not recover a large enough volume to test.
Laboratory Testing				
Moisture Content (%)		31	5 – 33 (16)	
Atterberg	Liquid Limit (%)	31	18 – 62 (31)	On the Casagrande Plasticity Chart (Figure 6-1), the samples of Glacial Till are largely classified as low plasticity clay, with a few samples classified as intermediate plasticity clay. One outlier sample is classified as a high plasticity clay.
	Plastic Limit (%)	31	8 – 25 (14)	
	Plasticity Index	31	10 – 37 (17)	
Particle Size Distribution		7	As per BS 5930:2015, the samples of Glacial Till should be described as ‘sandy gravelly silt and clay’, as shown in Figure 6-2.	
Undrained Shear Strength through Undrained Triaxial Testing (kPa)		9	29 – 253 (133)	
Coefficient of Volume Compressibility through One Dimensional Consolidation (m^2/MN)		11	Load stage 0 – 50kPa: mv of 0.122 – 0.789m^2/MN (0.51 mean) Load stage 50 – 100kPa: mv of 0.120 – 0.306m^2/MN (0.23 mean) Load stage 100 – 200kPa: mv of 0.090 – 0.215 m^2/MN (0.15 mean) Load stage 200 – 400kPa: mv of 0.070 – 0.119m^2/MN (0.09 mean)	
pH		11	7.9 – 10.2 (8.6)	As the site is a brownfield location and assuming potentially mobile groundwater, these results

Test	No. Tests	Results (mean)	Comment
SO_4	11	60 – 430 (216)	record a Design Sulphate Class of **DS-1** and an ACEC Class of **AC-1**.

Derived Parameters

Soil Parameter	Geotechnical Parameter	Comments and Relevant Standards
Unit Weight, γ (kN/m^3)	19	BS 8004:2015+A1:2020, Figure 1 and 2 [1]
Effective angle of shearing resistance, ϕ' (°)	28	Derived from soil plasticity as per BS 8002:2015, equation 7.
Effective Cohesion (kPa)	0	No long term effective cohesion assumed over the 120yr design life of the structure foundations.
Undrained Shear Strength (kPa)	The following undrained shear strength profile is recommended for the Glacial Till as shown on Figure 6-3: • 60kPa at the top of the stratum to 5.0m bgl, • 180kPa at the at the base of the stratum at 20m bgl • 120kPa average	Derived from SPT data, laboratory, data and soil descriptions. Correlated c_u values estimated from SPT N values using the relationship proposed by Stroud: $c_u = f_1 N_{60}$ Where f_1 is a factor based on other soil properties in as defined in *CIRIA Report 143 'The Standard Penetration Test (SPT): Method and Use, 1975.* An f_1 value of 4.0 is adopted to collate undrained shear strength values in the glacial soils. For the estimation of c_u values, SPT refusals have been considered as SPT N_{60} values of 50.
Undrained Stiffness (MPa)	The following undrained shear strength profile is recommended for the Glacial Till: • 10MPa at the top of the stratum, • 30MPa at the at the base of the stratum • 20MPa average	Derived from SPT data, laboratory, data and soil descriptions. Correlated from SPT N_{60} values based on relationship in *CIRIA Report 143 'The Standard Penetration Test (SPT): Method and Use, 1975.* $Eu = N_{60} \times 1.0$ (cohesive)

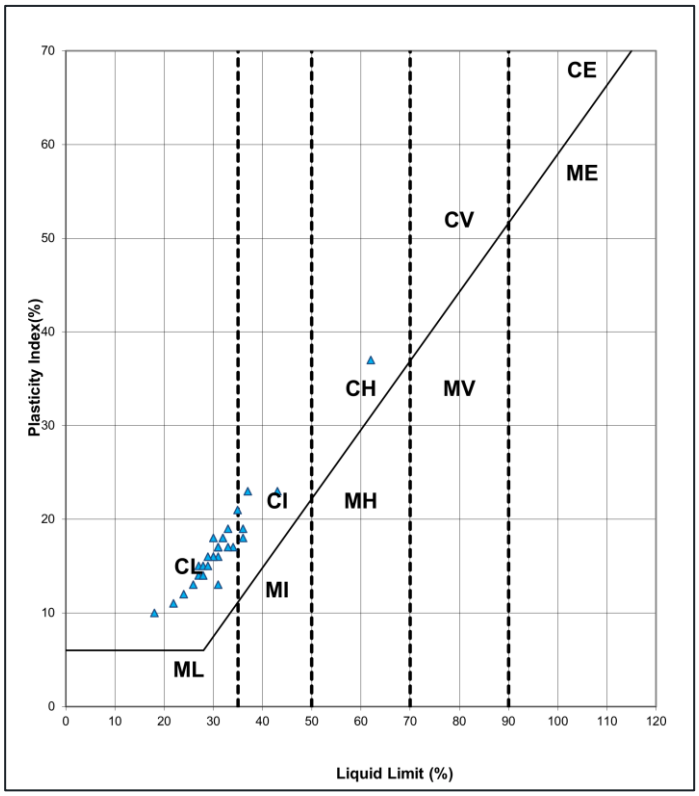


Figure 6-1 - Casagrande Plasticity Chart for Glacial Till

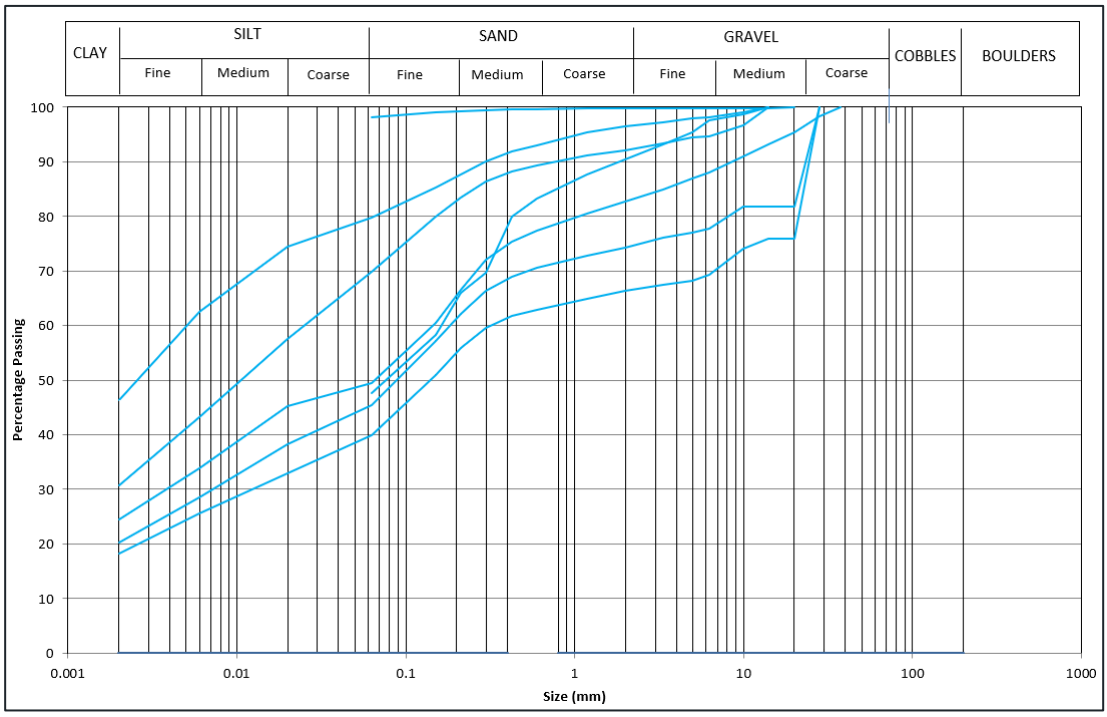


Figure 6-2 - Particle Size Distribution for Glacial Till

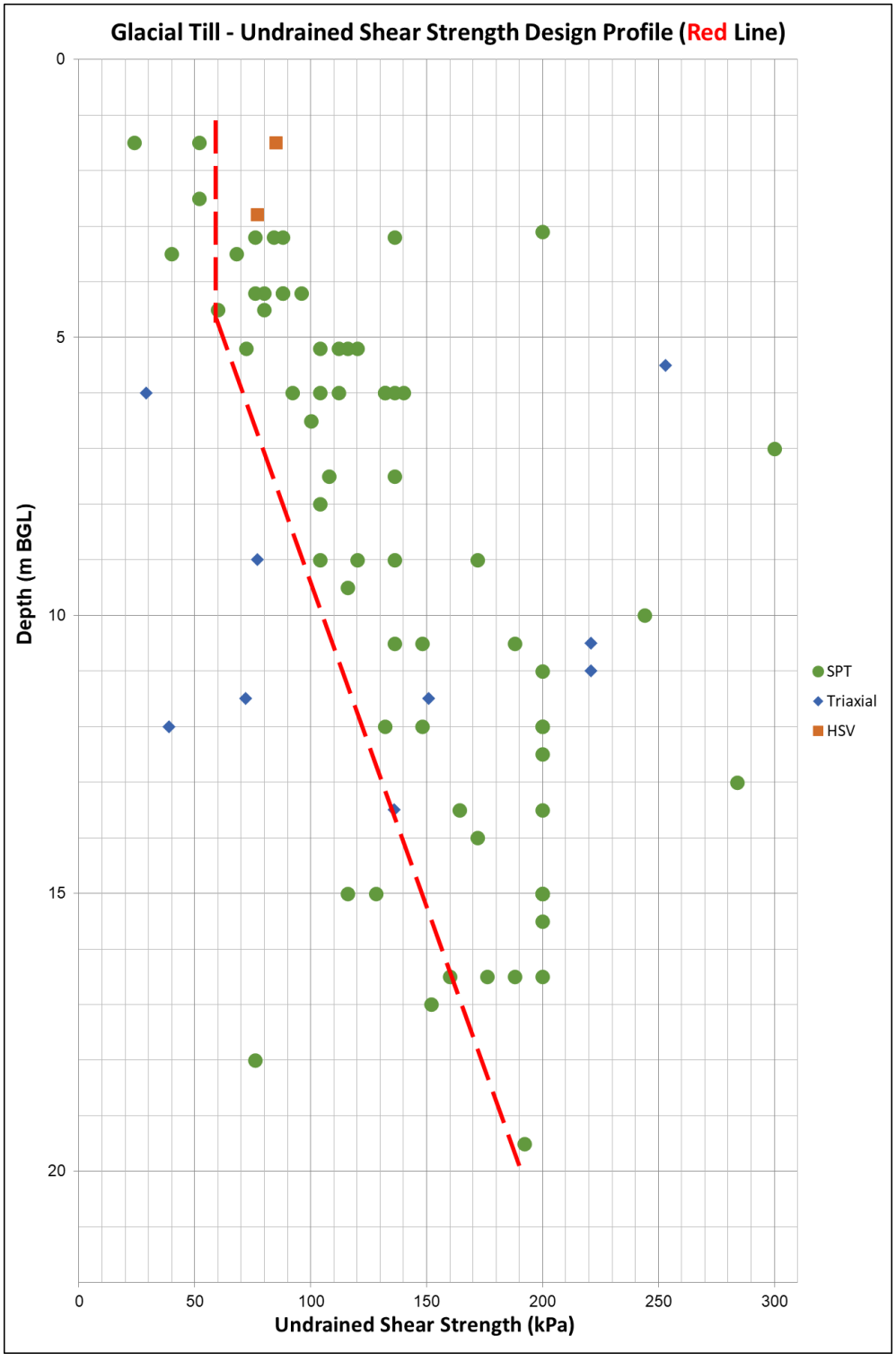


Figure 6-3 - Undrained Shear Strength Profile for Glacial Till

6.4 GLACIOFLUVIAL DEPOSITS

A summary of the in-situ and laboratory test results for the Glaciofluvial Deposits is presented in **Table 6-4**.

Table 6-4 – Summary of Testing in Glaciofluvial Deposits

Test		No. Tests	Results (mean)	Comment
In-Situ Testing				
Standard Penetration N_{60} Value	Granular Soils	35	20 – 91+ (56)	Corrected SPT N values (N_{60} values) have been calculated using corrected energy ratios and corrected rod lengths, in accordance with BS EN ISO 22476-3.
Cohesive Soils		7	39 – 50 (48)	-
Laboratory Testing				
Moisture Content (%)		10	10 – 30 (22)	-
Atterberg	Liquid Limit (%)	9	0 – 28 (21)	Atterberg Limit testing was undertaken on cohesive samples only. On the Casagrande Plasticity Chart the samples of Glaciofluvial deposits are classified as low plasticity clay/silt or non-plastic (Figure 6-4).
	Plastic Limit (%)	9	0 – 16 (12)	
	Plasticity Index	9	0 – 15 (9)	
Coefficient of Volume Compressibility through One Dimensional Consolidation (m^2/MN)		1	Load stage 0 – 100kPa: mv of 0.126m^2/MN Load stage 100 – 200kPa: mv of 0.039m^2/MN Load stage 200 – 400kPa: mv of 0.025m^2/MN	
Particle Size Distribution		7	As per BS 5930:2015, the 6 No. granular samples of Glaciofluvial Deposits should be described as ‘gravelly sand with some silt’, and the 1 No. cohesive sample of Glaciofluvial Deposits should be classed as ‘gravelly sandy silt/cay, as shown in Figure 6-5.	
Undrained Shear Strength through Undrained Triaxial Testing (kPa)		1	159	-
pH		5	8.3 – 9.2 (8.7)	As the site is a brownfield location and assuming potentially mobile groundwater,

SO_4	5	20 – 210 (97)	these results record a Design Sulphate Class of **DS-1** and an ACEC Class of **AC-1**.

Derived Parameters – Glaciofluvial – Cohesive soils

Soil Parameter	Geotechnical Parameter	Comments and Relevant Standards
Unit Weight, γ (kN/m³)	19	BS 8004:2015+A1:2020, Figure 1 and 2 [1]
Effective angle of shearing resistance, ϕ' (°)	28	Derived from soil plasticity as per BS 8002:2015, equation 7.
Effective Cohesion (kPa)	0	No long term effective cohesion assumed over the 120yr design life of the structure foundations.
Undrained Shear Strength (kPa)	125	Derived from SPT data and soil descriptions. Lower parameter values adopted to account for soil silt content. Correlated c_u values estimated from SPT N values using the relationship proposed by Stroud: $c_u = f_1 N_{60}$ Where f_1 is a factor based on other soil properties in as defined in *CIRIA Report 143 'The Standard Penetration Test (SPT): Method and Use, 1975.* An f_1 value of 4.0 is adopted to collate undrained shear strength values in the glacial soils. For the estimation of c_u values, SPT refusals have been considered as SPT N_{60} values of 50.
Undrained Stiffness (MPa)	20	Derived from SPT data and soil descriptions. Lower parameter values adopted to account for soil silt content. Correlated from SPT N_{60} values based on relationship in *CIRIA Report 143 'The Standard Penetration Test (SPT): Method and Use, 1975.* $Eu = N_{60} \times 1.0$ (cohesive)

Derived Parameters – Glaciofluvial – Granular soils

Soil Parameter	Geotechnical Parameter	Comments and Relevant Standards
Unit Weight, γ (kN/m³)	20	BS 8004:2015+A1:2020, Figure 1 and 2 [1]
Effective angle of shearing resistance, ϕ' (°)	34	Angle of internal friction derived from relationship with SPT-N value after Peck, Hanson and Thornburn, 1974 in *Soil Mechanics – Principles and Principles* 2nd Edition by G. Barnes, 2000.
Effective Cohesion (kPa)	0	Granular Stratum.

Drained Stiffness (MPa)	40	Derived from SPT N_{60} values based on relationship in *CIRIA Report 143 'The Standard Penetration Test (SPT): Method and Use', 1975.* $E' = N_{60} \times 1.0$ (granular)

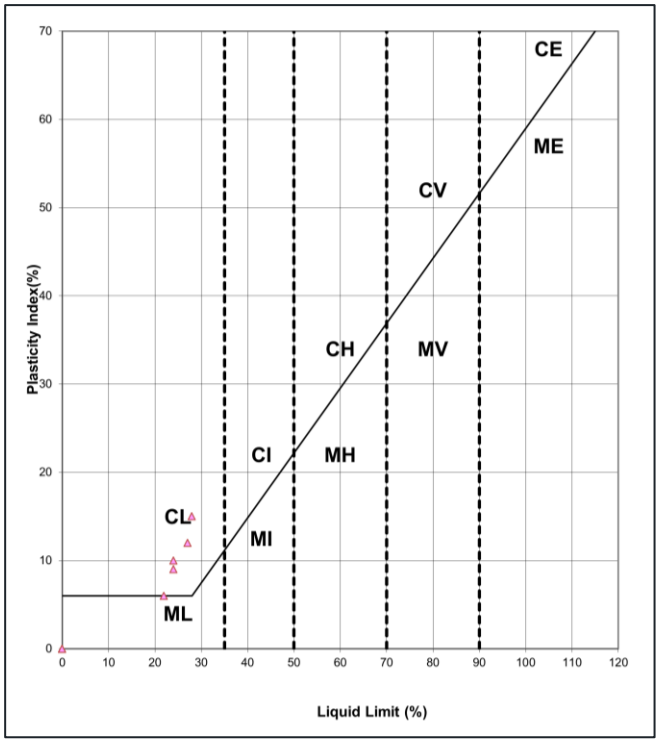


Figure 6-4 - Casagrande Plasticity Chart for Cohesive Glaciofluvial Deposits

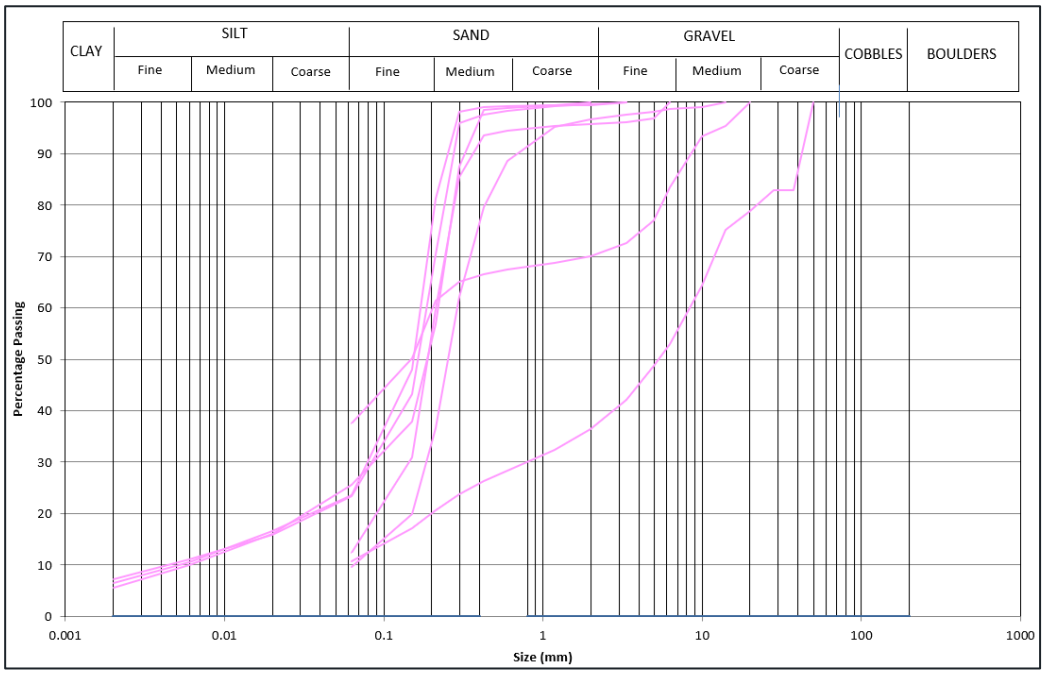


Figure 6-5 - Particle Size Distribution for Glaciofluvial Deposits

6.5 GLACIOFLUVIAL GRAVEL DEPOSITS

A summary of the in-situ and laboratory test results for the Glaciofluvial Gravel is presented in **Table 6-5**.

Table 6-5 – Summary of Testing in Glaciofluvial Gravel Deposits

Test		No. Tests	Results (mean)	Comment
In-Situ Testing				
Standard Penetration N_{60} Value		6	50+ (50+)	Corrected SPT N values (N_{60} values) have been calculated using corrected energy ratios and corrected rod lengths, in accordance with BS EN ISO 22476-3.
Laboratory Testing				
Moisture Content (%)		1	9.6	-
Atterberg	Liquid Limit (%)	1	0	-
	Plastic Limit (%)	1	0	
	Plasticity Index	1	0	
Particle Size Distribution		1	As per BS 5930:2015, the samples of Glaciofluvial Gravel Deposits should be described as 'slightly sandy gravel'	
pH		2	8.4 – 8.5 (8.5)	As the site is a brownfield location and assuming potentially mobile groundwater, these results record a Design Sulphate Class of **DS-1** and an ACEC Class of **AC-1**.
SO_4		2	39 - 64 (52)	
Derived Parameters				
Soil Parameter		**Geotechnical Parameter**	**Comments and Relevant Standards**	
Unit Weight, γ (kN/m^3)		21	BS 8004:2015+A1:2020, Figure 1 and 2 [1]	
Effective angle of shearing resistance, ϕ' (°)		38	Angle of internal friction derived from relationship with SPT-N value after Peck, Hanson and Thornburn, 1974 in *Soil Mechanics – Principles and Principles* 2nd Edition by G. Barnes, 2000.	

Effective Cohesion (kPa)	0	Granular Stratum
Drained Stiffness (MPa)	30	Derived from SPT N_{60} values based on relationship in *CIRIA Report 143 'The Standard Penetration Test (SPT): Method and Use', 1975.* $E' = N_{60} \times 1.0$ (granular)

6.6 PENNINE MIDDLE COAL MEASURES (BEDROCK)

A summary of the in-situ and laboratory test results for the Pennine Coal Measures is presented in **Table 6-6**.

Table 6-6 – Summary of Testing in Pennine Coal Measures

Test	No. Tests	Results (mean)	Comment
In-Situ Testing			
Standard Penetration N_{60} Value	3	50+	Corrected SPT N values (N_{60} values) have been calculated using corrected energy ratios and corrected rod lengths, in accordance with BS EN ISO 22476-3.
Laboratory Testing			
Point Load Index (IS50) (MPa)	14	0.000 – 2.156 (0.36)	-
Uniaxial Compressive Strength (MPa)	1	0.1	Test undertaken on sample recovered close to rockhead, sample considered to be a locally weak rock with a degree of weathering in comparison to the wider bedrock stratum. The unconfined compressive strength was prepared in accordance with ASTM D4543-08 and tested in accordance with ASTM D7012-14: Method C.
pH	2	9.0 – 9.2 (9.1)	As the site is a brownfield location and assuming potentially mobile groundwater, these results record a Design Sulphate Class of **DS-1** and an ACEC Class of **AC-1**.
SO_4	2	16 – 61 (39)	
Derived Parameters			
Soil Parameter	**Geotechnical Parameter**	**Comments and Relevant Standards**	

Test	No. Tests	Results (mean)	Comment
Unit Weight, γ (kN/m^3)	24	Derived from SPT N_{60} values and J. C. Cripps and R. K. Taylor, '*The engineering properties of mudrocks*', *1981*.	
Effective angle of shearing resistance, ϕ' (°)	32		
Effective Cohesion (kPa)	5		
Drained Stiffness (MPa)	30	Derived from SPT N_{60} values based on relationship in *CIRIA Report 143 'The Standard Penetration Test (SPT): Method and Use', 1975.* $E' = N_{60} \times 1.0$ (granular)	
Unconfined Compressive Strength (MPa)		1.0	Point Load Index (IS50) has been corrected using a K value of 20 as per J Rusnak, 2000.

7 ENGINEERING ASSESSMENT

7.1 INTRODUCTION

To enable construction of the proposed development (multi-story college campus building with associated landscaped areas and parking) the following geotechnical works are anticipated:

- New piled foundations for the new multi-story college campus building composed of classrooms, workshops, storage and plantrooms.
- Shallow foundations for very lightly loaded structures.
- Earthworks (cut/fill) for site levelling, car park construction, and soft and hard landscaping.
- New pavement and drainage.

7.2 ASSESSMENT OF GEOTECHNICAL RISKS

The geotechnical risk register is presented as **Appendix D**. The main geotechnical risks indicated by the ground investigation are detailed in the geotechnical risk register and comprise:

- Man made obstructions within the Made Ground and natural obstructions within the glacial strata;
- Localised soft/compressible ground within the Made Ground at shallow depth;
- Variable strata recorded within the Glaciofluvial deposits, with the recorded soil type ranging between granular and cohesive soils;
- Groundwater should be anticipated for any excavations or pile boring within natural soils. Shallow localised perched waters within the Made Ground should also be anticipated;
- Existing Structures and Earthworks (Grade II listed building and Terrace building in the North);
- Buried Utilities.

Note also that the site is affected by a Medium Risk from Unexploded Ordnance (UXO) and mitigation for this will be required during any future groundworks.

7.3 GEOTECHNICAL PARAMETERS

The geotechnical parameters considered appropriate for the soils and rocks recorded on site are contained within **Table 7-1**. These values are suggested global parameters and localised values should be considered during the design stage.

Table 7-1 – Preliminary Soil / Rock Derived Geotechnical Parameters

Stratum	γ' (kN/m³)	ϕ (°)	c' (kPa)	c_u / UCS for mudstone (kPa)	m_v (MN/m²)	Eu/E' [2] (MPa)
Made Ground[1]	18	-	-	-	-	-
Glacial Till	19	28	0	60 at stratum top to 5m bgl 180 at base of stratum at 20m bgl, 120 average	0.030	10 at top 30 at base at 20m bgl
Glaciofluvial Deposits (Cohesive)	19	28	0	125	0.050	20
Glaciofluvial Deposits (Granular)	20	34		-	-	40
Glaciofluvial Gravel Deposits	21	38	0	-	-	50
Pennine Middle Coal Measures (Mudstone)	24	32	5	1000 (1MPa)	-	30

[1] Due to its variable composition, global parameters for the Made Ground have not been derived. Localised Made Ground parameters for specified site areas should be derived at detailed design stage where appropriate.

[2] Undrained Young's Modulus (Eu) adopted for cohesive strata. Drained Young's Modulus (Eu) adopted for granular strata.

7.4 FOUNDATIONS

The recorded ground conditions typically comprise up to 3.0m of granular and cohesive Made Ground, overlying a circa 17m thick layer of firm to stiff Glacial Till. The Glacial Till is underlain from 20m bgl by Glaciofluvial Deposits predominantly comprising silty sand with localised interbedded sandy gravelly clay. Glaciofluvial Deposits of sandy gravel underlies this, over very weak or weak mudstone bedrock recorded from circa 34m depth and 37m depth respectively.

Shallow foundations within the Made Ground or underlying Glacial Till may be suitable for very lightly loaded structures not sensitive to differential settlement, such as ancillary structures if proposed (bin stores, shelters, canopies, signage, substations etc). A provisional safe bearing capacity in the order of 75kN/m^2 for the Made Ground and 125 kN/m^2 for the Glacial Till is considered appropriate for these situations. These foundations will require site specific geotechnical considerations at detailed design stage in order to assess their suitability. Excavation and replacement with well compacted granular fill may be required at foundation formation level if the Made Ground is found to be locally weak, compressible or highly variable in composition.

The foundations for the new multi-story building are anticipated to be subjected to high loads. Piled foundations are therefore recommended to provide adequate bearing capacity and to limit differential settlement between the structural columns. Detailed design of piles will be the

responsibility of the selected piling contractor, who will have their own methods for determining carrying capacity and resistance to lateral or shear loads. It is recommended that early discussions are progressed with an experienced piling contractor to develop suitable pile installation methods, depths, diameters and capacities as part of detailed design development.

Table 7-2 provides preliminary single pile axial capacities for different diameters and lengths. These capacities assume Continuous Flight Augur (CFA) piles with partial factors applied in accordance with Eurocode 7 Design Approach 1, Combinations 1 and 2.

These piles are provisionally recommended to end bear within the Glacial Till due to the anticipated high pile capacity achieved within 18m of existing ground level. Variable strata are recorded within the Glaciofluvial deposits below, with the soil type ranging between granular and cohesive materials. This variability should be accounted for in the design of any piles if scheduled to end bear within the Glaciofluvial stratum at detailed design stage.

Table 7-2 – Outline Bored Single Pile Axial Capacities for Preliminary Design

Pile Length	Unfactored Capacity (kN)	EC7 DA1 C1 Factored Capacity (kN)	EC7 DA1 C2 Factored Capacity (kN)
450mm Diameter Pile			
12m (end bearing within Glacial Till)	770	550	320
15m (end bearing within Glacial Till)	980	700	420
18m (end bearing within Glacial Till)	1190	850	510
600m Diameter Pile			
12m (end bearing within Glacial Till)	1110	800	460
15m (end bearing within Glacial Till)	1420	1010	590
18m (end bearing within Glacial Till)	1700	1210	720

All formations for shallow foundations and/or pile caps should be inspected by a geotechnical engineer following proof rolling, and local excavation and replacement of identified ‘soft spots’ should be undertaken prior to construction.

7.1 FLOOR SLABS

A ground bearing floor slab may be suitable depending on the final floor slab level and the conditions of the Made Ground below the slab. In the north of the site, recently excavated and backfilled basements are recorded and there is no record of systematic compaction of the recently placed backfill, which presents a risk of differential settlement. In this area a suspended floor slab is recommended.

In the centre and south of the site where any Made Ground has been in place for several decades the risk of differential settlement is low and consideration could be given to use of ground bearing floors for light commercial floor loads. Any pre-existing Made Ground should be well proof rolled with a vibrating smooth wheeled roller and any soft spots (defined as undrained shear strength <50 kPa) removed and replaced with compacted granular fill to a depth of 500mm.

Where ground levels are proposed to be raised below ground bearing floor slabs, this should not exceed 1.5m and any materials placed below the floor slab should be well compacted well graded granular engineered fill. If greater thickness of fill is required, floors should be suspended.

Localised slag gravel was recorded at shallow depth in BH103 within the Made Ground below the northern site area. Any Made Ground containing significant proportion (>25%) of slag should not be placed below the floor slab, as these materials may have potential to cause heave if disturbed.

7.2 EARTHWORKS

It is anticipated that some minor earthworks (cut/fill) will be required for site levelling, car park construction and landscaping.

The Made Ground is indicated to predominantly comprise granular materials of variable composition. The existing coarse granular materials on site may be suitable for re-use as subbase below new paving, subject to careful segregation during excavation and confirmatory acceptability testing. Any Made Ground material with variable grading and/or a higher fines content will likely only be suitable for re-use as bulk fill and/or landscape fill depending on their recorded contamination levels.

Localised slag gravel was recorded at shallow depth in BH103 within the Made Ground below the northern site area. Disturbance such as excavation and re-compaction of any Made Ground containing significant proportion (>25%) of slag should be avoided where possible, as these materials may have potential to cause heave if disturbed.

The Glacial Till may be suitable for re-use as engineered fill if the moisture contents are carefully managed during excavation, stockpiling, and material placement. It will likely also be suitable bulk fill below new hard landscaped paving, and/or landscape fill for site levelling, depending on its recorded contamination levels.

7.3 EXCAVATIONS

Excavations are anticipated to be within shallow Made Ground and potentially the underlying Glacial Till. The excavation works have potential to encounter contaminated materials, in ground obstructions, buried utilities, and shallow groundwater.

The stability of any Made Ground should not be relied upon in unsupported excavations. Zones loosened by the removal of in-ground obstructions or backfill to basements may be particularly unpredictable and prone to collapse.

Groundwater within the Glacial Till, and any localised perched waters within the Made Ground, will significantly decrease stability if encountered during excavation works. Fluctuations in groundwater levels should also be anticipated. Safe working conditions shall be ensured where persons are required to work in any excavations. This can be achieved by battering excavations back to a safe angle, trench support/shoring, and pumping from sumps to manage groundwater ingress.

Excavation works below the groundwater level should be avoided where possible, and only be undertaken using extensive shoring and pumping measures as required.

Further reference should be made to *CIRIA Report 97: Trenching Practice*, and the advice of a specialist temporary works designer should be sought.

7.4 PAVEMENTS

Based on the current and expected ground levels, Made Ground is anticipated to form the majority of the subgrade throughout the site.

During construction, the exposed subgrade should be proof rolled, inspected by an engineer, and any unsuitable soils ('soft spots') removed and replaced with well-compacted granular fill. If encountered, any existing foundations / obstructions should be 'grubbed out' to a minimum depth of 500mm below the underside of the formation to prevent hard spots from forming. Following proof-rolling and the appropriate treatment of any soft spots, confirmatory in-situ CBR tests should be undertaken to confirm design values and inform pavement design.

It should be noted that the Made Ground is recorded to be variable in composition. Provisional CBR values of 3% should be anticipated within the granular Made Ground and 1% for any cohesive Made Ground, and localised dig-out and fill replacement of soft spots may be required in any areas where low CBR values are identified by subsequent observation or on-site testing.

A design CBR of 3.0% is suitable for any subgrade formations within the underlying Glacial Till if exposed at formation.

In-situ slag containing materials may be left in-situ below the pavement construction if disturbance (excavation / compaction) is kept to a minimum.

It is anticipated that soils may soften and/or weather on exposure. The Contractor should undertake all necessary steps to protect the formation, which may include, but not be restricted to, one or more of the following:

- Shaping the formation to falls to prevent surface water ponding;
- Avoid the traffic of the formation;
- Placing subbase as soon as practicable; and,
- Leaving the formation slightly high until capping and/or subbase is ready to be placed and trimming immediately in advance of stone placement.

7.5 DRAINAGE

It is understood that new drainage services are proposed below the new pavement areas. It is anticipated that this will comprise piped drainage with outfall chambers. The existing Made Ground is likely to be unsuitable for direct infiltration drainage, and the underlying natural stratum (Glacial Till) will also have a low degree of permeability.

7.6 CHEMICAL ATTACK ON BURIED CONCRETE

The ground investigation included analysis of pH and water-soluble sulphate, allowing for the classification of buried concrete. Assuming the site to be brownfield with mobile groundwater, a design Sulphate Class of **DS-2** and an ACEC Class of **AC-2** should be considered locally for areas of Made Ground and design Sulphate Class of **DS-1** and an ACEC Class of **AC-1** for natural ground

for buried concrete in accordance with Building Research Establishment (BRE) Special Digest 1, *Concrete in aggressive ground*, 3rd edition, 2005.

7.7 SHALLOW COAL MINING

The investigation recorded a very thin (5cm) coal seam at just below rock head in BH101 at 38.1 – 38.15m bgl. This is considered to represent the High Main coal seam, reported by the coal authority to be of unworkable thickness in this area. No other coal seams or evidence of unrecorded coal workings was recorded and on this basis the site is not considered to be at risk from instability related to shallow mine workings.

8 CONTAMINATION GENERIC QUANTITATIVE RISK ASSESSMENT

8.1 HUMAN HEALTH

Following the tiered approach, which is described in Land Contamination Risk Management (LCRM, July 2023), this section provides a Generic Quantitative Risk Assessment (GQRA) of the plausible contamination source-pathway-receptor linkages identified in the initial CSM.

Legislation and guidance on the assessment of potentially contaminated sites acknowledges the need for a proportionate and consequently tiered risk-based approach. A GQRA has been undertaken by comparing site contaminant levels against Generic Assessment Criteria (GAC) and including a qualitative assessment of risk using the source-pathway-receptor model. Tier 1 GAC have been calculated by WSP using the EA Contaminated Land Exposure Assessment (CLEA) Workbook v1.071 to assess potential health risks associated with contaminants in soil. Further details on the assumptions and methodologies adopted by WSP in the derivation of GAC are provided in **Appendix E**.

There are no specific GAC for the proposed development type (a college campus with public open space areas). The soil chemical data has therefore been assessed against assessment criteria protective of a commercial land use, which is considered to be a proportionate approach.

GAC for hydrocarbon compounds are typically sensitive to the degree of soil organic matter (SOM). Assessment criteria based on an assumed SOM content of 1.0% have been used.

To assess potential cumulative toxicological effects on human health from petroleum hydrocarbons hazard quotients (HQ) have been calculated for each TPH fraction by dividing the recorded concentration by the respective GAC. The HQs were then summed to give a hazard index (HI). A threshold HI of 1 has been used to screen the results.

The GQRA screening results are included in **Appendix F**.

8.1.1 SCREENING RESULTS

A total of 27 samples of Made Ground and nine samples of natural soils were analysed and the results screened against the adopted GAC.

Exceedances of the GAC were recorded in one sample of Made Ground only; BH103 at 2.10m bgl, where a total PCB concentration (Congeners ICES 7) of 23mg/kg was recorded, exceeding the GAC for total PCB of 9.5mg/kg. Total PCB concentrations in the remaining samples ranged between <0.007mg/kg and 0.065mg/kg.

A total of 29 samples were screened for the presence of asbestos. Asbestos was identified in two samples of Made Ground in BH108 (0.50m bgl) and TP301 (2.00m bgl). In BH108, chrysotile asbestos fibres were recorded in a sample of cohesive Made Ground from 0.50m bgl. The asbestos content in the sample was quantified at 0.002%. In TP301, an asbestos cement fragment containing chrysotile and crocidolite was recorded in the eastern face of the trial pit at 2.00m bgl. No asbestos was recorded in a sample from 0.50m bgl taken from the overlying Made Ground in TP301.

8.1.2 SUMMARY

A single exceedance of the GAC for total PCBs was recorded in one sample of Made Ground (BH103 at 2.10m bgl). PCBs are a relatively immobile contaminant. The main pathway of exposure to human health receptors is therefore direct exposure to contaminated soils via ingestion or inhalation. The exceedance was recorded at depth in BH103 and is indicated to be isolated to this location. A plausible exposure pathway to human health receptors in the proposed development is therefore not considered to be present.

Asbestos was recorded as fibres in shallow Made Ground in BH108, and as ACM at depth in TP301. Asbestos fibres bound in soil or ACM are relatively immobile. The main pathway of exposure to human health receptors is direct exposure to respirable airborne fibres through inhalation or ingestion. The location of TP108 is proposed to be overlain by the building footprint of the main campus. The location of TP301 is proposed for public open space landscaping comprising a grassed area and tree planting.

It should be noted that asbestos contamination may not conform to a normal spatial distribution as compared to other contaminants where concentrations generally diminish with distance from a central source area. The presence of asbestos fibres or ACM within soils in other areas on the site can therefore not be discounted. There is no quantifiable safe exposure limit for asbestos.

8.2 CONTROLLED WATERS

A Generic Controlled Waters Risk Assessment has been undertaken by comparing directly measured chemical concentrations in soil leachate and groundwater with published Water Quality Standards (WQS) which are protective of surface water or groundwater resources. This provides an initial conservative assessment of potential risks from contamination to groundwater and surface waters and assumes there is a viable migration pathway.

The generic controlled waters risk assessment has been undertaken in accordance with the principles of the Environment Agency publication ‘Remedial Targets Methodology: Hydrogeological Risk Assessment for Land Contamination’ 2006 (EA 2006) and the ‘Prevent and Limit’ approach of the Water Framework Directive (2000/60/EC). Generic controlled waters risk assessments compare directly measured concentrations with standard assessment criteria. In this case the following assessments were undertaken:

- Level 2 - evaluates the concentrations of chemicals within the saturated zone immediately underlying a source area i.e. taking dilution and attenuation into account, in this case groundwater analysis.

Appropriate Water Quality Standards (WQS) have been selected based on both a hierarchy of relevance to England and Wales and the nature of the controlled waters receptor. For this site, the controlled water receptors identified in the CSM are:

- Surface watercourses (River Tyne) ca. 210m to the west of the site.
- Secondary Undifferentiated aquifer (Glacial Till).
- Unproductive Aquifer (Glaciolacustrine Deposits).
- Secondary A aquifer (Pennine Middle Coal Measures).

The following hierarchies of WQS were therefore considered as appropriate:

Surface Watercourses

- Environmental Quality Standards (EQS) from The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
- CL:AIRE Petroleum in Groundwater Guidance 2017
- R&D Technical Report P2-115/TR4 2002.

Aquifers

- UK Drinking Water Quality Standards (DWS) from The Water Supply (Water Quality) Regulations 2000 (amended 2004)
- World Health organisation Drinking Water Guidelines 2017
- World Health Organisation Petroleum Products in Drinking Water (2008)

The laboratory analysis results are included within the AEG Factual Reports in **Appendix C**.

8.2.1 SCREENING RESULTS

A total of five samples of soil leachate from Made Ground and seven samples of groundwater were analysed and the results screened against the adopted WQS for surface watercourses and groundwater.

8.2.1.1 Surface Waters

Exceedances of the WQS for surface waters were recorded in all samples of Made Ground leachate and all groundwater samples. Not all substances showed exceedances in all samples. The screening results are included in **Appendix F**.

Exceeding concentrations in Made Ground leachate were recorded for pH (three samples), chromium (one sample), copper (five samples), lead (one sample), zinc (two samples), and PAH (anthracene, fluoranthene and naphthalene; all in one sample from TP302). Exceedances were generally below one order of magnitude. A maximum factor of exceedance of 32 was recorded for fluoranthene in one sample (TP302).

Exceeding concentrations in groundwater were recorded for pH (one sample), cyanide (two samples), copper (six samples), nickel (three samples), zinc (one samples) and phenol (one sample). Exceedances were generally below one order of magnitude. A maximum factor of exceedance of 45 was recorded for cyanide in one sample (BH203).

8.2.1.2 Groundwater

Exceedances of the WQS for groundwater were variously recorded in four samples of Made Ground leachate and all groundwater samples. The screening results are included in **Appendix F**.

Exceeding concentrations in Made Ground leachate were recorded for pH and sulphate. Exceedances were below one order of magnitude. A maximum factor of exceedance of 1.6 was recorded for sulphate in one sample (TP303).

Exceeding concentrations in groundwater were recorded for pH (one sample), sulphate (all seven samples) and arsenic (one sample), nickel (one sample) and selenium (three samples). Exceedances were below one order of magnitude. A maximum factor of exceedance of 7.5 was recorded for sulphate in one sample (BH207).

8.2.2 SUMMARY

A number of analytes in soil leachate and groundwater have been recorded at concentrations above the WQS for controlled waters. However, the exceedances are generally below one order of magnitude.

The exceeding pH values may be as a result of frequent concrete fragment inclusion in the Made Ground. Elevated sulphate concentrations have been recorded in groundwater which may be as a result of impact to groundwater from the off-site gasworks to the south of the site.

Elevated concentrations of PAH have been recorded in Made Ground leachate from TP302 at 0.50m bgl. In samples of Made Ground from 0.20m bgl and 1.00m in TP302, total TPH concentrations of 2,700mg/kg and 1,240mg/kg were recorded. No exceeding PAH concentrations were recorded in the leachate sample from 1.00m bgl in TP302. Leachate testing was not undertaken on the sample from 0.20m bgl. TP302 was located in an area of previous development, and the elevated PAH concentrations in the soil leachate may be as a result of residual TPH impact or the clinker inclusions in the Made Ground.

The recorded elevated metal concentrations in soil leachate and groundwater are marginal and may be as a results of historical land uses on and surrounding the site.

The identified contaminants of potential concern are not highly mobile and the likelihood of unacceptable impact to water quality is considered to be low. There are no licensed surface water or groundwater abstractions recorded on or within 2km of the site, and no source protection zones within 500m of the site.

A piled foundation solution is recommended for the proposed building, with piles likely to bear within the Glacial Till. The construction of piles may create a preferential pathway for mobile/ leachable contaminants into the Glacial Till and the underlying bedrock. However, in the absence of evidence for gross mobile or leachable contamination piling is not considered to present a risk to the underlying aquifers.

9 GROUND GAS RISK ASSESSMENT

9.1 INDRODUCTION

An assessment of risks from hazardous ground gases has been undertaken in accordance with CIRIA guidance C665 ‘Assessing Risks Posed by Hazardous Ground Gases to Buildings’ and BS8485:2015+A1:2019 ‘Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings’.

9.2 GROUND GAS CONCEPTUAL SITE MODEL

Plausible sources of hazardous ground gases and vapours include:

- Made Ground deposits present across the site associated with historical developments.
- Off-site Made Ground deposits associated with a former gasworks, colliery (70m and 120m south respectively) and historical brick fields (150m south-east).
- Historical mine workings recorded 120m bgl beneath the site (last worked in 1916).

During the ground investigation a thin coal seam of 0.05m thickness was encountered below rockhead at 38.10m bgl in BH101. The seam is considered to be the High Main coal seam. The High Main seam is not recorded by the Coal Authority to be worked in the area and noted to be of an unworkable thickness. No evidence of voids or broken ground was noted during the drilling. The shallowest historical coal mine workings beneath the site are recorded by the Coal Authority at ca. 120m bgl. The High Main coal seam or the recorded workings at depth beneath the site are therefore not considered to be a plausible source of hazardous ground/ mine gases.

The principal migration pathways for ground gases and vapours are considered to be unsaturated pore spaces within granular Made Ground and granular superficial deposits, foundations and utility corridors that could act as preferential pathways, and subsequent ingress and accumulation in enclosed spaces.

Receptors at risk from hazardous ground gases or vapours include:

- Future site users.
- Construction and maintenance workers (confined spaces and trenches).
- Confined spaces within future buildings and infrastructure (potentially oxygen depleted or explosive atmospheres).

9.3 GAS MONITORING RESULTS

Monitoring wells were installed in nine boreholes during the ground investigation. The response zones were installed in Made Ground in four boreholes (BH201A, BH202, BH204 and BH207), in Glacial Till in four boreholes (BH101, BH104, BH108 and BH203) and in bedrock in one borehole (BH102).

Hazardous ground gases were monitored on six occasions between 22 November 2023 and 30 January 2024.

The atmospheric pressure recorded during each visit ranged between 1003mbar and 1039mbar. Reginal atmospheric pressure data obtained from the nearest weather station (Newcastle)[1] indicates falling atmospheric pressure trends preceding monitoring rounds 3 and 4, and rising pressure trends preceding monitoring rounds 1, 2, 5 and 6.

Negative gas flow rates were recorded in BH101 (6 of 6 rounds), BH102 (6 of 6 rounds), BH104 (1 of 4 rounds), BH108 (6 of 6 rounds), BH203 (5 of 6 rounds) and BH207 (2 of 5 rounds). Negative flow rates ranged between -26l/hr in BH207 and -0.1 l/hr in BH102.

Positive gas flow rates variously ranged between 0.1l/hr and 0.3l/hr in the remaining boreholes.

Initial and steady-state methane concentrations were below the limit of detection of <0.1% v/v during most monitoring events, with positively-identified concentrations only recorded during round 1 in the following boreholes,:

- BH101, 0.1% v/v initial and steady-state concentrations.
- BH108, 0.2% v/v initial and steady-state concentrations.
- BH204, 0.1% v/v initial and steady-state concentrations.

Initial and steady-state carbon dioxide concentrations were recorded above the limit of detection during most monitoring events and ranged between 0.1% v/v in BH102, BH201A, BH202 to BH204 and BH207, and 4.5% v/v in BH108 (round 4).

Initial and steady-state oxygen concentrations ranged between 1.9% v/v in BH101 (round 1) and 21.4% v/v in BH201A (round 6). Depleted oxygen concentrations (below 18% v/v) were recorded during 27 of 51 monitoring events. Depleted oxygen concentrations were not recorded in BH201 or BH202, and only during one round in BH203 and BH207.

Carbon monoxide concentrations were below the limit of detection of <1.0ppm during most monitoring events. Carbon monoxide concentrations above the limit of detection ranged between 1.0ppm in BH101, BH102, BH108, BH201A, BH202 and BH203, and 16.0ppm in BH201A (round 1).

Hydrogen sulphide concentrations were not recorded above the limit of detection of <1.0ppm in any of the monitoring wells.

9.4 GROUND GAS DATA QUALITY

The response zones in BH102 and BH203 were noted to be flooded during all six monitoring rounds. All other boreholes had at least some of the response zone above groundwater level on all occasions.

Flow rates and gas concentrations recorded in monitoring wells with flooded response zones are not considered to be representative of actual ground gas conditions and have been therefore excluded from the assessment.

Approximately 76% of the ground gas monitoring data (12 out of 51 monitoring data points) is not affected by flooding. Monitoring of ground gases was undertaken following and during periods of

[1] https://www.weatheronline.co.uk/weather/maps/city?LANG=en&CEL=C&SI=mph&MAPS=over&CONT=ukuk&LAND=UK&REGION=0003&WMO=u3005&UP=0&R=0&LEVEL=150&NOREGION=1

decreasing atmospheric pressure on two occasions. The dataset is therefore considered to give a reasonably good representation of actual ground gas conditions on the site.

9.5 GAS SCREENING VALUE CALCULATION

In accordance with CIRIA C665 and BS8485:2015+A1:2019 a Gas Screening Value (GSV) has been calculated for the site based on maximum gas concentrations and flow rates recorded during monitoring events not affected by flooding.

A worst-case GSV for methane has been calculated by multiplying the maximum recorded initial flow rate (0.3l/hr in BH104 and BH201A) with the maximum recorded initial methane concentration (0.2% v/v in BH108 during round 1). Using initial flow rates and concentrations for methane is considered appropriate given that methane presents an acute risk via explosion. The calculated GSV of 0.0006l/hr is below the threshold of 0.07l/hr for a Characteristic Situation (CS) classification of CS2.

A worst-case GSV for carbon dioxide has been calculated by multiplying the maximum recorded initial flow rate (0.3l/hr in BH104 and BH201A) with the maximum recorded steady concentration (4.5% v/v in BH108 during round 4). Using steady-state flow rates and concentrations for carbon dioxide is considered appropriate given that carbon dioxide presents a chronic risk to human health through long-term exposure. The calculated GSV of 0.0135l/hr is below the threshold of 0.07l/hr for a Characteristic Situation (CS) classification of CS2.

9.6 SUMMARY

The Made Ground encountered on the site is unlikely to be a plausible source of sustained gas generation given its composition and organic matter content. Migration of mine gases from coal mine workings at depth beneath the site is considered to be unlikely. Worst-case GSVs calculated for the site are below the threshold for a CS2 ground gas classification. The recorded concentrations for methane and carbon dioxide did not exceed <1% v/v (methane) and <5% v/v (carbon dioxide).

Negative flow rates have been recorded in several monitoring wells. Negative flows can be caused by decreases in the water levels within the wells. In addition, the presence of low permeability soils above the top of the well response zone can result in a ‘trapped system’ with the ground gas pressure acting, to a greater or lesser extent, independently to changes in atmospheric pressure.

Rapid increases in water levels and / or changes in other mechanisms that could reverse the negative flow rates within the wells in the future may result in gas screening values indicative of a higher ground gas classification (e.g. CS2). However, at this stage, the identified plausible ground gas sources and the recorded gas concentrations are not indicative of sustained ground gas emission.

The ground gas regime is therefore considered to represent a ground gas classification of CS1 (very low risk).

The Indicative Atlas of Radon in England and Wales (UK Health Security Agency 2022) and the Groundsure report obtained for the site indicate the site to be located in an area in which less than 1% of dwellings are above the action level for radon gas. Radon gas protection measures are therefore not required for new dwellings. Note that should the proposed development include basements, reference should be made to Public Health England PHE-CRCE-028 ‘Radon in Workplace Basements’ document which recommends routine radon monitoring.

10 UPDATED CONCEPTUAL SITE MODEL

10.1 PLAUSIBLE CONTAMINATION SOURCES

Based on the findings of the ground investigation, the human health GQRA and the gas risk assessment, the initial CSM has been updated.

The following plausible sources of contamination have been identified:

- Asbestos fibres in shallow Made Ground in BH108, and ACM fragment in deep Made Ground in TP301; the results may indicate the presence of asbestos in Made Ground in other areas of the site.
- pH, metals, PAH and sulphate in Made Ground at concentrations in exceedance of WQS for controlled waters.
- pH, cyanide, metals, phenol, and sulphate in groundwater at concentrations in exceedance of WQS for controlled waters.

10.2 POTENTIAL EXPOSURE PATHWAYS

Relevant exposure pathways between the identified plausible contamination sources and potential receptors are:

- Direct contact, ingestion, or inhalation of soil-bound contaminants.
- Inhalation of dust-bound or airborne contaminants or fibres.
- Migration of leachable or mobile contaminants through soil and groundwater.

10.3 POTENTIAL RECEPTORS

Potential sensitive receptors are:

HUMAN HEALTH

- Construction workers during redevelopment
- Adjacent land/ land users during redevelopment
- Future site users (i.e. staff, students, visitors and maintenance workers).

CONTROLLED WATERS

- Surface watercourses (River Tyne)
- Secondary Undifferentiated aquifer (Glacial Till)
- Unproductive Aquifer (Glaciolacustrine Deposits)
- Secondary A aquifer (Pennine Middle Coal Measures).

10.4 PLAUSIBLE CONTAMINANT LINKAGES

The plausible source-pathway-receptor contaminant linkages are summarised in **Table 10-1**.

Table 10-1 - Source-Pathway-Receptor Linkages (Updated CSM)

Plausible Source	Plausible Pathway	Plausible Receptor	Likelihood of Complete Linkage	Severity	Risk	Comment
Contaminants of concern in Made Ground (asbestos)	Inhalation of dust-bound or airborne fibres	Construction workers	Likely	Medium	Moderate	Construction workers, particularly ground workers, are likely to become exposed to airborne asbestos fibres where present in Made Ground. Management of risks from asbestos in soils during construction will be required.
		Future site users	Low	Medium	Moderate/ low	Future site users may become exposed to airborne asbestos fibres where Made Ground remains uncapped at or close to the surface. Remedial measures will be required.
		Adjacent site users	Low	Medium	Moderate/ low	Given the extent of asbestos contamination in Made Ground recorded to date, the likelihood of the proposed works to impact adjacent site users is low.
Contaminants of concern in Made Ground (elevated pH, metals, PAH, sulphate) Contaminants of concern in groundwater (elevated pH, metals, phenol, sulphate)	Migration of leachable or mobile contaminants through soil and groundwater Migration along piled foundations	Surface watercourses (River Tyne)	Unlikely	Medium	Low	Migration of mobile/ leachable contaminants in soils and groundwater towards controlled waters resulting in unacceptable impact to water quality is considered unlikely. In the absence of evidence for gross mobile or leachable contamination piling is not considered to present a risk to the underlying aquifers.
		Secondary Undifferentiated aquifer (Glacial Till)	Unlikely	Medium	Low	
		Secondary A aquifer (Pennine Middle Coal Measures)	Unlikely	Medium	Low	

11 SUMMARY AND CONCLUSIONS

11.1 GROUND CONDITIONS

The site is underlain by Made Ground of thickness between 1.3m and 4.3m, in turn underlain by a layer of Glacial Till, ranging between 9.7 and 17.3m thick, which is in turn underlain by Glaciofluvial Deposits comprising silty sand, sandy clay or gravel. Rockhead was encountered as mudstone / sandstone at a characteristic depth of 38.0m bgl.

11.2 GEOTECHNICAL CONSIDERATIONS

Based on the recorded ground conditions and the nature of the proposed development, the following geotechnical conclusions can be made:

- Shallow foundations within the Made Ground may be suitable for very lightly loaded structures not sensitive to differential settlement. A provisional safe bearing capacity of 75kN/m^2 is considered appropriate for these structures.
- CFA pile foundations end-bearing within the Glacial Till or Glaciofluvial Deposits are considered suitable for highly loaded structures. The length and diameter of piles are to be determined in the detailed design phase, considering the expected structural column loads.
- A ground bearing floor slab may be suitable depending on the final floor slab level for the central and south parts of the site. A suspended floor slab will be required where the floor slab level is proposed to bear within the recently placed Made Ground / basement backfill in the north.
- It is anticipated that some minor earthworks (cut/fill) will be required for site levelling, and for the construction of new paving. The Made Ground is anticipated to form the majority of the site subgrade below the pavement formation.
- For pavement construction, any unsuitable soils ('soft spots') at formation should be locally dug-out and replaced with well compacted granular fill. Localised soft spots (CBR<2.5%) are anticipated within the Made Ground due to its variability.
- Any in-ground obstructions comprising boulders / services within the Made Ground will need to be removed if encountered at foundation or pavement formation. This will require localised dig-out and replacement with well compacted granular fill.
- The stability of soils should not be relied upon in open excavations and appropriate temporary works will be required.

11.3 CONTAMINATION

11.3.1 RISK TO HUMAN HEALTH

Asbestos has been recorded as fibres in shallow Made Ground, and as ACM in deeper Made Ground. Asbestos fibres bound in soil or ACM are relatively immobile. Asbestos may be more widely distributed in Made Ground on the site.

Construction workers, particularly ground workers, may become exposed to airborne asbestos fibres where present in Made Ground; the risk of exposure has been assessed as moderate. Future site users may become exposed to airborne asbestos fibres where Made Ground remains uncapped at or close to the surface.

Management of risks from asbestos in soils during construction and related activities will therefore be required.

11.3.2 RISKS TO CONTROLLED WATERS

Contaminants of concern in exceedance of WQS for controlled waters have been identified in Made Ground leachate and groundwater on the site. The contaminants are not highly mobile and no evidence of gross mobile/ leachable contamination has been encountered. The likelihood of contaminant migration towards underlying site aquifers and off-site surface watercourse resulting in unacceptable impact to water quality is considered to be low.

11.3.3 GROUND GAS RISKS

The Made Ground encountered on the site is unlikely to be a plausible source of sustained gas generation given its composition and organic matter content. Migration of mine gases from coal mine workings at depth beneath the site is considered to be unlikely. Worst-case GSVs calculated for the site are below the threshold for a CS2 ground gas classification. The recorded concentrations for methane and carbon dioxide did not exceed <1% v/v (methane) and <5% v/v (carbon dioxide).

The ground gas risk assessment suggests a ground gas classification of CS1 (very low risk) for the site. Gas protection measures are not considered to be required. Radon protection measures are not required. For any proposed basements as part of the development reference should be made to Public Health England PHE-CRCE-028 ‘Radon in Workplace Basements’ document to identify requirements for radon monitoring.

12 RECOMMENDATIONS

12.1 GEOTECHNICAL

The geotechnical risk register in **Appendix D** considers the geotechnical risks that pose potential constraints to the proposed development. This risk register recommends mitigation measures where necessary and has been developed to include the findings of the ground investigation. It presents hazards recognised to potentially impact upon the proposed development.

A Geotechnical Design Report (GDR) and Earthworks Specification will be required for the scheme's detailed design and construction.

12.2 REMEDIATION

Based on the findings of ground investigation and risk assessments the following outline remedial measures are considered to be required to break the identified source-pathway-receptor linkages.

To mitigate the risk from exposure of future site users to asbestos in Made Ground provision of a clean cover soil system in soft landscaped areas will be required. A minimum cover thickness of 0.6m comprising chemically and texturally suitable soils is recommended. The requirements for and detailed design of a clean cover soil system, including its thickness, will require agreement from the Local Authority. A *Remediation Strategy* will be required to detail the requirements for the clean cover soil system and its verification.

In addition, an *Asbestos Management Plan* compliant with the Control of Asbestos Regulations 2012 (CAR-SOIL^{TM}) should be prepared for the site to ensure risks posed to construction workers from exposure to asbestos in Made Ground are adequately managed.

It is recommended that during earthworks a watching brief is carried out for the presence of asbestos, particularly in the area surrounding TP301 in which ACM fragments were encountered.

All construction works should be undertaken in accordance with appropriate risk assessment and method statements (RAMS), as well as suitable working practices, hygiene arrangements etc. Potential impacts to off-site receptors (i.e. through dust generation etc.) should also be suitably mitigated,

A *water supply pipe risk assessment* should be carried out to assess the requirement for upgraded potable water pipework.

12.3 MATERIAL MANAGEMENT CONSIDERATIONS

Where placement of soil (fill) is required to enable construction of the proposed development consideration should be given to re-using excavated soils to minimise the requirement for imported material and off-site disposal of surplus material.

Sampling and testing of all soils proposed for re-use on the site should be undertaken either prior to excavation or following excavation and stockpiling, to confirm their chemical suitability for re-use. The testing should consider the volume of the soils proposed for re-use, and any potentially vulnerable receptors at the re-use destination on site.

It is recommended that the re-use of excavated soils on the site is documented by a Materials Management Plan (MMP) in accordance with the CL:AIRE Definition of Waste Code of Practice

(DoWCoP). Contaminated soils and Made Ground can only be re-used on the site where they are suitable for use. Where soils are re-used under an MMP, a Verification Plan and subsequent Verification Report will be required.

All excavated Made Ground should be assumed to potentially contain asbestos (unless proven otherwise by laboratory analysis) and appropriate measures should be taken to mitigate the risk of exposure to asbestos during excavation, transport, placement and end use.

Surplus soils (e.g., from excavations) proposed for off-site disposal as a waste will require classification in accordance with the Environment Agency document 'Technical Guidance WM3: Waste Classification - Guidance on the Classification and Assessment of Waste' (1 April 2014). Waste classification testing of the materials intended for off-site disposal will be required.

Any imported materials to be used in cover systems will require demonstration of their chemical suitability with respect to the identified sensitive receptors. Verification sampling and testing of imported materials to demonstrate chemical suitability should be undertaken at source and in accordance with specifications detailed in a remediation strategy.

12.4 FURTHER WORKS REQUIRED

Unexploded ordnance

A detailed desk based UXO risk assessment undertaken for the site in preparation for the ground investigation recommended the following measures to mitigate the risk from encountering UXO during intrusive ground works:

- Site specific explosive ordnance safety and awareness briefings (UXO toolbox briefings) to all personnel conducting intrusive works.
- Site specific safety instructions (SSSI) training course.
- Explosive ordnance disposal (EOD) engineer on-site support (watching brief).
- EOD engineer support during borehole drilling.
- Intrusive magnetometer survey of all pile locations down to the maximum bomb penetration depth.

A separate UXO risk assessment for intrusive construction and earthworks, including all excavations and piling works, and mitigation measures will also be required.

Ground contamination

A ***Remediation Strategy*** will be required to detail the requirements for the clean cover soil system and its verification.

In addition, an ***Asbestos Management Plan*** compliant with the Control of Asbestos Regulations 2012 (CAR-SOIL^{TM}) should be prepared for the site to ensure risks posed to construction workers from exposure to asbestos in Made Ground are adequately managed.

The risk to controlled waters from the identified contaminants of concern in Made Ground leachate and groundwater on the site has been assessed as low. Piled foundations bearing in the Glacial Till or Glaciofluvial Deposits are considered suitable for lightly loaded structures at the site. The requirement for a ***Piling Risk Assessment*** for controlled waters should be confirmed in advance with the Local Authority.

Where potable water pipes are proposed to be installed in the Made Ground a ***water supply pipe risk assessment*** may be required to assess the likelihood of organic contaminants permeating into potable water supply pipes.

Appendix A

FIGURES AND DRAWINGS

DO NOT SCALE
All dimensions to be checked on site and Architect to be notified of any discrepancies prior to commencement

DESIGNER'S RISK ASSESSMENT
Construction (Design and Management) Regulations 2015
RESIDUAL RISKS:

REF:	DESCRIPTION	DATE:

0 5 10 20 50 metres

Scale 1:1250 @ A3

N

Planning Application Boundary

REVISION	DATE	DESCRIPTION	CHECKED

idPARTNERSHIP NORTHERN

ARCHITECTURE | MASTERPLANNING | URBAN DESIGN

IDPartnership Northern, St Jude's, Barker Street, Shieldfield, Newcastle upon Tyne, NE2 1AS
T: +44 (0)191 261 4442 | W: idpartnership.com | E: info@idpartnership-northern.com

PROJECT / CLIENT
Coast College
Faith and Gould

DRAWING TITLE
Main Campus Site
Location Plan

PROJECT ARCHITECT	AW	PROJECT NO. N71:127	DRAWING REVISION P1
DRAWN BY	MM	DRAWING NO. 1101	
CHECKED	IDP		
SCALE	1:1250@A3	DRAWING STATUS PLANNING	
DATE	03/03/2023		

DO NOT SCALE

KEY

- SITE OWNERSHIP BOUNDARY
- FOOTPRINT PROPOSED BUILDING
- INDIC. GEOLOGICAL LONG SECTION
- BH — BOREHOLE (CABLE PERCUSSION w/ ROTARY FOLLOW-ON)
- BH — BOREHOLE (DYNAMIC SAMPLING)
- TP — TRIAL PIT
- FP — FOUNDATION INSPECTION PIT

DRAWING STATUS: S2 - FOR INFORMATION

wsp
Amber Court, William Armstrong Drive, Newcastle upon Tyne, NE4 7YQ, UK
T+ 44 (0) 191 226 2000, F+ 44 (0) 191 226 2104
wsp.com

CLIENT: SOUTH TYNESIDE COLLEGE

ARCHITECT:

PROJECT: SOUTH TYNESIDE COLLEGE - MAIN CAMPUS

TITLE: EXPLORATORY HOLE LOCATION PLAN

SCALE @ A2:	CHECKED:		APPROVED:
1 : 500			
PROJECT No:	DESIGNED:	DRAWN:	DATE:
70084288		TD	JAN 2024

DRAWING No: FIGURE 2 REV: P01

Project Id: 70084288 - Final Factual Report

Project Title: South Tyneside College - Main Campus

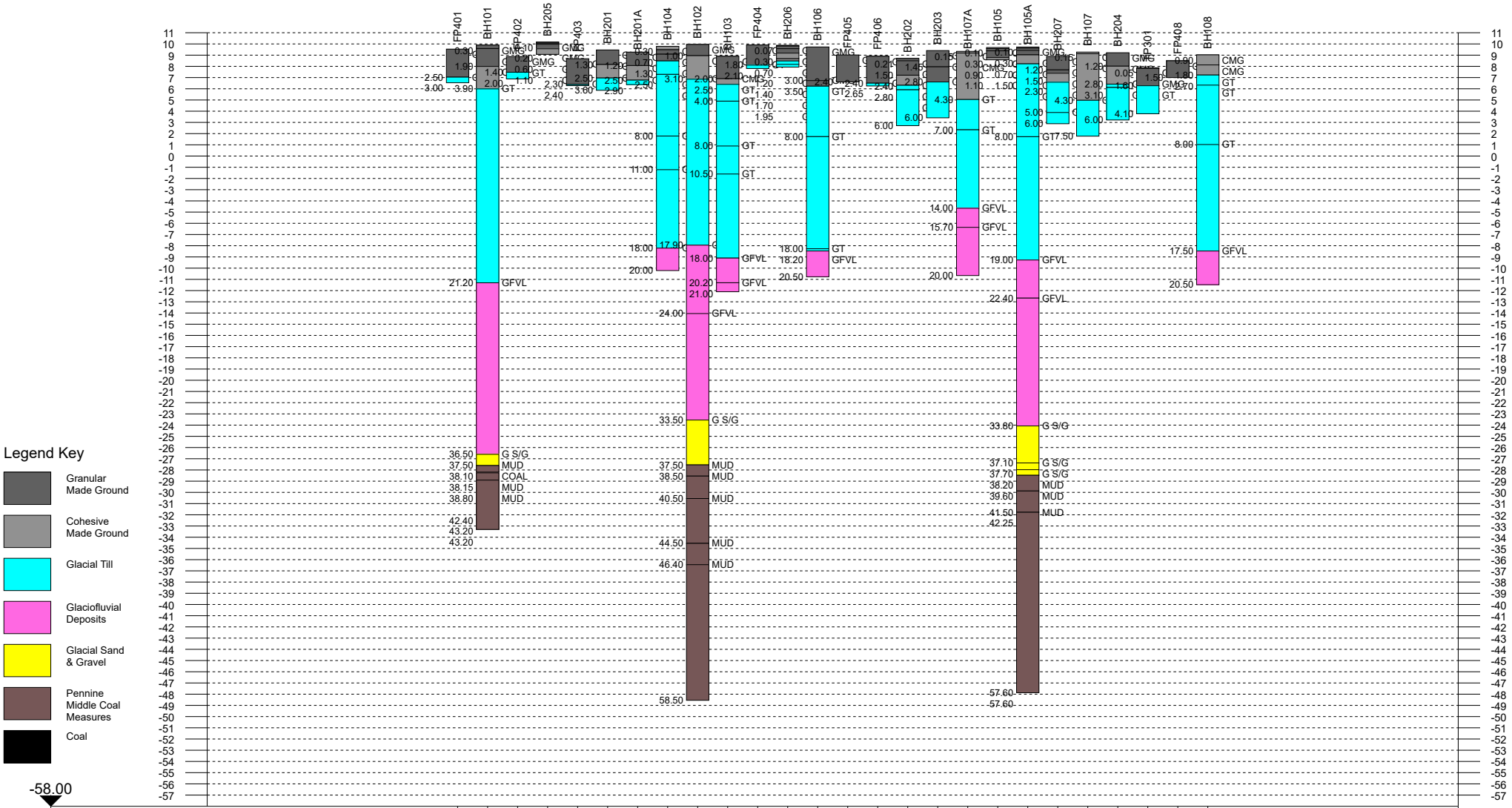
Location: South Tyneside

Title: Interpretive Geological Long Section

Vertical Scale: 1:500

Horizontal Scale: Not to scale

Engineer: Andrew Berry



Section Chainage (m)	4.78	6.05	11.36	18.81	19.77	21.39	22.49	24.39	28.12	30.10	32.90	33.58	37.34	38.63	48.35	50.25	57.03	60.77	61.67	63.15	64.16	65.35	81.11	82.26	83.29	96.21				
Elevation (mAOD)	9.54	9.89	8.87	10.17	8.68	9.46	9.27	9.79	9.95	8.90	9.91	9.88	9.73	9.02	8.90	8.71	9.41	9.34	9.68	9.73	8.89	9.27	9.22	7.87	8.50	9.03				
Offset (m)	26.16	31.56	20.80	48.96	13.35	39.13	38.17	4.64	56.40	30.07	62.57	60.59	42.89	57.74	49.56	26.45	21.94	3.55	44.89	46.72	63.36	2.85	14.60	29.70	16.67	25.61				

Appendix B

NOTES AND LIMITATIONS

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

GENERAL

1. WSP UK Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed and outlined in the body of the report.

2. Unless explicitly agreed otherwise, in writing, this report has been prepared under WSP UK Limited standard Terms and Conditions as included within our proposal to the Client.

3. Project specific appointment documents may be agreed at our discretion and a charge may be levied for both the time to review and finalise appointments documents and also for associated changes to the appointment terms. WSP UK Limited reserves the right to amend the fee should any changes to the appointment terms create an increase risk to WSP UK Limited.

4. The report needs to be considered in the light of the WSP UK Limited proposal and associated limitations of scope. The report needs to be read in full and isolated sections cannot be used without full reference to other elements of the report and any previous works referenced within the report.

PHASE 1 GEO ENVIRONMENTAL AND PRELIMINARY RISK ASSESSMENTS

Coverage: *This section covers reports with the following titles or combination of titles: phase 1; desk top study; geo environmental assessment; development appraisal; preliminary environmental risk assessment; constraints report; due diligence report; geotechnical development review; environmental statement; environmental chapter; project scope summary report (PSSR), program environmental impact report (PEIR), geotechnical development risk register; and, baseline environmental assessment.*

5. The works undertaken to prepare this report comprised a study of available and easily documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the Site and correspondence with relevant authorities and other interested parties. Due to the short timescales associated with these projects responses may not have been received from all parties. WSP UK Limited cannot be held responsible for any disclosures that are provided post production of our report and will not automatically update our report.

6. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only for the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP UK Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

7. It should be noted that any risks identified in this report are perceived risks based on the information reviewed. Actual risks can only be assessed following intrusive investigations of the site.

8. WSP UK Limited does not warrant work / data undertaken / provided by others.

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

INTRUSIVE INVESTIGATION REPORTS

Coverage: *The following report titles (or combination) may cover this category of work: geo environmental site investigation; geotechnical assessment; GIR (Ground Investigation reports); preliminary environmental and geotechnical risk assessment; and, geotechnical risk register.*

9. The investigation has been undertaken to provide information concerning either:

- **i.** The type and degree of contamination present at the site in order to allow a generic quantitative risk assessment to be undertaken; or
- **ii.** Information on the soil properties present at the site to allow for geotechnical development constraints to be considered.

10. The scope of the investigation was selected on the basis of the specific development and land use scenario proposed by the Client and may be inappropriate to another form of development or scheme. If the development layout was not known at the time of the investigation the report findings may need revisiting once the development layout is confirmed.

11. For contamination purposes, the objectives of the investigation are limited to establishing the risks associated with potential contamination sources with the potential to cause harm to human health, building materials, the environment (including adjacent land), or controlled waters.

12. For geotechnical investigations the purpose is to broadly consider potential development constraints associated with the physical property of the soils underlying the site within the context of the proposed future or continued use of the site, as stated within the report.

13. The amount of exploratory work, soil property testing and chemical testing undertaken has necessarily been restricted by various factors which may include accessibility, the presence of services; existing buildings; current site usage or short timescales. The exploratory holes completed assess only a small percentage of the area in relation to the overall size of the Site, and as such can only provide a general indication of conditions.

14. The number of sampling points and the methods of sampling and testing do not preclude the possible existence of contamination where concentrations may be significantly higher than those actually encountered or ground conditions that vary from those identified. In addition, there may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

15. The inspection, testing and monitoring records relate specifically to the investigation points and the timeframe that the works were undertaken. They will also be limited by the techniques employed. As part of this assessment, WSP UK Limited has used reasonable skill and care to extrapolate conditions between these points based upon assumptions to develop our interpretation and conclusions. The assumption made in forming our conclusions is that the ground and groundwater conditions (both chemically and physically) are the same as have been encountered during the works undertaken at the specific points of investigation. Conditions can change between investigation points and these interpretations should be considered indicative.

16. The risk assessment and opinions provided are based on currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values. Specific assumptions associated

with the WSP UK Limited risk assessment process have been outlined within the body or associated appendix of the report.

17. Additional investigations may be required in order to satisfy relevant planning conditions or to resolve any engineering and environmental issues.

18. Where soil contamination concentrations recorded as part of this investigation are used for commentary on potential waste classification of soils for disposal purposes, these should be classed as indicative only. Due consideration should be given to the variability of contaminant concentrations taken from targeted samples versus bulk excavated soils and the potential variability of contaminant concentrations between sampling locations. Where major waste disposal operations are considered, targeted waste classification investigations should be designed.

19. The results of the asbestos testing are factually reported and interpretation given as to how this relates to the previous use of the site, the types of ground encountered and site conceptualisation. This does not however constitute a formal asbestos assessment. These results should be treated cautiously and should not be relied upon to provide detailed and representative information on the delineation, type and extent of bulk ACMs and / or trace loose asbestos fibres within the soil matrix at the site.

20. If costs have been included in relation to additional site works, and / or site remediation works these must be considered as indicative only and must be confirmed by a qualified quantity surveyor.

EUROCODE 7: GEOTECHNICAL DESIGN

21. On 1st April 2010, BS EN 1997-1:2004 (Eurocode 7: Geotechnical Design – Part 1) became the mandatory baseline standard for geotechnical ground investigations.

22. In terms of geotechnical design for foundations, slopes, retaining walls and earthworks, EC7 sets guidance on design procedures including specific guidance on the numbers and spacings of boreholes for geotechnical design, there are limits to methods of ground investigation and the quality of data obtained and there are also prescriptive methods of assessing soil strengths and methods of design. Unless otherwise explicitly stated, the work has not been undertaken in accordance with EC7. A standard geotechnical interpretative report will not meet the requirements of the Geotechnical Design Report (GDR) under Eurocode 7. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. The report is likely to represent a Ground Investigation Report (GIR) under the Eurocode 7 guidance.

DETAILED QUANTITATIVE RISK ASSESSMENTS AND REMEDIAL STRATEGY REPORTS

23. These reports build upon previous report versions and associated notes. The scope of the investigation, further testing and monitoring and associated risk assessments were selected on the basis of the specific development and land use scenario proposed by the Client and may not be appropriate to another form of development or scheme layout. The risk assessment and opinions provided are based on currently available approaches in the generation of Site Specific Assessment Criteria relating to contamination concentrations and are not considered to represent a risk in a specific land use scenario to a specific receptor. No liability can be accepted for the retrospective effects of any future changes or amendments to these values, associated models or associated guidance.

REPORT LIMITATIONS - GROUND RISK AND REMEDIATION

24. The outputs of the Detailed Quantitative Risk Assessments are based upon WSP UK Limited manipulation of standard risk assessment models. These are our interpretation of the risk assessment criteria.

25. Prior to adoption on site they will need discussing and agreeing with the Regulatory Authorities prior to adoption on site. The regulatory discussion and engagement process may result in an alternative interpretation being determined and agreed. The process and timescales associated with the Regulatory Authority engagement are not within the control of WSP UK Limited. All costs and programmes presented as a result of this process should be validated by a quantity surveyor and should be presumed to be indicative.

GEOTECHNICAL DESIGN REPORT (GDR)

26. The GDR can only be prepared following confirmation of all structural loads and serviceability requirements. All the relevant information needs to be provided to allow for a GDR to be produced.

MONITORING (INCLUDING REMEDIATION MONITORING REPORTS)

27. These reports are factual in nature and comprise monitoring, normally groundwater and ground gas and data provided by contractors as part of an earthworks or remedial works.

28. The data is presented and will be compared with assessment criteria.

Appendix C

AEG FACTUAL REPORT

Appendix D

GEOTECHNICAL RISK REGISTER

GEOTECHNICAL RISK REGISTER			PROJECT: South Tyneside College				STAGE: Post GI, Detailed Design, RIBA 4-5			
No	**Hazard**	**Consequence**	Works Affected	**Before Control**			**Risk Management Measures**	**After Control**		
				Probability	**Impact**	**Total**		**Probability**	**Impact**	**Total**
GEO 01	Unknown ground conditions at the proposed work locations	Unexpected ground conditions encountered during the works may require design amendments and lead to costly delays.	Earthworks, Excavations, and Foundations	4	4	16	An intrusive ground investigation has been undertaken to inform the scheme design. The design and execution of the works shall account for the ground conditions encountered. Variable strata are recorded within the Glaciofluvial deposits, with the soil type ranging between granular and cohesive materials. This should be accounted for in the design of any piles scheduled to end bear within this stratum.	2	4	8
GEO 02	Unknown contamination within soils or groundwater	Undetected residual sources of contamination (e.g. underground storage tanks, spillages, asbestos etc) may be encountered during earthworks that could cause delays to the programme, and increased waste disposal or remediation costs.	Earthworks	4	4	16	Evidence of gross residual contamination of soils or groundwater has not been encountered during the ground investigation. A potential for encountering unrecorded contamination during construction remains. The risk shall be managed in A remediation strategy or design statement will be required to specify the measures required to treat unrecorded contamination encountered during construction.	2	4	8
GEO 03	Weak/ Soft Ground Conditions	Bearing capacity failure and excessive settlement of earthworks / foundations. Health and Safety implications for on-site personnel and increased maintenance costs. Delays and costs for design and construction of remedial works.	Earthworks, Excavations, and Foundations	3	4	15	An intrusive ground investigation has been undertaken to formulate a ground model with in-situ and laboratory tests to determine engineering properties. Made Ground has been encountered at all borehole locations, both Cohesive and Granular. Strength data for the natural deposits has been established by the investigation and a piled foundation solution is proposed. All ground investigation information should be passed onto the design team and contractor. Derived design parameters and factors of safety to be adopted for temporary and permanent works. The design and execution of the works shall take into account the ground conditions expected.	2	4	8
GEO 04	Shrinking or Swelling soils	Soils with potential for volume change, such as the Glacial Till may cause heave and subsequent damage to foundations and overlying structures.	Foundations	3	2	6	Glacial Till and Glaciofluvial Deposits were recorded in all positions as well as Cohesive Made Ground in certain locations. Shallow foundations and/or floor slabs bearing at shallow depth within the Glacial Till should consider the proximity and type of any existing or proposed trees, and foundations should be locally deepened where required to mitigate the effect of potential soil shrinkage/swelling.	3	2	6

GEOTECHNICAL RISK REGISTER			PROJECT: South Tyneside College				STAGE: Post GI, Detailed Design, RIBA 4-5			
No	**Hazard**	**Consequence**	Works Affected	**Before Control**			**Risk Management Measures**	**After Control**		
				Probability	**Impact**	**Total**		**Probability**	**Impact**	**Total**
GEO 05	Made Ground: Variability	Variable thickness and composition of Made Ground can present a risk of obstructions, compressible ground, and soft and hard spots beneath the site.	Earthworks, Excavations, and Foundations.	5	3	15	The ground investigation proved the presence of varying depths of Made Ground throughout the site. Made Ground was recorded to be of variable composition at shallow depth, recorded to be both Granular and cohesive with inclusions of gravel of brick, tile, wood and concrete. This risk should be mitigated by piling to bear within competent strata.	2	3	6
GEO 06	Shallow Mineworkings	Shallow Mine workings are not recorded to underlie the site in the CA report, although shallow coal seams are expected and unrecorded shallow workings are possible.	Foundations to structures, hard standing surfaces	2	5	10	The Ground Investigation encountered one intact coal seam of 5cm thickness at 38m bgl. It is unlikely this seam has been worked due to its very small thickness and proximity to rockhead, making it unlikely to be viable for commercial extraction. Therefore, the risk of unrecorded shallow working can be considered very low.	1	5	5
GEO 07	Obstructions	The previous developed nature of many parts of the site and the unknown scope of some demolition works indicates some in-ground obstructions associated with former foundations, basements, floors etc may remain in situ. Known or unforeseen obstructions may delay site works and require localised dig out / fill replacement, adding to construction costs.	Excavations, Foundations	5	3	15	Whilst in ground obstructions were not encountered on a wide scale during the investigation, the ground investigation records should be shared with the foundation designer and groundwork contractors. Any expected or encountered in-ground obstructions which clash with new foundations or services will need to be dug out and replaced with well compacted granular fill.	3	3	9
GEO 08	Shallow Groundwater	Shallow groundwater may be present which may require management in excavations. Groundwater arisings may contain contaminants and may incur increased disposal or treatment costs.	Excavations, Foundations	5	3	15	Although not encountered on a significant scale during the investigation works, if localised perched shallow groundwater is encountered, it will need to be managed for excavations during the works. Excavation depths should be limited where possible and shored/pumped as required. Groundwater pumped from excavations should be analysed to identify the most appropriate disposal route. Groundwater should be anticipated for pile boring within natural soils.	3	3	9
GEO 09	Aggressive Ground Conditions	High water-soluble sulphate or low pH conditions to be present on site which may corrode inground concrete. Foundations may require additional protection to buried concrete.	Foundations (buried concrete)	2	3	6	Assuming a brownfield location and potentially mobile groundwater, the investigation results indicate a Design Sulphate Class of **DS-2** and an ACEC Class of **AC-2**.	1	3	3

GEOTECHNICAL RISK REGISTER			PROJECT: South Tyneside College				STAGE: Post GI, Detailed Design, RIBA 4-5			
No	**Hazard**	**Consequence**	Works Affected	**Before Control**			**Risk Management Measures**	**After Control**		
				Probability	**Impact**	**Total**		**Probability**	**Impact**	**Total**
GEO 10	Buried Utilities	Health and Safety risk to site personnel during site excavation works. Buried service diversion may be required for foundation/pavement construction.	Excavations, foundations, Site Personnel	4	4	16	A GPR survey should be undertaken to trace all buried service locations and the scheme designed accordingly including any diversion works. Follow-on trial trenching may also be instructed by the Principal Contractor where required to verify the positions of critical services.	2	4	8
GEO 11	Existing Structures and Earthworks	Works adjacent to existing structures and earthworks, such as temporary excavations and new foundations, have potential to cause instability during construction.	Foundations, Earthworks	3	5	15	All the redundant structures on site have been demolished to facilitate the construction of the new development. However, the Grade two listed structure will be retained as well as the structures either side of the Northern site boundary. The risks to off-site structures, including the existing road infrastructure should be considered in the design and the Contractors temporary works during construction.	2	5	10
GEO 12	Unexploded Ordnance (UXO)	A detailed desk based UXO risk assessment for the site has identified a potential for undetected UXO in the ground. Monitoring for the presence of undetected UXO during all intrusive works on the site has been recommended.	Foundations, Earthworks	3	5	15	Monitoring for the presence of undetected UXO during all intrusive works (including piling and excavations) shall be undertaken. Method statements and risk assessments will be required for intrusive works to specify the measures required to mitigate the risk from encountering undetected UXO.	1	5	5
GEO 13	Contaminants in Made Ground (asbestos)	Asbestos has been identified in Made Ground in two exploratory holes during the ground investigation. The presence of more wide-spread asbestos contamination in Made Ground on the site cannot be discounted at this stage and remedial measures will be required to mitigate risks to human health of future site users.	Earthworks, landscaping design	3	4	12	A clean cover soil system will be required to mitigate the risk to future site users from exposure to asbestos containing Made Ground. A minimum thickness of 0.6m is recommended at this stage. The requirements for and detailed design of a clean cover soil system, including its thickness, will require agreement from the Local Authority. A remediation strategy will be required to detail the requirements for the clean cover soil system and its verification. An Asbestos Management Plan in accordance with CAR 2012 should be prepared to mitigate risks to construction workers from exposure to asbestos in Made Ground. An asbestos watching brief during earthworks is recommended.	1	4	4

Geotechnical Risk Evaluation Matrix

Probability (P)		
Very High	Very likely >75%	**5**
High	Probable 40-75%	**4**
Medium	Possible 10-40%	**3**
Low	Unlikely 2-10%	**2**
Very Low	Negligible <2%	**1**

x

Impact (I)			
		TIME	**COST**
Very High	**5**	>50%	>20%
High	**4**	25-50%	10-20%
Medium	**3**	10-25%	5-10%
Low	**2**	2-10%	1-5%
Very Low	**1**	<2%	<1%

=

Probability		**Impact**				
		5	**4**	**3**	**2**	**1**
	5	**25**	**20**	**15**	**10**	**5**
	4	**20**	**16**	**12**	**8**	**4**
	3	**15**	**12**	**9**	**6**	**3**
	2	**10**	**8**	**6**	**4**	**2**
	1	**5**	**4**	**3**	**2**	**1**

Risk Rating	
1 to 4	**Low Risk**
5 to 10	**Medium Risk**
12 to 16	**High Risk**
20+	**Critical Risk**

Appendix E

WSP GQRA METHODOLOGY

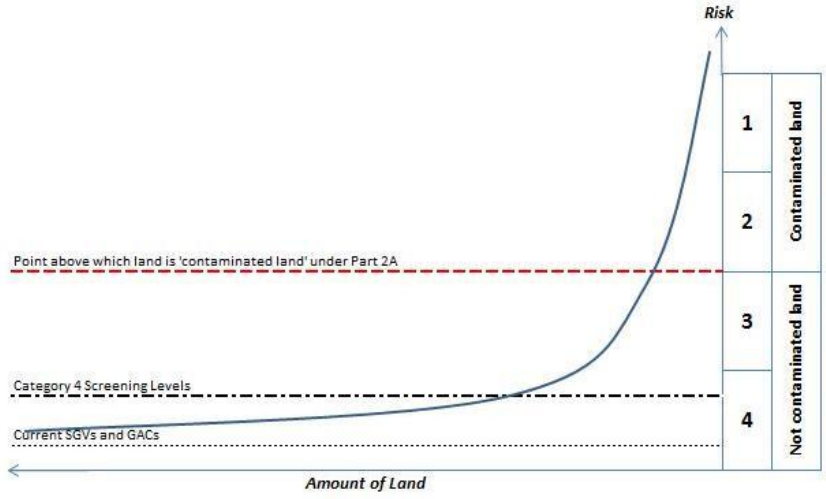
METHODOLOGY FOR THE DERIVATION OF GENERIC QUANTITATIVE ASSESSMENT CRITERIA TO EVALUATE RISKS TO HUMAN HEALTH FROM SOIL & GROUNDWATER CONTAMINATION

UK APPROACH

In the UK, the potential risks to human health from contamination in the ground are usually evaluated through a generic quantitative risk assessment (GQRA) approach. This allows generic and conservative exposure assumptions to be readily applied to risk assessments, and can be a useful tool for rapidly screening data and to identify those contaminants or scenarios that could benefit from further investigation and/or site-specific detailed quantitative risk assessment (DQRA). Current industry good practice is to use the approach presented in the Environment Agency (EA) publications SR2[1] and SR3[2]. This approach allows the derivation of Generic Assessment Criteria (GACs), primarily for chronic exposure.

In April 2012, the Department of Environment, Food and Rural Affairs (Defra) published updated statutory guidance[3] which introduced a four category approach to determining whether land in England and Wales is contaminated or not on the grounds of significant possibility of significant harm (SPOSH). **Figure 1** presents a graphical representation of the categories.

Figure 1: Four Categories for Determining if Land Represent a SPOSH



Cases classified as Category 1 are considered to be SPOSH based on actual evidence or an unacceptably high probability of harm existing. Category 4 cases are those where there is no risk, or a low risk of SPOSH.

[1] Environment Agency '*Human Health Toxicological Assessment of Contaminants in Soil',* Report SC050021/SR2. January 2009.
[2] Environment Agency '*Updated Technical Background to the CLEA Model*,' Report SC050021/SR3. January 2009.
[3] Defra '*Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance'.* April 2012.

GACs represent a minimal risk level, well within Category 4. A 2014 publication by Contaminated Land: Applicatons in Real Environments (CL:AIRE),SP1010[4] and endorsed by Defra[5] provided an approach to determine Category 4 Screening Levels (C4SLs) which are higher than the GACs whilst being "more pragmatic but still strongly precautionary". It also provided C4SLs for six contaminants of concern. Although the C4SLs were designed to support Part 2A assessments to determine 'contaminated land' they are specifically mentioned, along with reference to the Part 2A statutory guidance, by the Department for Communities and Local Government (DCLG) for use in a planning context[6].

An updated version the Contaminated Land Exposure Assessment (CLEA) Workbook (v1.071) was released by the EA in September 2015 to take into account the publication of SP1010. The updates comprised: additional toxicity data for the six chemicals for which C4SLs were derived; two new public open space land use scenarios; updated exposure parameters; options to run the model using C4SL exposure assumptions; and increased functionality. There were no changes to algorithms, so it is still possible to replicate the withdrawn SGVs using the input parameters held within v1.071.

It should be noted that the four category approach has not been adopted in Scotland under Part 2A or the planning regime. The Part 2A statutory guidance applicable in Scotland (Paper SE/2006/44 dated May 2006) does not reflect the changes introduced by Defra in April 2012 which allow for the use of C4SLs within Part 2A risk assessments. Additionally, it is considered that the principal of 'minimal risk' should still apply under planning in Scotland, based on current guidance.

WSP APPROACH

Following the withdrawal of the SGVs, and in the absence of an industry-wide, accepted set of GACs it is down to individual practitioners to derive their own soil assessment criteria. WSP has used the approach provided within SR2, SR3, SP1010, CLEA Workbook v1.071 and SR4[7] to produce a set of minimal risk GACs. The chemical-specific data within two key publications were considered during their production: CL:AIRE 2010[8] and LQM 2015[9]. Both documents provide comprehensive sets of GACs for different contaminants of concern.

The LQM Suitable For Use Levels (S4ULs) have selected exposure parameters consistent with the C4SL exposure scenarios. This approach was rejected by WSP as not representing minimal risk. However, the LQM S4UL document was critically reviewed and the approach and chemical input parameters were utilised where considered to be appropriate.

An industry-led C4SL Working Group is in the process of deriving a larger set of C4SLs in the near future, for approximately 20 contaminants. This will include a critical review of the chemical input data for all selected substances, and may therefore lead to further amendments to the chemical input data used in the WSP in-house screening values. It is considered likely that the contaminant list will

[4] CL:AIRE *'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination'* SP1010, Final Project Report (Revision 2). September 2014.
[5] Defra 'SP1010: *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document'*. December 2014.
[6] DCLG Planning Practice Guidance '*Land Affected by Contamination'*, particularly Paragraphs 001 and 007. Ref IDs: 33-001-20140306 & 33-007-20140612.
[7] Environment Agency '*CLEA Software (Version 1.05) Handbook (and Software)',* Report SC050021/SR4. September 2009.
[8] CL:AIRE 'The EIC/AGS/CL:AIRE *Soil Generic Assessment Criteria for Human Health Risk Assessment'.* ISBN 978-1-05046-20-1. January 2010.
[9] Nathanail et al '*The LQM/CIEH S4ULs for Human Health Risk Assessment'*, Land Quality Press, ISBN 978-0-9931084-0-2. 2015.

crossover with the 2009 EIC/AGS/CL:AIRE GACs. As such, this document was not critically reviewed by WSP.

WSP's current approach to the assessment of risks to human health is to continue to evaluate minimal risk through the use of in-house derived GACs, and to use the published C4SLs as a secondary tier of assessment until such time as additional C4SLs are published and/or in-house values are derived.

EXPOSURE MODELS

LAND USES

WSP has largely adopted the exposure assumptions of the generic land use scenarios included within SR3, with two additional public open space scenarios included from within SP1010 and two bespoke exposure scenarios (highways):

- Residential with homegrown produce consumption;
- Residential without homegrown produce consumption;
- Allotments;
- Commercial;
- Public open space near residential housing (POS_{resi});
- Public park (POS_{park});
- Highways (surface soils); and
- Highways (subsurface soils).

Exceptions are described in the following Sections.

SOIL PROPERTIES

SR3 assumes a sandy loam soil with a pH of 7 and a Soil Organic Matter (SOM) content of 6% for its generic land uses, based on the geographical spread of topsoils in the UK. WSP has adopted these default values. In addition, GACs based on an SOM of 1% and 2.5% have been derived, based on common experience of the nature of Made Ground and lack of topsoil on many brownfield sites.

RECEPTOR CHARACTERISTICS AND BEHAVIOURS

SP1010 provides some updated exposure parameters for long-term inhalation rates[10] and the consumption rates for homegrown produce[11] compared to those provided in SR3. This data was used to derived WSP's GACs.

The changes in inhalation rates do not apply to the allotment generic land use scenario, as these are based on the breathing rates for short-term exposure of light to moderate intensity activity which were derived from a study that was not updated in USEPA 2011, so the SR3 rates were retained.

[10] USEPA, National Centre for Environmental Assessment '*Exposure Factors Handbook: 2011 Edition*' EPA/600/R-09/052F. September 2011.
[11] National Diet and Nutrition Survey 2008/2009 to 2010/2011.

HIGHWAYS EXPOSURE SCENARIOS

Human health GAC for a Highways exposure scenario have been derived. The site area is defined by publicly accessible land adjacent to highways, comprising both hard and soft landscaped areas. Exposure is considered to be largely transitory.

There are no publicly available GAC for this exposure scenario. Consequently, WSP have derived GAC for the following exposure scenarios:

- à Highways (surface soils); and
- à Highways (sub-surface soils).

Surface soils GAC are for soil at ground level and within 300mm of the surface. Conversely, subsurface GAC are for soils at a depth exceeding 0.3m bgl. These GAC are not to be used as import criteria.

The critical receptor is a young female child, CLEA age classes 4-9. This is consistent with the critical receptor for the POS(resi) exposure scenario, and considered to be appropriate for a child potentially playing outside without direct adult supervision.

For all GAC, a sandy loam soil and a soil organic matter content of 1% is assumed. There is no building on site.

Exposure scenarios for surface and subsurface soils are detailed below. These are considered to be conservative estimates, due to the mostly transitory use of publically accessible lands adjacent to highways.

HIGHWAYS GAC (SURFACE SOILS)

The relevant exposure pathways include direct soil and dust ingestion, dermal contact (outdoors) and the inhalation of outdoor dust and vapour.

The exposure frequency is 170 days per annum, and the occupancy period outdoors is 1 hour per day (as per the POS (resi) exposure scenario). The soil and dust ingestion rate has been set at 50 mg/day, consistent with a POS(park) exposure scenario.

HIGHWAYS GAC (SUBSURFACE SOILS)

The single relevant exposure pathway is the inhalation of outdoor vapour. Direct exposure pathways are not viable due to the depth of the soils below ground level.

The exposure frequency is 170 days per annum, and the occupancy period outdoors is 1 hour per day (as per the POS (resi) exposure scenario). The soil and dust ingestion rate has been set to zero, as direct exposure pathways to soils at this depth are not viable.

CHEMICAL DATA

PHYSICO-CHEMICAL PARAMETERS

Physico-chemical properties for the contaminants for which GACs have been derived have been obtained following critical review of the following hierarchy of data sources:

1. Environment Agency/Defra SGV reports where available;
2. Environment Agency '*Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values*', Report SC050021/SR7, November 2008; and
3. Published fate and transport reviews within Nathanail et. al 2015 and CL:AIRE 2010.

Where appropriate, and where sufficient data is available, values were adjusted to reflect a UK soil temperature of 10ºC (e.g. K_{aw}).

TOXICOLOGICAL DATA

Toxicological data for the derivation of minimal risk Health Criteria Values (HCV) for each contaminant was selected with due regard to the approach presented in SR2. Where appropriate, the following hierarchy of data sources was used:

1. UK toxicity reviews published by authoritative bodies including:
   - EA;
   - Public Health England (PHE);
   - Committee on Toxicity of Chemicals in Food, Consumer Products and the Environment (COT); and
   - Committee on Carcinogenicity of Chemicals in Food, Consumer Products and the Environment (COC).
2. Authoritative European sources such as European Food Standards Agency (EFSA)
3. International organisations including:
   - World Health Organisation (WHO); and
   - Joint FAO/WHO Expert Committee on Food Additives (JECFA).
4. Authoritative country-specific sources including:
   - United States Environmental Protection Agency (USEPA);
   - US Agency for Toxic Substances and Disease Registry (ATSDR);
   - US Integrated Risk Information System (IRIS); and
   - Netherlands National Institute for Public Health and the Environment (RIVM).

Factors such as the applicability of the data to human health (e.g. epidemiological vs. animal studies), the quality of the data, the level of uncertainty in the results and the age of the data were also taken into account in the final selection. Details for specific substances are available on request.

MEAN DAILY INTAKES

Estimations of background exposure for each threshold substance have been updated. In line with the SR2 approach, the exposure from non-threshold substances in the soil does not take into account exposure from other sources, and as such GACs were derived without consideration of the Mean Daily Intake (MDI) for those substances.

The data published by the EA in its series of TOX reports between 2002 and 2009 was evaluated to determine whether the values were considered to remain valid today. Values from these current UK published sources were not amended unless they were considered to be significantly different so that the GACs remained as comparable as possible with the revoked SGVs.

ORAL MEAN DAILY INTAKES

Oral MDI were generally estimated as the sum of exposure via the ingestion of food and drinking water using the default adult physiological parameters presented in Table 3.3 of SR2.

Data on the exposure of substances from food ingestion was generally obtained from UK Total Diet Studies (TDS) published by the Food Standards Agency (FSA) and its predecessor the Ministry of Agriculture, Fisheries and Food (MAFF) and from studies commissioned by COT. Where no UK-specific data was available, MDI were derived from the European Food Safety Authority (EFSA), Health Canada and US sources. This was a rare occurrence, and in these instances, the data was evaluated to determine its applicability to the UK.

Data on the concentrations of substances in tap water was obtained from a variety of sources. UK data was used where available, with preference given to Drinking Water Inspectorate (DWI) 2014 data from water company tap water testing (LOD, 1st and 99th percentile data is available). Where the substance was not included in tap water testing, other UK sources of information were considered including:

- à DWI data from water company tap water testing from previous years;
- à COT; and
- à FSA.

Where UK data was not available, a number of other data sources were considered, largely WHO International Programme on Chemical Safety (IPCS) Concise International Chemical Assessment Documents (CICADs) and background documents for the development of Guidelines for Drinking Water Quality, using professional judgement on the relevance of the data to the UK. The final decision on the MDI from drinking water was made using professional judgement on the balance of relevance and probability, taking into account the detection limit where not detected, Koc and solubility, reduction in use of the substance, banned substances, tight controls (e.g. on explosives) and with due consideration to the SR2 instruction that “if no data or information in background exposure are available, background exposure should be assumed to be negligible and the MDI set to zero….”.

Data from other countries was generally not used because it was considered that the hydrogeology of these countries along with industrial practices were unlikely to be reflective of the UK.

INHALATION MEAN DAILY INTAKES

Inhalation MDIs were based on estimates of average daily exposure by the inhalation pathway and calculated using the default adult physiological parameters presented in Table 3.3 of SR2.

The inhalation MDIs were generally estimated using background exposure data from the UK, derived from Defra's UK-AIR: Air Information Resource[12], which provides ambient air quality data from a number of sites forming a UK-wide monitoring network. The MDIs for heavy metals were based on rolling annual average metal mass concentration data from Defra's UK Heavy Metals Monitoring Network from the period October 2009 to September 2010[13].

Information for some substances was obtained from UK sources including Environment Agency TOX reports and data from the UK Expert Panel on Air Quality Standards (EPAQS). Where recent UK data was not available, data was sourced from the International Programme on Chemical Safety (IPCS), the World Health Organisation (WHO), the Agency for Toxic Substances and Diseases Registry (ATSDR), Health Canada, and various other peer-reviewed sources summarised by LQM/CIEH[14].

For other substances, where no data or information on background exposure was available, background exposure was assumed to be negligible and the MDI set at 0.5*TDI in accordance with guidance in SR2.

PLANT UPTAKE

Soil to plant concentration factors are available in CLEA v1.071 for arsenic, cadmium, hexavalent chromium, lead, mercury, nickel and selenium. For all remaining inorganic chemicals, concentration factors were obtained using the PRISM model. Substance-specific correction factors have been selected in accordance with the guidance established within SR3. This is consistent to the approach utilised in the derivation of the LQM S4UL and the EIC/AGS/CL:AIRE GAC.

Where there is a lack of appropriate data to enable the derivation of specific soil to plant concentrations factors for organic chemicals, plant uptake was modelled within CLEA v1.071 using the generic equations recommended within SR3, as follows:

- Green Vegetables – Ryan et al. (1988);
- Root Vegetables – Trapp (2002);
- Tuber Vegetables – Trapp et al. (2007); and
- Tree Fruit – Trapp et al. (2003).

There are no suitable models available for modelling uptake for herbaceous fruit or shrub fruit. Exposure is considered negligible.

[12] Crown 2016 copyright Defra via uk-air.defra.gov.uk, licenced under the Open Government Licence (OGL).
[13] Defra, 2013 Spreadsheet of historic data for multiple years for the Metals network. Available online at: http://uk-air.defra.gov.uk/data/metals-data. [Accessed 13/03/2016].
[14] LQM/CIEH, 2015. The LQM/CIEH S4ULs for Human Health Risk Assessment.

SOIL SATURATION LIMITS

GACs are not limited to their theoretical soil saturation within CLEA, although where either the aqueous or the vapour-based saturation is exceeded, this is highlighted within the Workbook (compared with the lower of the two values). This affects pathways which depend on partitioning calculations so in reality this only affects the vapour pathways and is relevant to organic substances and other substances, such as elemental mercury, that have a significant volatile component. However, the Workbook highlights saturation for direct contact pathways to indicate to the user where further qualitative consideration of free phase contamination at the surface may be required.

Where the lower of the two saturation limits is exceeded and the vapour pathway is the only exposure route being considered, the chronic risks to human health are likely to be negligible. Further evaluation could be undertaken using an alternative model suitable for evaluating non-aqueous phase liquids (NAPLs), such as the Johnson & Ettinger (J&E) approach described in USEPA 2003. However, WSP considers that if NAPLs are suspected, given the known limitations and over-simplifications of J&E, soil vapour monitoring is a more accurate way of assessing potential risks.

Where the lower saturation limit is exceeded for the vapour pathway and a number of exposure routes are being considered, then the contribution from the NAPL via vapour inhalation to the overall exposure can be evaluated using the procedure provided in SR4. WSP would evaluate this as part of a DQRA process or through soil vapour monitoring on-site to determine site-specific soil vapour concentrations.

CHEMICAL SPECIFIC ASSUMPTIONS

CYANIDES

Cyanide has high acute toxicity, and short term exposure is an important consideration when assessing the risks from soils contaminated with cyanide. The primary risk to human receptors from free cyanide in soils is an acute risk.

There is no current UK guidance available for calculating acute risks from free cyanide. Consequently, GAC for acute exposure were derived using the algorithms presented in MADEP 1992[15] and assuming a one-off ingestion of 10g of soil (this conservative value has been taken as an upper bound estimate for a one-off soil ingestion rate amongst children). Receptor body weights have been selected according to the critical receptor for each exposure scenario. The lowest of the chronic and acute GAC for each land use scenario were adopted by WSP.

LEAD

The SGV for lead was withdrawn by the EA in 2009, and in 2011 the EA withdrew their published TOX report in light of new scientific evidence. The C4SL for lead was derived using the latest scientific evidence from a large human dataset. As such, no chemical-specific margin was applied in the derivation of the C4SL for lead. It may be possible for WSP to derive a GAC for lead using the same dataset and applying a chemical-specific margin, but the value is likely to be lower than UK natural background concentrations. Therefore, WSP has adopted the toxicological data used to derive the C4SLs in deriving the GAC for lead until such time as alternative GACs are published by an authoritative body. The relative bioavailability was set at 100% in line with the approach taken for other GACs, whereas the C4SL assumes 60% for soil and 64% for airborne dust. Thus, the WSP GAC are lower than the C4SLs.

[15] MADEP '*Background Documentation for the Development of an "Available Cyanide" Benchmark Concentration'* 1992. http://www.mass.gov/dep/toxics/cn_soil.htm

POLYCYCLIC AROMATIC HYDROCARBONS

WSP's approach to the assessment of polycyclic aromatic hydrocarbons (PAHs) uses the surrogate marker approach. BaP was used as a surrogate marker for all genotoxic PAHs in line with the Health Protection Agency 2010[16] recommendations and SP1010. This assumes that the PAH profile of the data is similar to that of the coal tars used in the Culp *et al* oral carcinogenicity study from which the toxicity data for BaP was produced. In reality, this profile has been shown by HPA to be applicable on the majority of contaminated sites based on assessment of sites across the country.

The alternative is the Toxic Equivalency Factor (TEF) approach which uses a reference compound and assigns TEFs for other compounds based on estimates of potency. Key uncertainties with this approach include the assumption that all compounds have the same toxic mechanism of action within the body and that no compounds with a greater potency than the reference compound are present. It is considered by the HPA that the TEF approach is likely to under predict the true carcinogenicity of PAHs and therefore favours the surrogate marker approach.

For these reasons, WSP considers that the adoption of BaP as a surrogate marker for genotoxic PAHs, as opposed to the TEF approach, is reasonable. In rare cases where the PAH profile may differ from the wide definitions of the Culp *et al* study the user should discuss their project with an experienced risk assessor. In addition, WSP has derived a GAC for naphthalene, which is commonly a risk driver due to its high volatility, relative to other PAH compounds.

TRIMETHYLBENZENES

The GAC for trimethylbenzenes can be used for the assessment of any individual isomer (1,2,3-trimethylbenzene, 1,2,4-trimethylbenzene or 1,3,5-trimethylbenzene), or a mixture of the three isomers.

CHEMICAL GROUPS

For a number of chemical groups, the available toxicity data is for combinations of chemicals. Given that the physico-chemical parameters may differ between the chemicals, the GACs for the chemicals within the groups have been calculated and then the lowest GAC selected to represent the entire group. This was the approach taken by the EA for m-, o- and p-xylenes, and has also been adopted by WSP for:

- 2-chlorophenol, 2,4-dichlorophenol, 2,4,6-trichlorophenol and 2,3,4,6-tetrachlorophenol;
- 2-, 3- and 4-methylphenol (total cresols);
- aldrin and dieldrin; and
- α- and β-endosulphan.

[16] HPA Contaminated Land Information Sheet '*Risk Assessment Approaches for Polycyclic Aromatic Hydrocarbons (PAHs)* 2010

EXPOSURE TO VAPOURS

INHALATION OF MEASURED VAPOURS

WSP has derived a set of soil vapour GACs (GAC_{sv}) that allow for the assessment of measured site soil vapour concentrations, using J&E, in order to establish potential risks via indoor inhalation of vapours. This methodology enables a more robust assessment of exposure via the inhalation of soil vapours indoors than using CLEA-derived soil GAC, as it is based upon measured soil vapour concentrations beneath the site. It also allows for the assessment of vapours from all source terms (i.e. groundwater, soil or NAPL). Outdoor inhalation was not included. WSP considers that the indoor inhalation pathway is the significantly dominant risk-driver.

The generic land use scenarios within CLEA (residential and commercial) that were used to derive the soil GAC were used to define the receptor and building characteristics for the soil vapour GAC. Only residential and commercial generic land use scenarios include the indoor inhalation of vapours pathway.

The GAC_{sv} were derived for three different soil types; sand, sandy loam and clay, reflecting the importance of this parameter within the J&E model. A depth to contamination of 0.85 m below the base of the building foundation was assumed (i.e. 1 m below ground level). This differs from the depth assumed for the soil GAC (0.5 m bgl), but was selected by WSP as a reasonable worst case scenario.

It is acknowledged that the J&E commonly over-predicts indoor vapour concentrations. In particular, it will significantly over-predict vapour concentrations for suspended floor slabs, which many new builds are constructed with, it does not take into account lateral migration and assumes an infinite source of contamination at steady state conditions. In addition, it is common for soil gas/vapour wells to be installed with at least 1 m of plain riser at the surface and this equates to a total depth of 0.85 m below the building foundation plus a 0.15 m thick foundation, and so is more representative of the depth that samples will be taken from.

The TDSIs and IDs for each substance were converted from $\mu gkg^{-1}_{bw}day^{-1}$ to μgm^{-3} using the standard conversions quoted in Table 3.3 of SR2, thereby replacing the need to model C_{air} in the equation:

$$C_{air} = \alpha . C_{vap} . 1{,}000{,}000 cm^3 m^{-3}$$

Where:

C_{air} is the concentration of vapours within the building, mg^{-3}
α is the steady state attenuation coefficient between soil and indoor air, dimensionless
C_{vap} is the soil vapour concentration, $mgcm^{-3}$

The target concentrations within indoor air for each substance (C_{air}) are a function of receptor inhalation rates and occupancy periods, as defined by the site conceptual exposure model (assuming standard CLEA occupancy periods and receptors).

The attenuation factor was calculated using J&E (Equation 10.4 in SR3) and the resulting C_{vap} is equivalent to the GAC_{sv} for the modelled exposure scenario.

Where reported soil vapour concentrations exceed the relevant saturated vapour concentration, free product may occur, and the user should discuss their project with an experienced risk assessor.

INHALATION OF GROUNDWATER-DERIVED VAPOURS

WSP has derived a set of groundwater GACs (GAC_{gw}) to evaluate the potential risks through the indoor inhalation of groundwater-derived vapours by first applying the approach described above for the derivation of the WSP GAC_{sv} to determine the acceptable concentration in soil vapour directly above the water table.

The depth to groundwater was assumed to be 1 m bgl (i.e. 0.85 m below the base of the building foundation). This depth was considered to be more representative of commonly encountered groundwater conditions than the 0.5 m below the base of the building foundation (i.e. 0.65 m bgl) that is used by CLEA for an unsaturated source present in the overlying soil.

The GAC_{gw} was then back-calculated from the GAC_{sv} using the air-water partition coefficient (K_{aw}) for each substance.

The WSP Groundwater Vapour GAC are protective against a dissolved phase contaminant source only. If the presence of NAPL is suspected, the risks from this source will need to be assessed. Where reported groundwater concentrations exceed the relevant solubility limit, free product may occur, and the user should discuss their project with an experienced risk assessor.

Appendix F

GQRA SCREENING RESULTS

PRE-REPORT DATA CHECK

- All analyte codes are matched to the library
- All Test Types are valid and Sample Matrix can be calculated.
- All result and screening units match

Region	Wales and England	**Hardness**	NA
Water Body	Groundwater	**Recieving surface water status**	NA
Water Body Type	NA		
Surface Water Type	NA	**Altitude**	NA

Phosphorous cannot currently be screened for a lake/loch receptor - refer to the River Basin Typology Standards to assess manually.

Sample Matrix: LEACHATE

Site Area(s) Selected: Whole site
Event(s) Selected: All events

General Chemistry

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
pH	7.80	9.62	10.80	6.50/10.0	UK DWS	pH units	5	5	3	BH101, TP302, TP303

Inorganics

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Ammonium	15.0	34.3	72.0	-		ug/l	5	4	0	
Cyanide	1.00	0.50	1.00	50.0	UK DWS - Assumes Total Cyanide	ug/l	5	0	0	
Cyanide (Free)	1.00	0.50	1.00	50.0	UK DWS - Assumes Total Cyanide	ug/l	5	0	0	
Sulphate as SO4	67700	207760	407000	250,000	UK DWS	ug/l	5	5	1	TP303

Metals

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Arsenic	1.00	1.62	2.10	10.0	UK DWS	ug/l	5	4	0	
Boron	15.0	26.0	44.0	1,000	UK DWS	ug/l	5	5	0	
Cadmium	0.080	0.040	0.080	5.00	UK DWS	ug/l	5	0	0	
Chromium	0.50	3.04	5.70	50.0	UK DWS	ug/l	5	5	0	
Chromium III	5.00	3.14	5.70	-		ug/l	5	1	0	
Copper	13.0	17.6	24.0	2,000	UK DWS	ug/l	5	5	0	
Hexavalent Chromium	5.00	2.50	5.00	-		ug/l	5	0	0	
Lead	1.00	1.22	3.50	10.0	UK DWS	ug/l	5	2	0	
Mercury	0.50	0.25	0.50	1.00	UK DWS	ug/l	5	0	0	
Nickel	0.50	1.04	2.00	20.0	UK DWS	ug/l	5	5	0	
Selenium	4.00	2.00	4.00	10.0	UK DWS	ug/l	5	0	0	
Zinc	4.6	52.5	230.0	-		ug/l	5	5	0	

Sample Matrix: LEACHATE

Site Area(s) Selected: Whole site
Event(s) Selected: All events

PAHs

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Acenaphthene	0.01	0.27	0.96	-		ug/l	5	2	0	
Acenaphthylene	0.010	0.005	0.010	-		ug/l	5	0	0	
Anthracene	0.010	0.034	0.150	-		ug/l	5	1	0	
Benzo (a) anthracene	0.010	0.005	0.010	-		ug/l	5	0	0	
Benzo (a) pyrene	0.010	0.005	0.010	0.010	UK DWS	ug/l	5	0	0	
Benzo (b) fluoranthene	0.010	0.005	0.010	-		ug/l	5	0	0	
Benzo (ghi) perylene	0.010	0.005	0.010	-		ug/l	5	0	0	
Benzo (k) fluoranthene	0.010	0.005	0.010	-		ug/l	5	0	0	
Chrysene	0.010	0.005	0.010	-		ug/l	5	0	0	
Dibenzo (ah) anthracene	0.010	0.005	0.010	-		ug/l	5	0	0	
Fluoranthene	0.010	0.044	0.200	-		ug/l	5	1	0	
Fluorene	0.010	0.093	0.330	-		ug/l	5	2	0	
Indeno (1,2,3-cd) pyrene	0.010	0.005	0.010	-		ug/l	5	0	0	
Naphthalene	0.01	0.92	2.90	-		ug/l	5	2	0	
PAH 16 Total	0.20	1.50	5.10	-		ug/l	5	2	0	
Phenanthrene	0.010	0.090	0.430	-		ug/l	5	1	0	
Pyrene	0.010	0.032	0.140	-		ug/l	5	1	0	

Phenols

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Phenol (Monohydric)	1.00	1.22	2.90	-		ug/l	5	2	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Unrecognised analytes — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
	10.00	5.00	10.00	-		ug/l	7	0	0	

Aliphatics and Aromatics — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Aliphatic C05-C06	1.00	0.50	1.00	15,000	WHO 2008	ug/l	7	0	0	
Aliphatic C05-C44	10.00	5.00	10.00	-		ug/l	7	0	0	
Aliphatic C06-C08	1.00	0.50	1.00	15,000	WHO 2008	ug/l	7	0	0	
Aliphatic C08-C10	1.00	0.50	1.00	300	WHO 2008	ug/l	7	0	0	
Aliphatic C10-C12	10.00	5.00	10.00	300	WHO 2008	ug/l	7	0	0	
Aliphatic C12-C16	10.00	5.00	10.00	300	WHO 2008	ug/l	7	0	0	
Aliphatic C16-C21	10.00	5.00	10.00	-		ug/l	7	0	0	
Aliphatic C21-C35	10.00	5.00	10.00	-		ug/l	7	0	0	
Aliphatic C35-C44	10.00	5.00	10.00	-		ug/l	7	0	0	
Aromatic C05-C07	1.00	0.50	1.00	-		ug/l	7	0	0	
Aromatic C06-C35	10.00	5.00	10.00	-		ug/l	7	0	0	
Aromatic C07-C08	1.00	0.50	1.00	-		ug/l	7	0	0	
Aromatic C08-C10	1.00	0.50	1.00	300	WHO 2008	ug/l	7	0	0	
Aromatic C10-C12	10.00	5.00	10.00	90.0	WHO 2008	ug/l	7	0	0	
Aromatic C12-C16	10.00	5.00	10.00	90.0	WHO 2008	ug/l	7	0	0	
Aromatic C16-C21	10.00	5.00	10.00	90.0	WHO 2008	ug/l	7	0	0	
Aromatic C21-C35	10.00	5.00	10.00	90.0	WHO 2008	ug/l	7	0	0	
Aromatic C35-C44	10.00	5.00	10.00	-		ug/l	7	0	0	
Total Aliphatics (C05-C35)	10.00	5.00	10.00	-		ug/l	7	0	0	

Alkali and Alkaline Earth Metals — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Calcium	170000	257143	420000	-		ug/l	7	7	0	
Magnesium	1600	109943	210000	-		ug/l	7	7	0	

BTEX and Fuel Additives — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
1,2,4-Trimethylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
1,3,5-Trimethylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
Benzene	3.00	1.50	3.00	1.00	UK DWS	ug/l	7	0	0	
Ethylbenzene	3.00	1.50	3.00	300	WHO 2017	ug/l	7	0	0	
Methyl t-butylether (MTBE)	3.00	1.50	3.00	15.0	WHO 2017	ug/l	7	0	0	
TAME	100.0	50.0	100.0	-		ug/l	5	0	0	
Toluene	3.00	1.50	3.00	700	WHO 2017	ug/l	7	0	0	
Xylene - Total (Summed)	3.00	3.00	3.00	-		ug/l	7	7	0	
Xylene-m & p	3.00	1.50	3.00	-		ug/l	7	0	0	
Xylene-o	3.00	1.50	3.00	-		ug/l	7	0	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Chlorinated Aliphatics — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
1,1,1,2-Tetrachloroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,1,1-Trichloroethane	3.00	1.50	3.00	2,000	WHO 2017	ug/l	7	0	0	
1,1,2,2-Tetrachloroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,1,2-Trichloroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,1-Dichloroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,1-Dichloroethene	3.00	1.50	3.00	140	WHO 2017	ug/l	7	0	0	
1,1-Dichloropropene	3.00	1.50	3.00	20.0	WHO 2017	ug/l	7	0	0	
1,2-Dichloroethane	3.00	1.50	3.00	3.00	UK DWS	ug/l	7	0	0	
1,2-Dichloropropane	3.00	1.50	3.00	40.0	WHO 2017	ug/l	7	0	0	
1,3-Dichloropropane	3.00	1.50	3.00	-		ug/l	7	0	0	
2,2-Dichloropropane	3.00	1.50	3.00	-		ug/l	7	0	0	
Chloroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Chloromethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Cis 1,2-Dichloroethene	3.00	1.50	3.00	50.0	WHO 2017	ug/l	7	0	0	
Cis 1,3-Dichloropropene	3.00	1.50	3.00	-		ug/l	7	0	0	
Hexachlorobutadiene	3.00	1.50	3.00	0.60	WHO 2017	ug/l	7	0	0	
Hexachloroethane	0.050	0.025	0.050	-		ug/l	7	0	0	
PCE	3.00	1.50	3.00	-		ug/l	7	0	0	
Tetrachloromethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Trans-1,2-Dichloroethene	3.00	1.50	3.00	50.0	WHO 2017	ug/l	7	0	0	
Trans-1,3-Dichloropropene	3.00	1.50	3.00	-		ug/l	7	0	0	
Trichloroethene (TCE)	3.00	1.50	3.00	-		ug/l	7	0	0	
Trichloromethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Vinyl chloride	3.00	1.50	3.00	0.50	UK DWS	ug/l	7	0	0	

Chlorinated Aromatics — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
1,2,3-Trichlorobenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
1,2,4-Trichlorobenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
1,2-Dichlorobenzene	3.00	1.50	3.00	1,000	WHO 2017	ug/l	7	0	0	
1,3-Dichlorobenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
1,4-Dichlorobenzene	3.00	1.50	3.00	300	WHO 2017	ug/l	7	0	0	
2-Chlorotoluene	3.00	1.50	3.00	-		ug/l	7	0	0	
4-Chlorotoluene	3.00	1.50	3.00	-		ug/l	7	0	0	
Chlorobenzene	3.00	1.50	3.00	300	WHO 2017	ug/l	7	0	0	
Hexachlorobenzene	0.050	0.025	0.050	-		ug/l	7	0	0	

Chlorinated Phenols — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
2,4,5-Trichlorophenol	0.050	0.025	0.050	-		ug/l	7	0	0	
2,4,6-Trichlorophenol	0.050	0.025	0.050	200	WHO 2017	ug/l	7	0	0	
2,4-Dichlorophenol	0.050	0.025	0.050	-		ug/l	7	0	0	
2-Chlorophenol	0.050	0.025	0.050	-		ug/l	7	0	0	
4-Chloro-3-Methlphenol	0.050	0.025	0.050	-		ug/l	7	0	0	
Chlorophenols - Total (Summed Isomers)	0.050	0.050	0.050	-		ug/l	7	7	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Dioxins and Furans — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Dibenzofuran	0.050	0.025	0.050	-		ug/l	7	0	0	

Dyes — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
4-Nitroaniline	0.050	0.025	0.050	-		ug/l	7	0	0	
Anthraquinone	0.050	0.025	0.050	-		ug/l	7	0	0	

Explosives — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
2,4-Dinitrotoluene	0.050	0.025	0.050	-		ug/l	7	0	0	
2,6-Dinitrotoluene	0.050	0.025	0.050	-		ug/l	7	0	0	

General Chemistry — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
pH	7.30	7.99	10.20	6.50/10.0	UK DWS	pH units	7	7	1	BH203

Halogonated Hydrocarbons — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
1,1,2-Trichloro-1,2,2-Trifluoroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,2-Dibromo-3-Chloropropane	3.00	1.50	3.00	1.00	WHO 2017	ug/l	7	0	0	
1,2-Dibromoethane	3.00	1.50	3.00	0.40	WHO 2017	ug/l	7	0	0	
Bromobenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
Bromodichloromethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Bromomethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Dibromochloromethane	3.00	1.50	3.00	100	WHO 2017	ug/l	7	0	0	
Dibromomethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Tribromomethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Trichlorofluoromethane	3.00	1.50	3.00	-		ug/l	7	0	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Inorganics — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Total hardness	678	1097	1900	-		ŋgCaCO3/	7	7	0	
Ammonium	150	2491	13000	-		ug/l	7	7	0	
Cyanide	1.0	10.7	45.0	50.0	UK DWS - Assumes Total Cyanide	ug/l	7	2	0	
Cyanide (Free)	1.00	3.71	10.00	50.0	UK DWS - Assumes Total Cyanide	ug/l	7	0	0	
Sulphate as SO4	371000	730571	1670000	250,000	UK DWS	ug/l	7	7	7	BH101, BH102, BH104, BH108, BH202, BH203, BH207

Ketones — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Isophorone	0.050	0.025	0.050	-		ug/l	7	0	0	

Metals — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Arsenic	0.32	3.39	16.80	10.0	UK DWS	ug/l	7	7	1	BH203
Boron	30	135	250	1,000	UK DWS	ug/l	7	7	0	
Cadmium	0.020	0.023	0.050	5.00	UK DWS	ug/l	7	3	0	
Chromium	0.20	0.51	0.90	50.0	UK DWS	ug/l	7	6	0	
Chromium III	5.00	2.50	5.00	-		ug/l	7	0	0	
Copper	0.90	3.50	11.00	2,000	UK DWS	ug/l	7	7	0	
Hexavalent Chromium	5.00	2.50	5.00	-		ug/l	7	0	0	
Lead	0.20	0.30	1.00	10.0	UK DWS	ug/l	7	3	0	
Mercury	0.050	0.025	0.050	1.00	UK DWS	ug/l	7	0	0	
Nickel	1.3	11.9	56.0	20.0	UK DWS	ug/l	7	7	1	BH203
Selenium	1.7	18.7	75.0	10.0	UK DWS	ug/l	7	7	3	BH102, BH202, BH207
Zinc	1.00	6.67	15.00	-		ug/l	7	7	0	

Other — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
2-Chloronaphthalene	0.050	0.025	0.050	-		ug/l	7	0	0	
4-Chloroaniline	0.050	0.025	0.050	-		ug/l	7	0	0	
4-Chlorophenyl phenyl ether	0.050	0.025	0.050	-		ug/l	7	0	0	
Aniline	0.05	0.62	4.20	-		ug/l	7	1	0	
Azobenzene	0.050	0.025	0.050	-		ug/l	7	0	0	
Bis (2-chloroethoxy) methane	0.050	0.025	0.050	-		ug/l	7	0	0	
Bis (2-chloroethyl) ether	0.050	0.025	0.050	-		ug/l	7	0	0	
Bis (2-chloroisopropyl) ether	0.050	0.025	0.050	-		ug/l	7	0	0	
Bromo phenyl phenyl ether	0.050	0.025	0.050	-		ug/l	7	0	0	
Carbazole	0.050	0.025	0.050	-		ug/l	7	0	0	
DOC	1720	20447	93000	-		ug/l	7	7	0	
Nitrobenzene	0.050	0.025	0.050	-		ug/l	7	0	0	
p-Isopropyltoluene	3.00	1.50	3.00	-		ug/l	7	0	0	
Styrene	3.00	1.50	3.00	20.0	WHO 2017	ug/l	7	0	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

PAHs — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
2-Methylnaphthalene	0.050	0.025	0.050	-		ug/l	7	0	0	
Acenaphthene	0.010	0.016	0.080	-		ug/l	7	1	0	
Acenaphthylene	0.010	0.005	0.010	-		ug/l	7	0	0	
Anthracene	0.010	0.005	0.010	-		ug/l	7	0	0	
Benzo (a) anthracene	0.010	0.005	0.010	-		ug/l	7	0	0	
Benzo (a) pyrene	0.010	0.005	0.010	0.010	UK DWS	ug/l	7	0	0	
Benzo (b) fluoranthene	0.010	0.005	0.010	-		ug/l	7	0	0	
Benzo (ghi) perylene	0.010	0.005	0.010	-		ug/l	7	0	0	
Benzo (k) fluoranthene	0.010	0.005	0.010	-		ug/l	7	0	0	
Chrysene	0.010	0.005	0.010	-		ug/l	7	0	0	
Dibenzo (ah) anthracene	0.010	0.005	0.010	-		ug/l	7	0	0	
Fluoranthene	0.010	0.005	0.010	-		ug/l	7	0	0	
Fluorene	0.010	0.011	0.050	-		ug/l	7	1	0	
Indeno (1,2,3-cd) pyrene	0.010	0.005	0.010	-		ug/l	7	0	0	
Naphthalene	3.00	1.50	3.00	-		ug/l	7	0	0	
PAH Total (EPA 16)	0.16	0.11	0.28	-		ug/l	7	1	0	
Phenanthrene	0.010	0.005	0.010	-		ug/l	7	0	0	
Pyrene	0.010	0.005	0.010	-		ug/l	7	0	0	

Phenols — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
2,4-Dimethylphenol	0.05	0.22	1.40	-		ug/l	7	1	0	
2-Methylphenol (o-Cresol)	0.05	0.19	1.20	-		ug/l	7	1	0	
2-Nitrophenol	0.050	0.025	0.050	-		ug/l	7	0	0	
3,4-Methylphenol	0.10	1.00	6.70	-		ug/l	7	1	0	
4-Methylphenol	0.05	0.98	6.70	-		ug/l	7	1	0	
Methylphenols Total (Summed)	0.05	1.17	7.90	-		ug/l	7	7	0	
Phenol	0.1	11.6	81.0	-		ug/l	7	1	0	
Phenol (Monohydric)	1.0	54.4	360.0	-		ug/l	7	1	0	

Phthalates — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Butyl benzyl phthalate	0.050	0.025	0.050	-		ug/l	7	0	0	
Diethyl phthalate	0.050	0.025	0.050	-		ug/l	7	0	0	
Dimethyl phthalate	0.050	0.025	0.050	-		ug/l	7	0	0	
Di-n-butyl phthalate	0.050	0.025	0.050	-		ug/l	7	0	0	

VOCs — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
iso-Propylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
n-Butylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
n-Propylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
Sec-Butylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
Tert-Butylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	

Gint Database: South Tyneside College_FINAL_v8.01.gpj

Data range: All data selected

Print date: 01/02/2024

Report Name: Screener_Water_v2.04.rpt

EXCEEDANCES OF THRESHOLDS

Sample matrix: LEACHATE

General Chemistry

Analyte	Point ID	Sample Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
pH	BH101	1.00	25/09/2023	N/A	10.4	UK DWS	6.5-10	pH units	
	TP302	0.50	03/10/2023	N/A	10.8	UK DWS	6.5-10	pH units	
	TP303	1.00	03/10/2023	N/A	10.7	UK DWS	6.5-10	pH units	

Inorganics

Analyte	Point ID	Sample Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
Sulphate as SO4	TP303	1.00	03/10/2023	N/A	407000	UK DWS	250000	ug/l	

EXCEEDANCES OF THRESHOLDS

Sample matrix: WATER

General Chemistry

Analyte	Point ID	Response Zone Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
pH	BH203	3.00 - 6.00	09/01/2024	Jan-2024	10.2	UK DWS	6.5-10	pH units	

Inorganics

Analyte	Point ID	Response Zone Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
Sulphate as SO4	BH101	4.00 - 19.50	09/01/2024	Jan-2024	749000	UK DWS	250000	ug/l	
	BH102	39.00 - 58.50	09/01/2024	Jan-2024	371000	UK DWS	250000	ug/l	
	BH104	2.00 - 16.00	10/01/2024	Jan-2024	435000	UK DWS	250000	ug/l	
	BH108	3.00 - 17.00	10/01/2024	Jan-2024	371000	UK DWS	250000	ug/l	
	BH202	1.00 - 2.50	09/01/2024	Jan-2024	688000	UK DWS	250000	ug/l	
	BH203	3.00 - 6.00	09/01/2024	Jan-2024	830000	UK DWS	250000	ug/l	
	BH207	1.60 - 2.20	09/01/2024	Jan-2024	1670000	UK DWS	250000	ug/l	

Metals

Analyte	Point ID	Response Zone Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
Arsenic	BH203	3.00 - 6.00	09/01/2024	Jan-2024	16.8	UK DWS	10	ug/l	
Nickel	BH203	3.00 - 6.00	09/01/2024	Jan-2024	56.0	UK DWS	20	ug/l	
Selenium	BH102	39.00 - 58.50	09/01/2024	Jan-2024	19.0	UK DWS	10	ug/l	
	BH202	1.00 - 2.50	09/01/2024	Jan-2024	21.0	UK DWS	10	ug/l	
	BH207	1.60 - 2.20	09/01/2024	Jan-2024	75.0	UK DWS	10	ug/l	

PRE-REPORT DATA CHECK

All GEOL_GEO2 codes are complete.

All GEOL_GEO2 codes are recognised and suitable for this report.

All Test Types are valid and Sample Matrix can be calculated.

All result and screening units match

All TPH fractions are present for all samples to enable the calculation of the TPH Hazard Index

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Unrecognised analytes

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
	10	196	1,400	10.0	5.00	10.0	-	mg/kg	18	27	17	0	

Aliphatics and Aromatics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Aliphatic C05-C06	0.020	0.030	0.100	0.10	0.050	0.10	3,190	mg/kg	18	27	0	0	
Aliphatic C05-C44	10	180	1,300	10.0	5.00	10.0	-	mg/kg	18	27	19	0	
Aliphatic C06-C08	0.020	0.030	0.100	0.10	0.050	0.10	7,780	mg/kg	18	27	0	0	
Aliphatic C08-C10	0.050	0.038	0.100	0.10	0.050	0.10	2,000	mg/kg	18	27	0	0	
Aliphatic C10-C12	1.00	0.52	1.00	1.00	0.50	1.00	9,690	mg/kg	18	27	1	0	
Aliphatic C12-C16	2.00	3.14	12.00	2.00	1.00	2.00	58,800	mg/kg	18	27	12	0	
Aliphatic C16-C21	8.0	11.1	42.0	8.00	4.00	8.00	-	mg/kg	18	27	9	0	
Aliphatic C21-C35	8.0	79.4	460.0	8.00	4.00	8.00	-	mg/kg	18	27	19	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Aliphatics and Aromatics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Aliphatic C35-C44	8.4	91.0	850.0	8.40	4.20	8.40	1,910,000	mg/kg	18	27	16	0	
Aromatic C05-C07	0.010	0.028	0.100	0.10	0.050	0.10	26,200	mg/kg	18	27	0	0	
Aromatic C06-C35	10	106	730	10.0	5.00	10.0	-	mg/kg	18	27	17	0	
Aromatic C07-C08	0.010	0.028	0.100	0.10	0.050	0.10	56,100	mg/kg	18	27	0	0	
Aromatic C08-C10	0.050	0.038	0.100	0.10	0.050	0.10	3,460	mg/kg	18	27	0	0	
Aromatic C10-C12	1.00	0.59	2.00	1.00	0.50	1.00	16,200	mg/kg	18	27	2	0	
Aromatic C12-C16	2.00	2.86	13.00	2.00	1.00	2.00	36,200	mg/kg	18	27	11	0	
Aromatic C16-C21	10.0	19.3	97.0	10.0	5.00	10.0	28,600	mg/kg	18	27	13	0	
Aromatic C21-C35	10.0	85.6	620.0	10.0	5.00	10.0	28,600	mg/kg	18	27	16	0	
Aromatic C35-C44	8.4	91.7	660.0	8.40	4.20	8.40	28,600	mg/kg	18	27	15	0	
Total Aliphatics (C05-C35)	10.0	91.5	490.0	10.0	5.00	10.0	-	mg/kg	18	27	19	0	
TPH Hazard Index	0.001	0.007	0.049	0.0007	0.0007	0.0007	1.00	mg/kg	18	27	N/A	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Asbestos

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Asbestos Quantification - Gravimetric	0.002	0.002	0.002	0.0000	-	0.0000	-	%	1	1	1	0	
Asbestos Quantification - Total %	0.002	0.002	0.002	0.0000	-	0.0000	-	%	1	1	1	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

BTEX and Fuel Additives

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
1,2,4-Trimethylbenzene	0.005	0.003	0.005	0.005	0.003	0.005	611	mg/kg	18	27	0	0	
1,3,5-Trimethylbenzene	0.005	0.003	0.005	0.005	0.003	0.005	611	mg/kg	18	27	0	0	
Benzene	0.005	0.003	0.005	0.005	0.003	0.005	27.0	mg/kg	18	27	0	0	
Ethylbenzene	0.005	0.003	0.005	0.005	0.003	0.005	5,710	mg/kg	18	27	0	0	
Methyl t-butylether (MTBE)	0.005	0.003	0.005	0.005	0.003	0.005	7,480	mg/kg	18	27	0	0	
TAME	0.100	0.050	0.100	0.10	0.050	0.10	-	mg/kg	18	27	0	0	
Toluene	0.005	0.003	0.005	0.005	0.003	0.005	56,300	mg/kg	18	27	0	0	
Xylene - Total (Summed)	0.005	0.005	0.005	0.005	0.005	0.005	5,920	mg/kg	18	27	27	0	
Xylene-m & p	0.005	0.003	0.005	0.005	0.003	0.005	5,920	mg/kg	18	27	0	0	
Xylene-o	0.005	0.003	0.005	0.005	0.003	0.005	5,920	mg/kg	18	27	0	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Chlorinated Aliphatics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
1,1,1,2-Tetrachloroethane	0.005	0.003	0.005	0.005	0.003	0.005	108	mg/kg	18	27	0	0	
1,1,1-Trichloroethane	0.005	0.003	0.005	0.005	0.003	0.005	1,580	mg/kg	18	27	0	0	
1,1,2,2-Tetrachloroethane	0.005	0.003	0.005	0.005	0.003	0.005	274	mg/kg	18	27	0	0	
1,1,2-Trichloroethane	0.005	0.003	0.005	0.005	0.003	0.005	89.0	mg/kg	18	27	0	0	
1,1-Dichloroethane	0.005	0.003	0.005	0.005	0.003	0.005	263	mg/kg	18	27	0	0	
1,1-Dichloroethene	0.005	0.003	0.005	0.005	0.003	0.005	24.0	mg/kg	18	27	0	0	
1,1-Dichloropropene	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
1,2-Dichloroethane	0.005	0.003	0.005	0.005	0.003	0.005	0.67	mg/kg	18	27	0	0	
1,2-Dichloropropane	0.005	0.003	0.005	0.005	0.003	0.005	3.10	mg/kg	18	27	0	0	
1,3-Dichloropropane	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
2,2-Dichloropropane	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Chloroethane	0.005	0.003	0.005	0.005	0.003	0.005	904	mg/kg	18	27	0	0	
Chloromethane	0.005	0.003	0.005	0.005	0.003	0.005	0.96	mg/kg	18	27	0	0	
Cis 1,2-Dichloroethene	0.005	0.003	0.005	0.005	0.003	0.005	14.0	mg/kg	18	27	0	0	
Cis 1,3-Dichloropropene	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Hexachlorobutadiene	0.005	0.003	0.005	0.005	0.003	0.005	31.0	mg/kg	18	27	0	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Chlorinated Aliphatics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Hexachloroethane	0.050	0.025	0.050	0.050	0.025	0.050	21.0	mg/kg	18	27	0	0	
PCE	0.005	0.003	0.005	0.005	0.003	0.005	19.0	mg/kg	18	27	0	0	
Tetrachloromethane	0.005	0.003	0.005	0.005	0.003	0.005	31.0	mg/kg	18	27	0	0	
Trans-1,2-Dichloroethene	0.005	0.003	0.005	0.005	0.003	0.005	21.0	mg/kg	18	27	0	0	
Trans-1,3-Dichloropropene	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Trichloroethene (TCE)	0.005	0.003	0.005	0.005	0.003	0.005	1.20	mg/kg	18	27	0	0	
Trichloromethane	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Vinyl chloride	0.005	0.003	0.005	0.005	0.003	0.005	0.059	mg/kg	18	27	0	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Chlorinated Aromatics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
1,2,3-Trichlorobenzene	0.005	0.003	0.005	0.005	0.003	0.005	102	mg/kg	18	27	0	0	
1,2,4-Trichlorobenzene	0.005	0.003	0.005	0.005	0.003	0.005	265	mg/kg	18	27	0	0	
1,2-Dichlorobenzene	0.005	0.003	0.005	0.005	0.003	0.005	2,020	mg/kg	18	27	0	0	
1,3-Dichlorobenzene	0.005	0.003	0.005	0.005	0.003	0.005	30.0	mg/kg	18	27	0	0	
1,4-Dichlorobenzene	0.005	0.003	0.005	0.005	0.003	0.005	584	mg/kg	18	27	0	0	
2-Chlorotoluene	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
4-Chlorotoluene	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Chlorobenzene	0.005	0.003	0.005	0.005	0.003	0.005	58.0	mg/kg	18	27	0	0	
Hexachlorobenzene	0.30	0.15	0.30	0.30	0.15	0.30	105	mg/kg	18	27	0	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Chlorinated Phenols

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
2,4,5-Trichlorophenol	0.20	0.10	0.20	0.20	0.10	0.20	-	mg/kg	18	27	0	0	
2,4,6-Trichlorophenol	0.100	0.050	0.100	0.10	0.050	0.10	2,700	mg/kg	18	27	0	0	
2,4-Dichlorophenol	0.30	0.15	0.30	0.30	0.15	0.30	2,700	mg/kg	18	27	0	0	
2-Chlorophenol	0.100	0.050	0.100	0.10	0.050	0.10	2,700	mg/kg	18	27	0	0	
4-Chloro-3-Methlphenol	0.100	0.050	0.100	0.10	0.050	0.10	-	mg/kg	18	27	0	0	
Chlorophenols - Total (Summed Isomers)	0.30	0.30	0.30	0.30	0.30	0.30	2,700	mg/kg	18	27	27	0	

Dioxins and Furans

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Dibenzofuran	0.20	0.34	2.00	0.20	0.10	0.20	-	mg/kg	18	27	9	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Dyes

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
4-Nitroaniline	0.20	0.10	0.20	0.20	0.10	0.20	-	mg/kg	18	27	0	0	
Anthraquinone	0.30	0.42	2.00	0.30	0.15	0.30	-	mg/kg	18	27	11	0	

Explosives

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
2,4-Dinitrotoluene	0.20	0.10	0.20	0.20	0.10	0.20	3,720	mg/kg	18	27	0	0	
2,6-Dinitrotoluene	0.100	0.050	0.100	0.10	0.050	0.10	1,850	mg/kg	18	27	0	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

General Chemistry

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
pH	7.70	9.84	11.60	7.90	8.94	11.8	-	pH units	19	36	36	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Halogonated Hydrocarbons

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
1,1,2-Trichloro-1,2,2-Trifluoroethane	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
1,2-Dibromo-3-Chloropropane	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
1,2-Dibromoethane	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Bromobenzene	0.005	0.003	0.005	0.005	0.003	0.005	91.0	mg/kg	18	27	0	0	
Bromodichloromethane	0.005	0.003	0.005	0.005	0.003	0.005	2.00	mg/kg	18	27	0	0	
Bromomethane	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Dibromochloromethane	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Dibromomethane	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Tribromomethane	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Trichlorofluoromethane	0.005	0.006	0.071	0.005	0.003	0.005	-	mg/kg	18	27	2	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Inorganics

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Cyanide	1.00	0.56	1.60	1.00	0.50	1.00	-	mg/kg	18	27	2	0	
Cyanide (Free)	1.00	0.50	1.00	1.00	0.50	1.00	78.0	mg/kg	18	27	0	0	
Sulphate	33,200	766,279	1,900,000	72,000	254,463	571,000	-	ug/l	19	36	36	0	
Water soluble sulphate (2:1)	33,200	766,279	1,900,000	72,000	254,463	571,000	-	ug/l	19	36	36	0	

Ketones

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Isophorone	0.20	0.10	0.20	0.20	0.10	0.20	-	mg/kg	18	27	0	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Metals

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Arsenic	3.8	10.4	50.0	5.00	6.88	9.70	635	mg/kg	19	36	36	0	
Boron	0.30	1.30	3.80	0.20	0.61	1.40	207,000	mg/kg	19	36	35	0	
Cadmium	0.20	0.22	0.70	0.20	0.15	0.50	223	mg/kg	19	36	13	0	
Chromium	7.0	20.9	34.0	17.0	24.3	38.0	-	mg/kg	19	36	36	0	
Chromium III	6.5	21.1	34.0	16.0	24.1	38.0	9,550	mg/kg	19	35	35	0	
Copper	15.0	35.1	91.0	18.0	20.8	26.0	69,800	mg/kg	19	36	36	0	
Hexavalent Chromium	1.20	0.62	1.80	1.20	0.86	1.80	24.0	mg/kg	19	36	0	0	
Lead	10	101	440	19.0	51.1	210	1,390	mg/kg	19	36	36	0	
Mercury	0.30	0.21	0.60	0.30	0.15	0.30	1,110	mg/kg	19	36	6	0	
Nickel	7.8	20.1	39.0	16.0	27.0	33.0	1,710	mg/kg	19	36	36	0	
Selenium	1.00	0.66	3.00	1.00	0.50	1.00	12,300	mg/kg	19	36	3	0	
Zinc	35	111	260	51.0	67.9	82.0	1,050,000	mg/kg	19	36	36	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Other

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Organic matter	0.40	2.37	6.80	1.20	1.88	3.10	-	%	19	36	36	0	
2-Chloronaphthalene	0.100	0.050	0.100	0.10	0.050	0.10	370	mg/kg	18	27	0	0	
4-Chloroaniline	0.100	0.050	0.100	0.10	0.050	0.10	-	mg/kg	18	27	0	0	
4-Chlorophenyl phenyl ether	0.30	0.15	0.30	0.30	0.15	0.30	-	mg/kg	18	27	0	0	
Aniline	0.10	0.17	1.60	1.10	1.10	1.10	-	mg/kg	18	27	5	0	
Azobenzene	0.30	0.15	0.30	0.30	0.15	0.30	-	mg/kg	18	27	0	0	
Bis (2-chloroethoxy) methane	0.30	0.15	0.30	0.30	0.15	0.30	-	mg/kg	18	27	0	0	
Bis (2-chloroethyl) ether	0.20	0.10	0.20	0.20	0.10	0.20	-	mg/kg	18	27	0	0	
Bis (2-chloroisopropyl) ether	0.100	0.050	0.100	0.10	0.050	0.10	-	mg/kg	18	27	0	0	
Bromo phenyl phenyl ether	0.20	0.10	0.20	0.20	0.10	0.20	-	mg/kg	18	27	0	0	
Carbazole	0.30	0.46	3.10	0.30	0.15	0.30	-	mg/kg	18	27	8	0	
Nitrobenzene	0.30	0.15	0.30	0.30	0.15	0.30	-	mg/kg	18	27	0	0	
p-Isopropyltoluene	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Styrene	0.005	0.003	0.005	0.005	0.003	0.005	3,170	mg/kg	18	27	0	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

PAHs

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
2-Methylnaphthalene	0.10	0.16	0.70	0.10	0.050	0.10	-	mg/kg	18	27	13	0	
Acenaphthene	0.05	0.43	3.30	0.050	0.043	0.090	-	mg/kg	19	36	20	0	
Acenaphthylene	0.05	0.12	0.97	0.050	0.028	0.050	-	mg/kg	19	36	18	0	
Anthracene	0.05	1.11	9.20	0.050	0.034	0.10	-	mg/kg	19	36	22	0	
Benzo (a) anthracene	0.05	2.59	21.00	0.050	0.10	0.40	-	mg/kg	19	36	29	0	
Benzo (a) pyrene	0.05	2.15	17.00	0.050	0.081	0.36	38.0	mg/kg	19	36	27	0	
Benzo (b) fluoranthene	0.05	2.78	20.00	0.050	0.11	0.46	-	mg/kg	19	36	29	0	
Benzo (ghi) perylene	0.05	1.23	8.60	0.050	0.066	0.22	-	mg/kg	19	36	26	0	
Benzo (k) fluoranthene	0.05	1.24	8.00	0.050	0.048	0.17	-	mg/kg	19	36	25	0	
Chrysene	0.05	2.40	16.00	0.050	0.11	0.40	-	mg/kg	19	36	30	0	
Dibenzo (ah) anthracene	0.05	0.33	2.40	0.050	0.029	0.060	-	mg/kg	19	36	17	0	
Fluoranthene	0.05	5.54	43.00	0.050	0.21	0.77	-	mg/kg	19	36	32	0	
Fluorene	0.05	0.54	4.40	0.050	0.053	0.11	-	mg/kg	19	36	21	0	
Indeno (1,2,3-cd) pyrene	0.05	1.16	8.60	0.050	0.054	0.17	-	mg/kg	19	36	26	0	
Naphthalene	-	0.086	0.760	0.0001	0.25	1.00	193	mg/kg	19	36	24	0	
PAH Total (EPA 16)	0.8	30.1	230.0	0.80	1.42	4.61	-	mg/kg	19	36	28	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

PAHs

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Phenanthrene	0.05	3.97	32.00	0.080	0.23	0.61	-	mg/kg	19	36	33	0	
Pyrene	0.05	4.39	34.00	0.050	0.18	0.65	-	mg/kg	19	36	32	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

PCBs

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
PCB101	-	0.89	23.00	0.001	0.0005	0.001	-	mg/kg	18	27	10	0	
PCB118	0.001	0.002	0.009	0.001	0.0005	0.001	-	mg/kg	18	27	9	0	
PCB138	0.001	0.001	0.008	0.001	0.0005	0.001	-	mg/kg	18	27	9	0	
PCB153	0.001	0.001	0.008	0.001	0.0005	0.001	-	mg/kg	18	27	9	0	
PCB180	0.0010	0.0008	0.0050	0.001	0.0005	0.001	-	mg/kg	18	27	2	0	
PCB28	0.001	0.006	0.037	0.001	0.0005	0.001	-	mg/kg	18	27	8	0	
PCB52	0.001	0.002	0.009	0.001	0.0005	0.001	-	mg/kg	18	27	9	0	
Total PCB Congeners ICES 7	0.01	0.90	23.00	0.007	0.004	0.007	9.50	mg/kg	18	27	10	1	BH103

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Phenols

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
2,4-Dimethylphenol	0.30	0.15	0.30	0.30	0.15	0.30	15,700	mg/kg	18	27	0	0	
2-Methylphenol (o-Cresol)	0.30	0.15	0.30	0.30	0.15	0.30	160,000	mg/kg	18	27	0	0	
2-Nitrophenol	0.30	0.15	0.30	0.30	0.15	0.30	-	mg/kg	18	27	0	0	
4-Methylphenol	0.20	0.10	0.20	0.20	0.10	0.20	160,000	mg/kg	18	27	0	0	
Methylphenols Total (Summed)	0.30	0.30	0.30	0.30	0.30	0.30	160,000	mg/kg	18	27	27	0	
Phenol	0.20	0.10	0.20	0.20	0.10	0.20	760	mg/kg	18	27	0	0	
Phenol (Monohydric)	1.00	0.50	1.00	1.00	0.50	1.00	-	mg/kg	18	27	0	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

Phthalates

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Butyl benzyl phthalate	0.30	0.17	0.40	0.30	0.15	0.30	940,000	mg/kg	18	27	2	0	
Diethyl phthalate	0.20	0.10	0.20	0.20	0.10	0.20	144,000	mg/kg	18	27	0	0	
Dimethyl phthalate	0.100	0.050	0.100	0.10	0.050	0.10	-	mg/kg	18	27	0	0	
Di-n-butyl phthalate	0.20	0.12	0.50	0.20	0.10	0.20	15,400	mg/kg	18	27	2	0	

Physical

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
Moisture content	1.3	12.2	25.0	7.10	14.0	22.0	-	%	19	36	36	0	
Stone content	0.10	7.97	86.00	0.10	2.42	19.0	-	%	19	36	4	0	
	0.80	1.37	2.00	0.90	1.34	1.70	-	kg	19	37	37	0	

Commercial, SOM=1%

Site Area(s) Selected: Whole site
Phase(s): All phases

Notes: * For results below LOD, a value of half LOD is used in the calculation of the mean

VOCs

Analyte	Madeground			Natural Ground			Assessment Criteria (AC)	Units	No. of Locations	No. of Samples	No. of Samples > LOD	No. of Locations >AC	Locations Failing Screening
	Min	Mean*	Max	Min	Mean*	Max							
iso-Propylbenzene	0.005	0.003	0.005	0.005	0.003	0.005	1,300	mg/kg	18	27	0	0	
n-Butylbenzene	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
n-Propylbenzene	0.005	0.003	0.005	0.005	0.003	0.005	3,860	mg/kg	18	27	0	0	
Sec-Butylbenzene	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	
Tert-Butylbenzene	0.005	0.003	0.005	0.005	0.003	0.005	-	mg/kg	18	27	0	0	

THERE WERE NO EXCEEDANCES OF Commercial, SOM=1%

EXCEEDANCES OF Commercial, SOM=1%

PCBs

Analyte	Point ID	Depth	Result	Threshold	Units	Stratum
Total PCB Congeners ICES 7	BH103	2.10	23.0	9.50	mg/kg	

PRE-REPORT DATA CHECK

All GEOL_GEO2 codes are complete.

All GEOL_GEO2 codes are recognised and suitable for this report.

All Test Types are valid and Sample Matrix can be calculated.

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
	mg/kg	10.0			220	<10	<10	310	81	<10	<10	<10	53	<10	280	350	360	<10	<10	<10	250	120	53

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
	mg/kg	10.0			77	590	<10	1400	500	170	220	15

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Aliphatics and Aromatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Aliphatic C05-C06	mg/kg	0.020	3,190		<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02
Aliphatic C05-C44	mg/kg	10.0			220	<10	36	200	16	<10	27	<10	60	<10	36	270	270	30	<10	<10	260	87	<10
Aliphatic C06-C08	mg/kg	0.020	7,780		<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.1	<0.1	<0.1	<0.02	<0.02	<0.02	<0.02	<0.1	<0.02
Aliphatic C08-C10	mg/kg	0.050	2,000		<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
Aliphatic C10-C12	mg/kg	1.00	9,690		<1	<1	<1	<1	<1	<1	<1	<1	1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
Aliphatic C12-C16	mg/kg	2.00	58,800		2.3	<2	<2	<2	<2	<2	<2	<2	3.1	<2	<2	3.9	<2	2.9	<2	<2	9.5	2.2	<2
Aliphatic C16-C21	mg/kg	8.00			14	<8	<8	8.8	<8	<8	<8	<8	<8	<8	<8	14	13	<8	<8	<8	34	<8	<8
Aliphatic C21-C35	mg/kg	8.00			97	<8	17	98	9.1	<8	13	<8	33	<8	21	140	130	16	<8	<8	100	39	<8
Aliphatic C35-C44	mg/kg	8.40	1,910,000		110	<8.4	19	92	<8.4	<8.4	14	<8.4	18	<8.4	15	110	130	<8.4	<8.4	<8.4	120	42	<8.4
Aromatic C05-C07	mg/kg	0.010	26,200		<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01
Aromatic C06-C35	mg/kg	10.0			110	<10	<10	180	70	<10	<10	<10	35	<10	230	180	200	<10	<10	<10	110	58	53
Aromatic C07-C08	mg/kg	0.010	56,100		<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	<0.1	<0.1	<0.01	<0.01	<0.01	<0.01	<0.1	<0.01
Aromatic C08-C10	mg/kg	0.050	3,460		<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.1	<0.1	<0.1	<0.05	<0.05	<0.05	<0.05	<0.1	<0.05
Aromatic C10-C12	mg/kg	1.00	16,200		<1	<1	<1	<1	<1	<1	<1	2	<1	<1	1.3	<1	<1	<1	<1	<1	<1	<1	<1
Aromatic C12-C16	mg/kg	2.00	36,200		<2	<2	<2	4.9	2.2	<2	<2	2.7	<2	<2	13	2.4	6.8	<2	<2	<2	2.2	<2	<2
Aromatic C16-C21	mg/kg	10.0	28,600		17	<10	<10	25	23	<10	<10	<10	<10	<10	76	25	38	<10	<10	<10	23	<10	15

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Aliphatics and Aromatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Aliphatic C05-C06	mg/kg	0.020	3,190		<0.02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatic C05-C44	mg/kg	10.0			73	490	<10	1300	740	230	270	25
Aliphatic C06-C08	mg/kg	0.020	7,780		<0.02	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatic C08-C10	mg/kg	0.050	2,000		<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aliphatic C10-C12	mg/kg	1.00	9,690		<1	<1	<1	<1	<1	<1	<1	<1
Aliphatic C12-C16	mg/kg	2.00	58,800		2.7	<2	<2	5.6	10	12	10	3.4
Aliphatic C16-C21	mg/kg	8.00			<8	<8	<8	18	41	36	42	<8
Aliphatic C21-C35	mg/kg	8.00			40	160	<8	460	400	120	130	12
Aliphatic C35-C44	mg/kg	8.40	1,910,000		23	330	<8.4	850	290	69	91	<8.4
Aromatic C05-C07	mg/kg	0.010	26,200		<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatic C06-C35	mg/kg	10.0			27	230	<10	730	270	100	110	15
Aromatic C07-C08	mg/kg	0.010	56,100		<0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatic C08-C10	mg/kg	0.050	3,460		<0.05	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Aromatic C10-C12	mg/kg	1.00	16,200		<1	<1	<1	<1	<1	<1	<1	<1
Aromatic C12-C16	mg/kg	2.00	36,200		<2	<2	<2	11	9.4	<2	2.5	2.2
Aromatic C16-C21	mg/kg	10.0	28,600		<10	10	<10	97	52	17	20	<10

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Aliphatics and Aromatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Aromatic C21-C35	mg/kg	10.0	28,600		96	<10	<10	150	45	<10	<10	<10	27	<10	140	150	150	<10	<10	<10	86	50	37
Aromatic C35-C44	mg/kg	8.40	28,600		110	<8.4	<8.4	130	10	<8.4	<8.4	<8.4	18	<8.4	54	170	170	<8.4	<8.4	<8.4	140	64	<8.4
Total Aliphatics (C05-C35)	mg/kg	10.0			110	<10	17	110	10	<10	13	<10	42	<10	22	150	140	24	<10	<10	150	45	<10

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Aliphatics and Aromatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Aromatic C21-C35	mg/kg	10.0	28,600		24	220	<10	620	210	84	87	<10
Aromatic C35-C44	mg/kg	8.40	28,600		51	360	<8.4	660	220	70	110	<8.4
Total Aliphatics (C05-C35)	mg/kg	10.0			50	160	<10	490	450	160	180	21

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Asbestos

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID: BH108
				Depth (m bgl): 0.5
				Sample Date: 16/10/23
				Geology (at top depth of sample): Made Ground
Asbestos Quantification - Gravimetric	%	0.001		0.002
Asbestos Quantification - Total %	%	0.001		0.002

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

BTEX and Fuel Additives

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
1,2,4-Trimethylbenzene	mg/kg	0.005	611		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,3,5-Trimethylbenzene	mg/kg	0.005	611		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzene	mg/kg	0.005	27.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ethylbenzene	mg/kg	0.005	5,710		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Methyl t-butylether (MTBE)	mg/kg	0.005	7,480		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
TAME	mg/kg	0.10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.005	56,300		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Xylene - Total (Summed)	mg/kg	-999	5,920		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Xylene-m & p	mg/kg	0.005	5,920		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Xylene-o	mg/kg	0.005	5,920		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

BTEX and Fuel Additives

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
1,2,4-Trimethylbenzene	mg/kg	0.005	611		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,3,5-Trimethylbenzene	mg/kg	0.005	611		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Benzene	mg/kg	0.005	27.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Ethylbenzene	mg/kg	0.005	5,710		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Methyl t-butylether (MTBE)	mg/kg	0.005	7,480		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
TAME	mg/kg	0.10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Toluene	mg/kg	0.005	56,300		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Xylene - Total (Summed)	mg/kg	-999	5,920		0.005	0.005	0.005	0.005	0.005	0.005	0.005	0.005
Xylene-m & p	mg/kg	0.005	5,920		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Xylene-o	mg/kg	0.005	5,920		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Chlorinated Aliphatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
1,1,1,2-Tetrachloroethane	mg/kg	0.005	108		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1,1-Trichloroethane	mg/kg	0.005	1,580		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1,2,2-Tetrachloroethane	mg/kg	0.005	274		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1,2-Trichloroethane	mg/kg	0.005	89.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1-Dichloroethane	mg/kg	0.005	263		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1-Dichloroethene	mg/kg	0.005	24.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1-Dichloropropene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dichloroethane	mg/kg	0.005	0.67		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dichloropropane	mg/kg	0.005	3.10		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,3-Dichloropropane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,2-Dichloropropane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chloroethane	mg/kg	0.005	904		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chloromethane	mg/kg	0.005	0.96		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cis 1,2-Dichloroethene	mg/kg	0.005	14.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cis 1,3-Dichloropropene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobutadiene	mg/kg	0.005	31.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Chlorinated Aliphatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
1,1,1,2-Tetrachloroethane	mg/kg	0.005	108		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1,1-Trichloroethane	mg/kg	0.005	1,580		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1,2,2-Tetrachloroethane	mg/kg	0.005	274		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1,2-Trichloroethane	mg/kg	0.005	89.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1-Dichloroethane	mg/kg	0.005	263		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1-Dichloroethene	mg/kg	0.005	24.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,1-Dichloropropene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dichloroethane	mg/kg	0.005	0.67		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dichloropropane	mg/kg	0.005	3.10		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,3-Dichloropropane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2,2-Dichloropropane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chloroethane	mg/kg	0.005	904		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chloromethane	mg/kg	0.005	0.96		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cis 1,2-Dichloroethene	mg/kg	0.005	14.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Cis 1,3-Dichloropropene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobutadiene	mg/kg	0.005	31.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Chlorinated Aliphatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Hexachloroethane	mg/kg	0.050	21.0		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PCE	mg/kg	0.005	19.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tetrachloromethane	mg/kg	0.005	31.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trans-1,2-Dichloroethene	mg/kg	0.005	21.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trans-1,3-Dichloropropene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trichloroethene (TCE)	mg/kg	0.005	1.20		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trichloromethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vinyl chloride	mg/kg	0.005	0.059		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Chlorinated Aliphatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Hexachloroethane	mg/kg	0.050	21.0		<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PCE	mg/kg	0.005	19.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tetrachloromethane	mg/kg	0.005	31.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trans-1,2-Dichloroethene	mg/kg	0.005	21.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trans-1,3-Dichloropropene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trichloroethene (TCE)	mg/kg	0.005	1.20		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trichloromethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Vinyl chloride	mg/kg	0.005	0.059		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Chlorinated Aromatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
1,2,3-Trichlorobenzene	mg/kg	0.005	102		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2,4-Trichlorobenzene	mg/kg	0.005	265		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dichlorobenzene	mg/kg	0.005	2,020		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,3-Dichlorobenzene	mg/kg	0.005	30.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,4-Dichlorobenzene	mg/kg	0.005	584		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2-Chlorotoluene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4-Chlorotoluene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chlorobenzene	mg/kg	0.005	58.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	mg/kg	0.30	105		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3

Chlorinated Aromatics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
1,2,3-Trichlorobenzene	mg/kg	0.005	102		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2,4-Trichlorobenzene	mg/kg	0.005	265		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dichlorobenzene	mg/kg	0.005	2,020		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,3-Dichlorobenzene	mg/kg	0.005	30.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,4-Dichlorobenzene	mg/kg	0.005	584		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
2-Chlorotoluene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
4-Chlorotoluene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Chlorobenzene	mg/kg	0.005	58.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Hexachlorobenzene	mg/kg	0.30	105		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Chlorinated Phenols

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
2,4,5-Trichlorophenol	mg/kg	0.20			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2,4,6-Trichlorophenol	mg/kg	0.10	2,700		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	mg/kg	0.30	2,700		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
2-Chlorophenol	mg/kg	0.10	2,700		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-Methlphenol	mg/kg	0.10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorophenols - Total	mg/kg	-999	2,700		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
(Summed Isomers)																							

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Chlorinated Phenols

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
2,4,5-Trichlorophenol	mg/kg	0.20			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2,4,6-Trichlorophenol	mg/kg	0.10	2,700		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
2,4-Dichlorophenol	mg/kg	0.30	2,700		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
2-Chlorophenol	mg/kg	0.10	2,700		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
4-Chloro-3-Methlphenol	mg/kg	0.10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Chlorophenols - Total (Summed Isomers)	mg/kg	-999	2,700		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Dioxins and Furans

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Dibenzofuran	mg/kg	0.20			<0.2	<0.2	<0.2	<0.2	0.3	<0.2	<0.2	<0.2	<0.2	<0.2	2	0.2	1.8	<0.2	<0.2	<0.2	0.4	0.3	0.2

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Dioxins and Furans

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Dibenzofuran	mg/kg	0.20			<0.2	<0.2	<0.2	0.7	1.2	<0.2	<0.2	<0.2

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Dyes

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
4-Nitroaniline	mg/kg	0.20			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Anthraquinone	mg/kg	0.30			0.3	<0.3	<0.3	<0.3	0.6	<0.3	<0.3	<0.3	0.4	<0.3	2	0.4	1.1	<0.3	<0.3	<0.3	0.5	0.5	0.6

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Dyes

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
4-Nitroaniline	mg/kg	0.20			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Anthraquinone	mg/kg	0.30			<0.3	<0.3	<0.3	1	1.3	<0.3	<0.3	<0.3

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Explosives

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
2,4-Dinitrotoluene	mg/kg	0.20	3,720		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2,6-Dinitrotoluene	mg/kg	0.10	1,850		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Explosives

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
2,4-Dinitrotoluene	mg/kg	0.20	3,720		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
2,6-Dinitrotoluene	mg/kg	0.10	1,850		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

General Chemistry

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102		BH103			BH104		BH105		BH105A	BH107		BH108		BH201		
				Depth (m bgl)	0.5	2.1	0.5	4.1	0.5	2.1	3.1	0.5	2.1	0.5	1.0	2.1	1.0	2.0	0.5	2.0	0.3	1.0	2.0
				Sample Date	25/09/23	25/09/23	09/10/23	09/10/23	30/10/23	30/10/23	30/10/23	01/11/23	01/11/23	17/10/23	17/10/23	18/10/23	30/10/23	30/10/23	16/10/23	17/10/23	27/10/23	27/10/23	13/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground		Made Ground	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground
pH	pH units	0.0000			10.3	8.5	11.2	8.3	11.3	10.5	8.5	8.3	10.3	11	7.8	8.1	8.2	7.7	8.2	8.3	10.9	10.7	9.6

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

General Chemistry

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH201A	BH202		BH203	BH204		BH205	BH207	TP301		TP302			TP303		TP304	
				Depth (m bgl)	2.0	0.5	2.0	0.2	0.3	2.0	0.8	0.5	0.5	3.5	0.2	1.0	2.1	0.5	2.0	0.5	3.1
				Sample Date	20/11/23			30/10/23	31/10/23		03/11/23	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground
pH	pH units	0.0000			9.6	8.4	8.6	11.5	10.3	11.6	9.3	11.6	8.9	8.3	9.9	11	7.9	11.3	11.8	11	8.3

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Halogonated Hydrocarbons

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
1,1,2-Trichloro-1,2,2-Trifluoroethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dibromo-3-Chloropropane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dibromoethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bromobenzene	mg/kg	0.005	91.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bromodichloromethane	mg/kg	0.005	2.00		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bromomethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dibromochloromethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dibromomethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tribromomethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trichlorofluoromethane	mg/kg	0.005			<0.005	<0.005	<0.005	0.02	0.071	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Halogonated Hydrocarbons

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
1,1,2-Trichloro-1,2,2-Trifluoroethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dibromo-3-Chloropropane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
1,2-Dibromoethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bromobenzene	mg/kg	0.005	91.0		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bromodichloromethane	mg/kg	0.005	2.00		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Bromomethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dibromochloromethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Dibromomethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tribromomethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Trichlorofluoromethane	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Inorganics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102		BH103			BH104		BH105		BH105A	BH107		BH108		BH201		
				Depth (m bgl)	0.5	2.1	0.5	4.1	0.5	2.1	3.1	0.5	2.1	0.5	1.0	2.1	1.0	2.0	0.5	2.0	0.3	1.0	2.0
				Sample Date	25/09/23	25/09/23	09/10/23	09/10/23	30/10/23	30/10/23	30/10/23	01/11/23	01/11/23	17/10/23	17/10/23	18/10/23	30/10/23	30/10/23	16/10/23	17/10/23	27/10/23	27/10/23	13/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground		Made Ground	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground
Cyanide	mg/kg	1.00			<1	<1	<1		<1	<1		<1		<1	<1		<1	<1	<1		<1	<1	
Cyanide (Free)	mg/kg	1.00	78.0		<1	<1	<1		<1	<1		<1		<1	<1		<1	<1	<1		<1	<1	
Sulphate	ug/l	1,300			1690000	386000	1820000	212000	1150000	1710000	320000	636000	287000	404000	422000	314000	1670000	148000	1790000	170000	1800000	1900000	374000
Water soluble sulphate (2:1)	ug/l	1,300			1690000	386000	1820000	212000	1150000	1710000	320000	636000	287000	404000	422000	314000	1670000	148000	1790000	170000	1800000	1900000	374000

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Inorganics

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH201A	BH202		BH203	BH204		BH205	BH207	TP301		TP302			TP303		TP304	
				Depth (m bgl)	2.0	0.5	2.0	0.2	0.3	2.0	0.8	0.5	0.5	3.5	0.2	1.0	2.1	0.5	2.0	0.5	3.1
				Sample Date	20/11/23			30/10/23	31/10/23		03/11/23	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground
Cyanide	mg/kg	1.00			<1	1.6	<1	<1	<1		1	<1	<1	<1	<1	<1		<1		<1	<1
Cyanide (Free)	mg/kg	1.00	78.0		<1	<1	<1	<1	<1		<1	<1	<1	<1	<1	<1		<1		<1	<1
Sulphate	ug/l	1,300			530000	220000	58300	330000	203000	240000	33200	76300	1810000	89700	269000	552000	571000	348000	72000	403000	483000
Water soluble sulphate (2:1)	ug/l	1,300			530000	220000	58300	330000	203000	240000	33200	76300	1810000	89700	269000	552000	571000	348000	72000	403000	483000

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Ketones

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Isophorone	mg/kg	0.20			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Ketones

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Isophorone	mg/kg	0.20			<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Metals

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102		BH103			BH104		BH105		BH105A	BH107		BH108		BH201		
				Depth (m bgl)	0.5	2.1	0.5	4.1	0.5	2.1	3.1	0.5	2.1	0.5	1.0	2.1	1.0	2.0	0.5	2.0	0.3	1.0	2.0
				Sample Date	25/09/23	25/09/23	09/10/23	09/10/23	30/10/23	30/10/23	30/10/23	01/11/23	01/11/23	17/10/23	17/10/23	18/10/23	30/10/23	30/10/23	16/10/23	17/10/23	27/10/23	27/10/23	13/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground		Made Ground	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground
Arsenic	mg/kg	1.00	635		5.2	7.6	8.1	6.7	8.1	7.4	6.1	50	6.7	6.1	20	5.7	18	5.4	10	5.6	7.1	7.1	7.2
Boron	mg/kg	0.20	207,000		1.2	0.6	0.6	<0.2	1.3	1.3	0.5	0.4	1.4	1.4	2.8	0.4	1.8	0.9	2.3	0.8	1.8	1.6	0.7
Cadmium	mg/kg	0.20	223		<0.2	<0.2	<0.2	<0.2	<0.2	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	0.4	0.5	0.4	0.3	<0.2
Chromium	mg/kg	1.00			17	32	19	24	14	25	21	21	17	12	25	29	18	34	30	27	14	16	24
Chromium III	mg/kg	1.00	9,550		16	32	19	24	14	25	21	20	17		25	29	18	34	29	27	14	16	24
Copper	mg/kg	1.00	69,800		19	29	38	21	28	40	20	31	19	15	55	19	52	17	91	26	20	22	26
Hexavalent Chromium	mg/kg	1.20 - 1.80	24.0		<1.2	<1.2	<1.2	<1.8	<1.2	<1.2	<1.8	<1.2	<1.8	<1.2	<1.2	<1.8	<1.2	<1.2	<1.2	<1.8	<1.2	<1.2	<1.8
Lead	mg/kg	1.00	1,390		100	26	190	21	65	42	30	68	210	32	110	19	190	33	120	33	130	130	54
Mercury	mg/kg	0.30	1,110		<0.3	<0.3	0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.3	<0.3	0.6	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Nickel	mg/kg	1.00	1,710		12	39	16	33	13	26	29	22	22	11	31	32	23	26	23	31	13	13	25
Selenium	mg/kg	1.00	12,300		<1	<1	<1	<1	<1	<1	<1	3	<1	<1	<1	<1	<1	<1	1.1	<1	<1	<1	<1
Zinc	mg/kg	1.00	1,050,000		75	58	110	82	79	75	64	35	61	61	160	51	110	63	200	69	110	110	73

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Metals

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH201A	BH202		BH203	BH204		BH205	BH207	TP301		TP302			TP303		TP304	
				Depth (m bgl)	2.0	0.5	2.0	0.2	0.3	2.0	0.8	0.5	0.5	3.5	0.2	1.0	2.1	0.5	2.0	0.5	3.1
				Sample Date	20/11/23			30/10/23	31/10/23		03/11/23	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground
Arsenic	mg/kg	1.00	635		8.3	9.4	4.9	8	11	8.6	10	6.5	10	5	3.8	6.5	9.5	5.3	9.7	6.8	24
Boron	mg/kg	0.20	207,000		2.2	0.6	1	0.6	0.4	1.7	0.4	0.5	0.6	0.2	0.3	1.5	0.8	2.3	0.7	1.7	3.8
Cadmium	mg/kg	0.20	223		0.2	<0.2	<0.2	0.5	<0.2	0.4	0.4	0.7	<0.2	<0.2	<0.2	0.5	<0.2	0.3	<0.2	0.3	<0.2
Chromium	mg/kg	1.00			26	7	28	18	28	21	12	16	22	21	27	19	38	15	17	25	20
Chromium III	mg/kg	1.00	9,550		26	6.5	28	18	28	21	12	15	22	21	27	19	38	15	16	25	20
Copper	mg/kg	1.00	69,800		24	16	22	28	80	37	48	17	41	20	29	22	18	43	23	53	39
Hexavalent Chromium	mg/kg	1.20 - 1.80	24.0		<1.2	<1.2	<1.2	<1.2	<1.2	<1.8	<1.2	<1.2	<1.2	<1.2	<1.2	<1.2	<1.8	<1.2	<1.8	<1.2	<1.2
Lead	mg/kg	1.00	1,390		86	440	13	58	110	68	180	46	180	28	9.8	82	32	42	36	49	180
Mercury	mg/kg	0.30	1,110		<0.3	0.3	<0.3	<0.3	<0.3	<0.3	0.6	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.5
Nickel	mg/kg	1.00	1,710		29	7.8	26	16	23	19	10	13	22	28	24	18	25	14	16	18	29
Selenium	mg/kg	1.00	12,300		<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	1.9
Zinc	mg/kg	1.00	1,050,000		92	100	67	160	180	100	180	150	120	75	62	260	68	110	73	120	85

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Other

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102		BH103			BH104		BH105		BH105A	BH107		BH108		BH201		
				Depth (m bgl)	0.5	2.1	0.5	4.1	0.5	2.1	3.1	0.5	2.1	0.5	1.0	2.1	1.0	2.0	0.5	2.0	0.3	1.0	2.0
				Sample Date	25/09/23	25/09/23	09/10/23	09/10/23	30/10/23	30/10/23	30/10/23	01/11/23	01/11/23	17/10/23	17/10/23	18/10/23	30/10/23	30/10/23	16/10/23	17/10/23	27/10/23	27/10/23	13/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground		Made Ground	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground
2-Chloronaphthalene	mg/kg	0.10	370		<0.1	<0.1	<0.1		<0.1	<0.1		<0.1		<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	
4-Chloroaniline	mg/kg	0.10			<0.1	<0.1	<0.1		<0.1	<0.1		<0.1		<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	
4-Chlorophenyl phenyl ether	mg/kg	0.30			<0.3	<0.3	<0.3		<0.3	<0.3		<0.3		<0.3	<0.3		<0.3	<0.3	<0.3		<0.3	<0.3	
Aniline	mg/kg	0.10			<0.1	<0.1	<0.1		<0.1	<0.1		<0.1		<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	
Azobenzene	mg/kg	0.30			<0.3	<0.3	<0.3		<0.3	<0.3		<0.3		<0.3	<0.3		<0.3	<0.3	<0.3		<0.3	<0.3	
Bis (2-chloroethoxy) methane	mg/kg	0.30			<0.3	<0.3	<0.3		<0.3	<0.3		<0.3		<0.3	<0.3		<0.3	<0.3	<0.3		<0.3	<0.3	
Bis (2-chloroethyl) ether	mg/kg	0.20			<0.2	<0.2	<0.2		<0.2	<0.2		<0.2		<0.2	<0.2		<0.2	<0.2	<0.2		<0.2	<0.2	
Bis (2-chloroisopropyl) ether	mg/kg	0.10			<0.1	<0.1	<0.1		<0.1	<0.1		<0.1		<0.1	<0.1		<0.1	<0.1	<0.1		<0.1	<0.1	
Bromo phenyl phenyl ether	mg/kg	0.20			<0.2	<0.2	<0.2		<0.2	<0.2		<0.2		<0.2	<0.2		<0.2	<0.2	<0.2		<0.2	<0.2	
Carbazole	mg/kg	0.30			<0.3	<0.3	<0.3		<0.3	0.6		<0.3		<0.3	<0.3		<0.3	<0.3	3.1		0.4	1.9	
Nitrobenzene	mg/kg	0.30			<0.3	<0.3	<0.3		<0.3	<0.3		<0.3		<0.3	<0.3		<0.3	<0.3	<0.3		<0.3	<0.3	
Organic matter	%	0.10			2	1.7	1.9	3.1	1.8	1.4	2.3	0.8	1.6	0.9	4.7	1.6	3.1	1.3	4.2	1.5	2.4	2.3	1.4
p-Isopropyltoluene	mg/kg	0.005			<0.005	<0.005	<0.005		<0.005	<0.005		<0.005		<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	
Styrene	mg/kg	0.005	3,170		<0.005	<0.005	<0.005		<0.005	<0.005		<0.005		<0.005	<0.005		<0.005	<0.005	<0.005		<0.005	<0.005	

Other

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH201A	BH202		BH203	BH204		BH205	BH207	TP301		TP302			TP303		TP304	
				Depth (m bgl)	2.0	0.5	2.0	0.2	0.3	2.0	0.8	0.5	0.5	3.5	0.2	1.0	2.1	0.5	2.0	0.5	3.1
				Sample Date	20/11/23			30/10/23	31/10/23		03/11/23	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground
2-Chloronaphthalene	mg/kg	0.10	370		<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1		<0.1	<0.1
4-Chloroaniline	mg/kg	0.10			<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1		<0.1	<0.1
4-Chlorophenyl phenyl ether	mg/kg	0.30			<0.3	<0.3	<0.3	<0.3	<0.3		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		<0.3		<0.3	<0.3
Aniline	mg/kg	0.10			<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	0.8	1.1	0.1	1.6		<0.1		<0.1	0.8
Azobenzene	mg/kg	0.30			<0.3	<0.3	<0.3	<0.3	<0.3		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		<0.3		<0.3	<0.3
Bis (2-chloroethoxy) methane	mg/kg	0.30			<0.3	<0.3	<0.3	<0.3	<0.3		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		<0.3		<0.3	<0.3
Bis (2-chloroethyl) ether	mg/kg	0.20			<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2		<0.2	<0.2
Bis (2-chloroisopropyl) ether	mg/kg	0.10			<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1		<0.1	<0.1
Bromo phenyl phenyl ether	mg/kg	0.20			<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2		<0.2	<0.2
Carbazole	mg/kg	0.30			<0.3	<0.3	<0.3	0.6	0.4		<0.3	<0.3	<0.3	<0.3	1	1.3		<0.3		<0.3	<0.3
Nitrobenzene	mg/kg	0.30			<0.3	<0.3	<0.3	<0.3	<0.3		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		<0.3		<0.3	<0.3
Organic matter	%	0.10			1.4	0.4	1.4	2	5.2	2.5	1.5	0.7	2.9	2.3	5.4	2.6	1.4	1.7	1.2	2	6.8
p-Isopropyltoluene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005		<0.005	<0.005
Styrene	mg/kg	0.005	3,170		<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005		<0.005	<0.005

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

PAHs

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102		BH103			BH104		BH105		BH105A	BH107		BH108		BH201		
				Depth (m bgl)	0.5	2.1	0.5	4.1	0.5	2.1	3.1	0.5	2.1	0.5	1.0	2.1	1.0	2.0	0.5	2.0	0.3	1.0	2.0
				Sample Date	25/09/23	25/09/23	09/10/23	09/10/23	30/10/23	30/10/23	30/10/23	01/11/23	01/11/23	17/10/23	17/10/23	18/10/23	30/10/23	30/10/23	16/10/23	17/10/23	27/10/23	27/10/23	13/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground		Made Ground	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground
2-Methylnaphthalene	mg/kg	0.10			0.1	<0.1	0.2		<0.1	<0.1		<0.1		<0.1	<0.1		0.3	<0.1	0.7		0.2	0.4	
Acenaphthene	mg/kg	0.050			0.11	<0.05	0.07	0.06	0.11	0.27	<0.05	<0.05	<0.05	<0.05	<0.05	0.09	0.12	<0.05	3.3	<0.05	0.27	1.9	<0.05
Acenaphthylene	mg/kg	0.050			0.07	<0.05	<0.05	<0.05	0.12	0.18	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.16	0.05	0.97	<0.05	0.16	0.22	<0.05
Anthracene	mg/kg	0.050			0.4	<0.05	0.2	<0.05	0.39	1.3	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.42	0.05	9.2	<0.05	1.1	3.1	<0.05
Benzo (a) anthracene	mg/kg	0.050			1.6	0.07	0.76	<0.05	1.1	2	0.1	0.11	<0.05	0.12	<0.05	<0.05	1.1	0.12	21	0.06	3.1	6.5	0.15
Benzo (a) pyrene	mg/kg	0.050	38.0		1.4	0.06	0.65	<0.05	1.1	1.7	<0.05	0.07	<0.05	0.09	<0.05	<0.05	1.2	<0.05	17	0.06	2.9	4.6	0.13
Benzo (b) fluoranthene	mg/kg	0.050			1.7	0.07	0.9	<0.05	1.9	3	0.13	0.13	<0.05	0.14	<0.05	<0.05	2	0.25	20	0.07	3.2	5.4	0.19
Benzo (ghi) perylene	mg/kg	0.050			0.74	<0.05	0.41	<0.05	0.79	0.96	0.1	<0.05	<0.05	0.06	<0.05	<0.05	0.8	0.11	8.6	<0.05	1.5	2.4	0.09
Benzo (k) fluoranthene	mg/kg	0.050			0.7	<0.05	0.32	<0.05	2.5	0.43	<0.05	0.05	<0.05	0.05	<0.05	<0.05	2.4	<0.05	8	<0.05	1.8	3.2	0.07
Chrysene	mg/kg	0.050			1.5	0.07	0.86	<0.05	1.6	2.4	0.12	0.11	<0.05	0.1	<0.05	<0.05	1.4	0.23	16	0.09	3.1	5.3	0.17
Dibenzo (ah) anthracene	mg/kg	0.050			0.21	<0.05	0.11	<0.05	0.14	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	2.4	<0.05	0.45	0.71	<0.05
Fluoranthene	mg/kg	0.050			3.3	0.17	1.5	0.07	2.7	5.4	0.21	0.16	0.09	0.19	<0.05	<0.05	2.9	0.33	43	0.18	5.9	15	0.27
Fluorene	mg/kg	0.050			0.14	<0.05	0.07	0.11	0.11	0.36	0.08	<0.05	<0.05	<0.05	<0.05	0.06	0.13	<0.05	4.4	<0.05	0.4	2.5	<0.05
Indeno (1,2,3-cd) pyrene	mg/kg	0.050			0.66	<0.05	0.37	<0.05	0.73	0.97	0.08	<0.05	<0.05	0.05	<0.05	<0.05	0.75	0.14	8.6	<0.05	1.5	2.3	0.09
Naphthalene	mg/kg	0.0001 - 0.050	193		0.1	<0.0001	0.24	0.86	0.06	0.06	0.18	<0.0001	<0.05	<0.0001	<0.0001	1	0.19	0.05	0.53	<0.05	0.11	0.2	<0.05
PAH Total (EPA 16)	mg/kg	0.80			16.8	<0.8	8.67	1.42	17	27.3	1.5	<0.8	<0.8	1.07	<0.8	1.27	17.5	1.8	230	<0.8	34	79.7	1.58

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

PAHs

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH201A	BH202		BH203	BH204		BH205	BH207	TP301		TP302			TP303		TP304	
				Depth (m bgl)	2.0	0.5	2.0	0.2	0.3	2.0	0.8	0.5	0.5	3.5	0.2	1.0	2.1	0.5	2.0	0.5	3.1
				Sample Date	20/11/23			30/10/23	31/10/23		03/11/23	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground
2-Methylnaphthalene	mg/kg	0.10			<0.1	<0.1	<0.1	0.1	0.4		0.3	<0.1	<0.1	<0.1	0.2	0.2		0.2		0.2	<0.1
Acenaphthene	mg/kg	0.050			<0.05	<0.05	<0.05	0.41	0.56	0.4	0.33	<0.05	0.09	<0.05	1.4	2.1	<0.05	0.2	0.07	0.18	<0.05
Acenaphthylene	mg/kg	0.050			<0.05	<0.05	<0.05	0.09	0.19	0.1	0.13	<0.05	0.08	<0.05	0.22	0.31	<0.05	0.09	<0.05	0.07	<0.05
Anthracene	mg/kg	0.050			0.07	<0.05	<0.05	1.5	1.3	1.4	1.5	0.08	0.46	<0.05	3.4	3.9	<0.05	0.65	0.1	0.55	0.07
Benzo (a) anthracene	mg/kg	0.050			0.18	<0.05	<0.05	3.1	4.5	3.1	5.8	0.43	1.4	<0.05	6.2	6.2	0.14	1.9	0.4	1.8	0.17
Benzo (a) pyrene	mg/kg	0.050	38.0		0.12	<0.05	<0.05	2.4	3.9	2.8	5.2	0.35	1.2	<0.05	4.9	5	0.1	1.6	0.36	1.5	0.15
Benzo (b) fluoranthene	mg/kg	0.050			0.2	<0.05	<0.05	3.3	5	3.5	7.6	0.59	1.5	<0.05	6.7	6.5	0.13	1.9	0.46	1.8	0.23
Benzo (ghi) perylene	mg/kg	0.050			0.09	<0.05	<0.05	1.2	2.3	1.5	3.6	0.21	1.2	<0.05	3	3	0.08	0.85	0.22	0.82	0.12
Benzo (k) fluoranthene	mg/kg	0.050			0.06	<0.05	<0.05	1.2	2.3	1.2	2.2	0.14	0.74	<0.05	2.5	2.9	0.06	0.93	0.17	0.9	0.07
Chrysene	mg/kg	0.050			0.18	<0.05	<0.05	2.7	4.3	3	5.4	0.39	1.4	0.09	6.4	6.9	0.13	1.7	0.4	1.6	0.22
Dibenzo (ah) anthracene	mg/kg	0.050			<0.05	<0.05	<0.05	0.37	0.61	0.57	0.91	0.06	0.26	<0.05	0.98	0.7	<0.05	0.23	0.06	0.2	<0.05
Fluoranthene	mg/kg	0.050			0.4	<0.05	<0.05	6.7	8.7	6.6	11	0.82	2.6	0.09	15	15	0.28	3.6	0.77	3.4	0.28
Fluorene	mg/kg	0.050			<0.05	<0.05	<0.05	0.75	0.64	0.5	0.38	<0.05	0.09	<0.05	1.7	2	<0.05	0.32	0.07	0.24	<0.05
Indeno (1,2,3-cd) pyrene	mg/kg	0.050			0.08	<0.05	<0.05	1.2	2	1.3	3	0.17	0.88	<0.05	2.9	3	0.06	0.76	0.17	0.73	0.07
Naphthalene	mg/kg	0.0001 - 0.050	193		<0.0001	<0.0001	<0.0001	0.14	0.25	0.28	0.76	<0.0001	0.08	0.06	0.37	0.16	<0.05	0.15	0.1	0.14	0.05
PAH Total (EPA 16)	mg/kg	0.80			2.1	<0.8	<0.8	36	48	35.7	60.7	4.28	15.4	<0.8	77.7	83.6	1.35	20.1	4.61	18.5	2.07

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

PAHs

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102		BH103			BH104		BH105		BH105A	BH107		BH108		BH201		
				Depth (m bgl)	0.5	2.1	0.5	4.1	0.5	2.1	3.1	0.5	2.1	0.5	1.0	2.1	1.0	2.0	0.5	2.0	0.3	1.0	2.0
				Sample Date	25/09/23	25/09/23	09/10/23	09/10/23	30/10/23	30/10/23	30/10/23	01/11/23	01/11/23	17/10/23	17/10/23	18/10/23	30/10/23	30/10/23	16/10/23	17/10/23	27/10/23	27/10/23	13/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground		Made Ground	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground
Phenanthrene	mg/kg	0.050			1.6	0.11	0.86	0.24	1.1	4.3	0.3	<0.05	0.08	0.11	0.1	0.1	1.5	0.19	32	0.15	3.1	15	0.21
Pyrene	mg/kg	0.050			2.8	0.13	1.4	0.08	2.5	4	0.15	0.13	0.08	0.16	<0.05	<0.05	2.4	0.28	34	0.14	5.4	11	0.21

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

PAHs

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH201A	BH202		BH203	BH204		BH205	BH207	TP301		TP302			TP303		TP304	
				Depth (m bgl)	2.0	0.5	2.0	0.2	0.3	2.0	0.8	0.5	0.5	3.5	0.2	1.0	2.1	0.5	2.0	0.5	3.1
				Sample Date	20/11/23			30/10/23	31/10/23		03/11/23	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground
Phenanthrene	mg/kg	0.050			0.42	<0.05	<0.05	5.9	4.6	4.3	4.8	0.34	1.3	0.19	11	14	0.15	2.1	0.61	1.7	0.38
Pyrene	mg/kg	0.050			0.3	<0.05	<0.05	5	6.9	5.4	8.4	0.7	2.2	0.08	11	12	0.22	3.2	0.65	3	0.26

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

PCBs

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
PCB101	mg/kg	0.001			0.002	<0.001	0.005	0.003	23	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.004	0.004	0.001	<0.001	<0.001	0.001	<0.001	<0.001
PCB118	mg/kg	0.001			0.003	<0.001	0.005	0.004	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.004	0.004	0.001	<0.001	<0.001	0.001	<0.001	<0.001
PCB138	mg/kg	0.001			0.003	<0.001	0.005	0.002	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001	0.003	0.003	0.001	<0.001	<0.001	0.002	<0.001	<0.001
PCB153	mg/kg	0.001			0.002	<0.001	0.004	0.001	<0.001	<0.001	<0.001	<0.001	0.002	<0.001	<0.001	0.003	0.003	0.001	<0.001	<0.001	0.003	<0.001	<0.001
PCB180	mg/kg	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.005	<0.001	<0.001	<0.001	<0.001	0.003	<0.001	<0.001
PCB28	mg/kg	0.001			0.019	<0.001	0.037	0.02	0.006	<0.001	0.004	<0.001	<0.001	<0.001	<0.001	0.023	0.029	0.002	<0.001	<0.001	<0.001	<0.001	<0.001
PCB52	mg/kg	0.001			0.005	<0.001	0.009	0.006	0.002	<0.001	0.001	<0.001	0.001	<0.001	<0.001	0.006	0.007	0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total PCB Congeners ICES 7	mg/kg	0.007	9.50		0.033	<0.007	0.065	0.037	23	<0.007	<0.007	<0.007	0.009	<0.007	<0.007	0.047	0.05	0.007	<0.007	<0.007	0.011	<0.007	<0.007

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

PCBs

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
PCB101	mg/kg	0.001			<0.001	<0.001	<0.001	<0.001	0.007	<0.001	<0.001	<0.001
PCB118	mg/kg	0.001			<0.001	<0.001	<0.001	<0.001	0.009	<0.001	<0.001	<0.001
PCB138	mg/kg	0.001			<0.001	<0.001	<0.001	<0.001	0.008	<0.001	<0.001	<0.001
PCB153	mg/kg	0.001			<0.001	<0.001	<0.001	<0.001	0.008	<0.001	<0.001	<0.001
PCB180	mg/kg	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PCB28	mg/kg	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
PCB52	mg/kg	0.001			<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001
Total PCB Congeners ICES 7	mg/kg	0.007	9.50		<0.007	<0.007	<0.007	<0.007	0.032	<0.007	<0.007	<0.007

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Phenols

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101	BH101	BH102	BH103	BH103	BH104	BH105	BH105	BH107	BH107	BH108	BH201	BH201	BH201A	BH202	BH202	BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
2,4-Dimethylphenol	mg/kg	0.30	15,700		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
2-Methylphenol (o-Cresol)	mg/kg	0.30	160,000		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
2-Nitrophenol	mg/kg	0.30			<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
4-Methylphenol	mg/kg	0.20	160,000		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methylphenols Total (Summed)	mg/kg	-999	160,000		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Phenol	mg/kg	0.20	760		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Phenol (Monohydric)	mg/kg	1.00			<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Phenols

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
2,4-Dimethylphenol	mg/kg	0.30	15,700		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
2-Methylphenol (o-Cresol)	mg/kg	0.30	160,000		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
2-Nitrophenol	mg/kg	0.30			<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
4-Methylphenol	mg/kg	0.20	160,000		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Methylphenols Total (Summed)	mg/kg	-999	160,000		0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Phenol	mg/kg	0.20	760		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Phenol (Monohydric)	mg/kg	1.00			<1	<1	<1	<1	<1	<1	<1	<1

Phthalates

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Butyl benzyl phthalate	mg/kg	0.30	940,000		<0.3	<0.3	0.4	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	0.4	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Diethyl phthalate	mg/kg	0.20	144,000		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethyl phthalate	mg/kg	0.10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-butyl phthalate	mg/kg	0.20	15,400		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Phthalates

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
Butyl benzyl phthalate	mg/kg	0.30	940,000		<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Diethyl phthalate	mg/kg	0.20	144,000		<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Dimethyl phthalate	mg/kg	0.10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Di-n-butyl phthalate	mg/kg	0.20	15,400		<0.2	<0.2	<0.2	<0.2	0.3	0.5	<0.2	<0.2

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Physical

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102		BH103			BH104		BH105		BH105A	BH107		BH108		BH201		
				Depth (m bgl)	0.5	2.1	0.5	4.1	0.5	2.1	3.1	0.5	2.1	0.5	1.0	2.1	1.0	2.0	0.5	2.0	0.3	1.0	2.0
				Sample Date	25/09/23	25/09/23	09/10/23	09/10/23	30/10/23	30/10/23	30/10/23	01/11/23	01/11/23	17/10/23	17/10/23	18/10/23	30/10/23	30/10/23	16/10/23	17/10/23	27/10/23	27/10/23	13/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground		Made Ground	Made Ground		Made Ground		Made Ground	Made Ground		Made Ground	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground
	kg				1.9	2	1.3	1.3	1	0.8	1.1	1.7	1.7	1.2	1.3	1.2	0.9	0.9	1.5	1.6	2	2	1.2
Moisture content	%	0.010			13	17	6.7	9.9	8.2	18	14	12	15	11	17	21	13	17	12	12	9.6	8.9	13
Stone content	%	0.10			<0.1	<0.1	60	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	19	<0.1	<0.1	<0.1

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

Physical

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH201A	BH202		BH203	BH204		BH205	BH207	TP301			TP302			TP303		TP304	
				Depth (m bgl)	2.0	0.5	2.0	0.2	0.3	2.0	0.8	0.5	0.5	2.0	3.5	0.2	1.0	2.1	0.5	2.0	0.5	3.1
				Sample Date	20/11/23			30/10/23	31/10/23		03/11/23	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground			Made Ground	Made Ground		Made Ground		Made Ground	Made Ground
	kg				1.4	0.8	1.1	1.4	2	1.3	0.8	1.5	1.4	0.9	1.4	1.4	1.4	1.4	1.3	1.5	1.3	1.5
Moisture content	%	0.010			15	17	13	15	13	8.9	18	5.8	13		11	1.3	7.4	22	6.6	7.1	5.4	25
Stone content	%	0.10			<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	76	<0.1		<0.1	86	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

VOCs

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH101		BH102	BH103		BH104	BH105		BH107		BH108	BH201		BH201A	BH202		BH203	BH204	BH205
				Depth (m bgl)	0.5	2.1	0.5	0.5	2.1	0.5	0.5	1.0	1.0	2.0	0.5	0.3	1.0	2.0	0.5	2.0	0.2	0.3	0.8
				Sample Date	25/09/23	25/09/23	09/10/23	30/10/23	30/10/23	01/11/23	17/10/23	17/10/23	30/10/23	30/10/23	16/10/23	27/10/23	27/10/23	20/11/23			30/10/23	31/10/23	03/11/23
				Geology (at top depth of sample)	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
iso-Propylbenzene	mg/kg	0.005	1,300		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
n-Butylbenzene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
n-Propylbenzene	mg/kg	0.005	3,860		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Sec-Butylbenzene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tert-Butylbenzene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

Commercial, SOM=1%

Site Area(s): Whole site
Phase(s): All phases

VOCs

Result > Assessment Criteria

Limit of detection > Assessment Criteria

Analyte	Units	LOD	GAC	PointID	BH207	TP301		TP302		TP303	TP304	
				Depth (m bgl)	0.5	0.5	3.5	0.2	1.0	0.5	0.5	3.1
				Sample Date	01/11/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23	03/10/23
				Geology (at top depth of sample)	Made Ground	Made Ground		Made Ground	Made Ground	Made Ground	Made Ground	Made Ground
iso-Propylbenzene	mg/kg	0.005	1,300		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
n-Butylbenzene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
n-Propylbenzene	mg/kg	0.005	3,860		<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Sec-Butylbenzene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005
Tert-Butylbenzene	mg/kg	0.005			<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005

PRE-REPORT DATA CHECK

- All analyte codes are matched to the library
- All Test Types are valid and Sample Matrix can be calculated.
- All result and screening units match

Region	Wales and England	**Hardness**	> 250 mg/l
Water Body	Surface water	**Recieving surface water status**	Good (or below)
Water Body Type	Inland		
Surface Water Type	River or Stream	**Altitude**	Any

Phosphorous cannot currently be screened for a lake/loch receptor - refer to the River Basin Typology Standards to assess manually.

Sample Matrix: LEACHATE

Site Area(s) Selected: Whole site
Event(s) Selected: All events

General Chemistry

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
pH	7.80	9.62	10.80	6.00/9.00	EQS 2015	pH units	5	5	3	BH101, TP302, TP303

Inorganics

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Ammonium	15.0	34.3	72.0	-		ug/l	5	4	0	
Cyanide	1.00	0.50	1.00	1.00	EQS 2015 - Assumes Free Cyanide	ug/l	5	0	0	
Cyanide (Free)	1.00	0.50	1.00	1.00	EQS 2015	ug/l	5	0	0	
Sulphate as SO4	67700	207760	407000	-		ug/l	5	5	0	

Metals

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Arsenic	1.00	1.62	2.10	50.0	EQS 2015	ug/l	5	4	0	
Boron	15.0	26.0	44.0	-		ug/l	5	5	0	
Cadmium	0.080	0.040	0.080	-		ug/l	5	0	0	
Chromium	0.50	3.04	5.70	4.70	EQS 2015	ug/l	5	5	1	TP303
Chromium III	5.00	3.14	5.70	4.70	EQS 2015	ug/l	5	1	1	TP303
Copper	13.0	17.6	24.0	1.00	EQS 2015 - Bioavailable	ug/l	5	5	5	BH101, BH102, BH204, TP302, TP303
Hexavalent Chromium	5.00	2.50	5.00	3.40	EQS 2015	ug/l	5	0	0	
Lead	1.00	1.22	3.50	1.20	EQS 2015 - Bioavailable	ug/l	5	2	1	BH102
Mercury	0.50	0.25	0.50	0.070	EQS 2015 MAC	ug/l	5	0	0	
Nickel	0.50	1.04	2.00	4.00	EQS 2015 - Bioavailable	ug/l	5	5	0	
Selenium	4.00	2.00	4.00	-		ug/l	5	0	0	
Zinc	4.6	52.5	230.0	10.9	EQS 2015 - Bioavailable	ug/l	5	5	2	BH102, BH204

Sample Matrix: LEACHATE

Site Area(s) Selected: Whole site
Event(s) Selected: All events

PAHs

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Acenaphthene	0.01	0.27	0.96	-		ug/l	5	2	0	
Acenaphthylene	0.010	0.005	0.010	-		ug/l	5	0	0	
Anthracene	0.010	0.034	0.150	0.10	EQS 2015	ug/l	5	1	1	TP302
Benzo (a) anthracene	0.010	0.005	0.010	-		ug/l	5	0	0	
Benzo (a) pyrene	0.010	0.005	0.010	0.0002	EQS 2015	ug/l	5	0	0	
Benzo (b) fluoranthene	0.010	0.005	0.010	-		ug/l	5	0	0	
Benzo (ghi) perylene	0.010	0.005	0.010	-		ug/l	5	0	0	
Benzo (k) fluoranthene	0.010	0.005	0.010	-		ug/l	5	0	0	
Chrysene	0.010	0.005	0.010	-		ug/l	5	0	0	
Dibenzo (ah) anthracene	0.010	0.005	0.010	-		ug/l	5	0	0	
Fluoranthene	0.010	0.044	0.200	0.006	EQS 2015	ug/l	5	1	1	TP302
Fluorene	0.010	0.093	0.330	-		ug/l	5	2	0	
Indeno (1,2,3-cd) pyrene	0.010	0.005	0.010	-		ug/l	5	0	0	
Naphthalene	0.01	0.92	2.90	2.00	EQS 2015	ug/l	5	2	1	TP302
PAH 16 Total	0.20	1.50	5.10	-		ug/l	5	2	0	
Phenanthrene	0.010	0.090	0.430	-		ug/l	5	1	0	
Pyrene	0.010	0.032	0.140	-		ug/l	5	1	0	

Phenols

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Phenol (Monohydric)	1.00	1.22	2.90	-		ug/l	5	2	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Unrecognised analytes — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
	10.00	5.00	10.00	-		ug/l	7	0	0	

Aliphatics and Aromatics — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Aliphatic C05-C06	1.00	0.50	1.00	-		ug/l	7	0	0	
Aliphatic C05-C44	10.00	5.00	10.00	-		ug/l	7	0	0	
Aliphatic C06-C08	1.00	0.50	1.00	-		ug/l	7	0	0	
Aliphatic C08-C10	1.00	0.50	1.00	-		ug/l	7	0	0	
Aliphatic C10-C12	10.00	5.00	10.00	-		ug/l	7	0	0	
Aliphatic C12-C16	10.00	5.00	10.00	-		ug/l	7	0	0	
Aliphatic C16-C21	10.00	5.00	10.00	-		ug/l	7	0	0	
Aliphatic C21-C35	10.00	5.00	10.00	-		ug/l	7	0	0	
Aliphatic C35-C44	10.00	5.00	10.00	-		ug/l	7	0	0	
Aromatic C05-C07	1.00	0.50	1.00	10.0	CL:AIRE 2017	ug/l	7	0	0	
Aromatic C06-C35	10.00	5.00	10.00	-		ug/l	7	0	0	
Aromatic C07-C08	1.00	0.50	1.00	74.0	CL:AIRE 2017	ug/l	7	0	0	
Aromatic C08-C10	1.00	0.50	1.00	20.0	CL:AIRE 2017	ug/l	7	0	0	
Aromatic C10-C12	10.00	5.00	10.00	2.00	CL:AIRE 2017	ug/l	7	0	0	
Aromatic C12-C16	10.00	5.00	10.00	2.00	CL:AIRE 2017	ug/l	7	0	0	
Aromatic C16-C21	10.00	5.00	10.00	0.10	CL:AIRE 2017	ug/l	7	0	0	
Aromatic C21-C35	10.00	5.00	10.00	0.0002	CL:AIRE 2017	ug/l	7	0	0	
Aromatic C35-C44	10.00	5.00	10.00	-		ug/l	7	0	0	
Total Aliphatics (C05-C35)	10.00	5.00	10.00	-		ug/l	7	0	0	

Alkali and Alkaline Earth Metals — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Calcium	170000	257143	420000	-		ug/l	7	7	0	
Magnesium	1600	109943	210000	-		ug/l	7	7	0	

BTEX and Fuel Additives — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
1,2,4-Trimethylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
1,3,5-Trimethylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
Benzene	3.00	1.50	3.00	10.0	EQS 2015	ug/l	7	0	0	
Ethylbenzene	3.00	1.50	3.00	20.0	Proposed EQS	ug/l	7	0	0	
Methyl t-butylether (MTBE)	3.00	1.50	3.00	-		ug/l	7	0	0	
TAME	100.0	50.0	100.0	-		ug/l	5	0	0	
Toluene	3.00	1.50	3.00	74.0	EQS 2015	ug/l	7	0	0	
Xylene - Total (Summed)	3.00	3.00	3.00	-		ug/l	7	7	0	
Xylene-m & p	3.00	1.50	3.00	-		ug/l	7	0	0	
Xylene-o	3.00	1.50	3.00	-		ug/l	7	0	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Chlorinated Aliphatics — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
1,1,1,2-Tetrachloroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,1,1-Trichloroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,1,2,2-Tetrachloroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,1,2-Trichloroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,1-Dichloroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,1-Dichloroethene	3.00	1.50	3.00	-		ug/l	7	0	0	
1,1-Dichloropropene	3.00	1.50	3.00	-		ug/l	7	0	0	
1,2-Dichloroethane	3.00	1.50	3.00	10.0	EQS 2015	ug/l	7	0	0	
1,2-Dichloropropane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,3-Dichloropropane	3.00	1.50	3.00	-		ug/l	7	0	0	
2,2-Dichloropropane	3.00	1.50	3.00	-		ug/l	7	0	0	
Chloroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Chloromethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Cis 1,2-Dichloroethene	3.00	1.50	3.00	-		ug/l	7	0	0	
Cis 1,3-Dichloropropene	3.00	1.50	3.00	-		ug/l	7	0	0	
Hexachlorobutadiene	3.00	1.50	3.00	0.60	EQS 2015 MAC	ug/l	7	0	0	
Hexachloroethane	0.050	0.025	0.050	-		ug/l	7	0	0	
PCE	3.00	1.50	3.00	10.0	EQS 2015	ug/l	7	0	0	
Tetrachloromethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Trans-1,2-Dichloroethene	3.00	1.50	3.00	-		ug/l	7	0	0	
Trans-1,3-Dichloropropene	3.00	1.50	3.00	-		ug/l	7	0	0	
Trichloroethene (TCE)	3.00	1.50	3.00	10.0	EQS 2015	ug/l	7	0	0	
Trichloromethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Vinyl chloride	3.00	1.50	3.00	-		ug/l	7	0	0	

Chlorinated Aromatics — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
1,2,3-Trichlorobenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
1,2,4-Trichlorobenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
1,2-Dichlorobenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
1,3-Dichlorobenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
1,4-Dichlorobenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
2-Chlorotoluene	3.00	1.50	3.00	-		ug/l	7	0	0	
4-Chlorotoluene	3.00	1.50	3.00	-		ug/l	7	0	0	
Chlorobenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
Hexachlorobenzene	0.050	0.025	0.050	0.050	EQS 2015 MAC	ug/l	7	0	0	

Chlorinated Phenols — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
2,4,5-Trichlorophenol	0.050	0.025	0.050	-		ug/l	7	0	0	
2,4,6-Trichlorophenol	0.050	0.025	0.050	-		ug/l	7	0	0	
2,4-Dichlorophenol	0.050	0.025	0.050	4.20	EQS 2015	ug/l	7	0	0	
2-Chlorophenol	0.050	0.025	0.050	-		ug/l	7	0	0	
4-Chloro-3-Methlphenol	0.050	0.025	0.050	-		ug/l	7	0	0	
Chlorophenols - Total (Summed Isomers)	0.050	0.050	0.050	-		ug/l	7	7	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Dioxins and Furans — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Dibenzofuran	0.050	0.025	0.050	-		ug/l	7	0	0	

Dyes — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
4-Nitroaniline	0.050	0.025	0.050	-		ug/l	7	0	0	
Anthraquinone	0.050	0.025	0.050	-		ug/l	7	0	0	

Explosives — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
2,4-Dinitrotoluene	0.050	0.025	0.050	-		ug/l	7	0	0	
2,6-Dinitrotoluene	0.050	0.025	0.050	-		ug/l	7	0	0	

General Chemistry — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
pH	7.30	7.99	10.20	6.00/9.00	EQS 2015	pH units	7	7	1	BH203

Halogonated Hydrocarbons — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
1,1,2-Trichloro-1,2,2-Trifluoroethane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,2-Dibromo-3-Chloropropane	3.00	1.50	3.00	-		ug/l	7	0	0	
1,2-Dibromoethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Bromobenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
Bromodichloromethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Bromomethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Dibromochloromethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Dibromomethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Tribromomethane	3.00	1.50	3.00	-		ug/l	7	0	0	
Trichlorofluoromethane	3.00	1.50	3.00	-		ug/l	7	0	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

Inorganics — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Total hardness	678	1097	1900	-		ŋgCaCO3/	7	7	0	
Ammonium	150	2491	13000	-		ug/l	7	7	0	
Cyanide	1.0	10.7	45.0	1.00	EQS 2015 - Assumes Free Cyanide	ug/l	7	2	2	BH203, BH207
Cyanide (Free)	1.00	3.71	10.00	1.00	EQS 2015	ug/l	7	0	0	
Sulphate as SO4	371000	730571	1670000	-		ug/l	7	7	0	

Ketones — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Isophorone	0.050	0.025	0.050	-		ug/l	7	0	0	

Metals — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Arsenic	0.32	3.39	16.80	50.0	EQS 2015	ug/l	7	7	0	
Boron	30	135	250	-		ug/l	7	7	0	
Cadmium	0.020	0.023	0.050	-		ug/l	7	3	0	
Chromium	0.20	0.51	0.90	4.70	EQS 2015	ug/l	7	6	0	
Chromium III	5.00	2.50	5.00	4.70	EQS 2015	ug/l	7	0	0	
Copper	0.90	3.50	11.00	1.00	EQS 2015 - Bioavailable	ug/l	7	7	6	BH102, BH104, BH108, BH202, BH203, BH207
Hexavalent Chromium	5.00	2.50	5.00	3.40	EQS 2015	ug/l	7	0	0	
Lead	0.20	0.30	1.00	1.20	EQS 2015 - Bioavailable	ug/l	7	3	0	
Mercury	0.050	0.025	0.050	0.070	EQS 2015 MAC	ug/l	7	0	0	
Nickel	1.3	11.9	56.0	4.00	EQS 2015 - Bioavailable	ug/l	7	7	3	BH104, BH203, BH207
Selenium	1.7	18.7	75.0	-		ug/l	7	7	0	
Zinc	1.00	6.67	15.00	10.9	EQS 2015 - Bioavailable	ug/l	7	7	1	BH101

Other — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
2-Chloronaphthalene	0.050	0.025	0.050	-		ug/l	7	0	0	
4-Chloroaniline	0.050	0.025	0.050	-		ug/l	7	0	0	
4-Chlorophenyl phenyl ether	0.050	0.025	0.050	-		ug/l	7	0	0	
Aniline	0.05	0.62	4.20	-		ug/l	7	1	0	
Azobenzene	0.050	0.025	0.050	-		ug/l	7	0	0	
Bis (2-chloroethoxy) methane	0.050	0.025	0.050	-		ug/l	7	0	0	
Bis (2-chloroethyl) ether	0.050	0.025	0.050	-		ug/l	7	0	0	
Bis (2-chloroisopropyl) ether	0.050	0.025	0.050	-		ug/l	7	0	0	
Bromo phenyl phenyl ether	0.050	0.025	0.050	0.14	EQS 2015 MAC	ug/l	7	0	0	
Carbazole	0.050	0.025	0.050	-		ug/l	7	0	0	
DOC	1720	20447	93000	-		ug/l	7	7	0	
Nitrobenzene	0.050	0.025	0.050	-		ug/l	7	0	0	
p-Isopropyltoluene	3.00	1.50	3.00	-		ug/l	7	0	0	
Styrene	3.00	1.50	3.00	-		ug/l	7	0	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

PAHs — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
2-Methylnaphthalene	0.050	0.025	0.050	-		ug/l	7	0	0	
Acenaphthene	0.010	0.016	0.080	-		ug/l	7	1	0	
Acenaphthylene	0.010	0.005	0.010	-		ug/l	7	0	0	
Anthracene	0.010	0.005	0.010	0.10	EQS 2015	ug/l	7	0	0	
Benzo (a) anthracene	0.010	0.005	0.010	-		ug/l	7	0	0	
Benzo (a) pyrene	0.010	0.005	0.010	0.0002	EQS 2015	ug/l	7	0	0	
Benzo (b) fluoranthene	0.010	0.005	0.010	-		ug/l	7	0	0	
Benzo (ghi) perylene	0.010	0.005	0.010	-		ug/l	7	0	0	
Benzo (k) fluoranthene	0.010	0.005	0.010	-		ug/l	7	0	0	
Chrysene	0.010	0.005	0.010	-		ug/l	7	0	0	
Dibenzo (ah) anthracene	0.010	0.005	0.010	-		ug/l	7	0	0	
Fluoranthene	0.010	0.005	0.010	0.006	EQS 2015	ug/l	7	0	0	
Fluorene	0.010	0.011	0.050	-		ug/l	7	1	0	
Indeno (1,2,3-cd) pyrene	0.010	0.005	0.010	-		ug/l	7	0	0	
Naphthalene	3.00	1.50	3.00	2.00	EQS 2015	ug/l	7	0	0	
PAH Total (EPA 16)	0.16	0.11	0.28	-		ug/l	7	1	0	
Phenanthrene	0.010	0.005	0.010	-		ug/l	7	0	0	
Pyrene	0.010	0.005	0.010	-		ug/l	7	0	0	

Phenols — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
2,4-Dimethylphenol	0.05	0.22	1.40	-		ug/l	7	1	0	
2-Methylphenol (o-Cresol)	0.05	0.19	1.20	-		ug/l	7	1	0	
2-Nitrophenol	0.050	0.025	0.050	-		ug/l	7	0	0	
3,4-Methylphenol	0.10	1.00	6.70	-		ug/l	7	1	0	
4-Methylphenol	0.05	0.98	6.70	-		ug/l	7	1	0	
Methylphenols Total (Summed)	0.05	1.17	7.90	-		ug/l	7	7	0	
Phenol	0.1	11.6	81.0	7.70	EQS 2015	ug/l	7	1	1	BH203
Phenol (Monohydric)	1.0	54.4	360.0	-		ug/l	7	1	0	

Phthalates — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
Butyl benzyl phthalate	0.050	0.025	0.050	7.50	EQS 2015	ug/l	7	0	0	
Diethyl phthalate	0.050	0.025	0.050	-		ug/l	7	0	0	
Dimethyl phthalate	0.050	0.025	0.050	-		ug/l	7	0	0	
Di-n-butyl phthalate	0.050	0.025	0.050	-		ug/l	7	0	0	

Sample Matrix: WATER

Site Area(s) Selected: Whole site
Event(s) Selected: All events

VOCs — Aquifer: No aquifer defined

Analyte	Min	Mean*	Max	Assessment Criteria (AC)	Assessment Criteria Source	Units	No. Locations Sampled	No. Samples > LOD	No. Locations > AC	Location(s) Failing Screening
iso-Propylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
n-Butylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
n-Propylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
Sec-Butylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	
Tert-Butylbenzene	3.00	1.50	3.00	-		ug/l	7	0	0	

EXCEEDANCES OF THRESHOLDS

Sample matrix: LEACHATE

General Chemistry

Analyte	Point ID	Sample Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
pH	BH101	1.00	25/09/2023	N/A	10.4	EQS 2015	6-9	pH units	
	TP302	0.50	03/10/2023	N/A	10.8	EQS 2015	6-9	pH units	
	TP303	1.00	03/10/2023	N/A	10.7	EQS 2015	6-9	pH units	

Metals

Analyte	Point ID	Sample Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
Chromium	TP303	1.00	03/10/2023	N/A	5.70	EQS 2015	4.7	ug/l	
Chromium III	TP303	1.00	03/10/2023	N/A	5.70	EQS 2015	4.7	ug/l	
Copper	BH101	1.00	25/09/2023	N/A	18.0	EQS 2015 - Bioavailable	1	ug/l	
	BH102	2.10	09/10/2023	N/A	24.0	EQS 2015 - Bioavailable	1	ug/l	
	BH204	1.00	31/10/2023	N/A	16.0	EQS 2015 - Bioavailable	1	ug/l	
	TP302	0.50	03/10/2023	N/A	17.0	EQS 2015 - Bioavailable	1	ug/l	
	TP303	1.00	03/10/2023	N/A	13.0	EQS 2015 - Bioavailable	1	ug/l	
Lead	BH102	2.10	09/10/2023	N/A	3.50	EQS 2015 - Bioavailable	1.2	ug/l	
Zinc	BH102	2.10	09/10/2023	N/A	230	EQS 2015 - Bioavailable	10.9	ug/l	
	BH204	1.00	31/10/2023	N/A	15.0	EQS 2015 - Bioavailable	10.9	ug/l	

PAHs

Analyte	Point ID	Sample Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
Anthracene	TP302	0.50	03/10/2023	N/A	0.15	EQS 2015	0.1	ug/l	
Fluoranthene	TP302	0.50	03/10/2023	N/A	0.20	EQS 2015	0.0063	ug/l	
Naphthalene	TP302	0.50	03/10/2023	N/A	2.90	EQS 2015	2	ug/l	

EXCEEDANCES OF THRESHOLDS

Sample matrix: WATER

General Chemistry

Analyte	Point ID	Response Zone Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
pH	BH203	3.00 - 6.00	09/01/2024	Jan-2024	10.2	EQS 2015	6-9	pH units	

Inorganics

Analyte	Point ID	Response Zone Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
Cyanide	BH203	3.00 - 6.00	09/01/2024	Jan-2024	14.0	EQS 2015 - Assumes Free Cyanide	1	ug/l	
	BH207	1.60 - 2.20	09/01/2024	Jan-2024	45.0	EQS 2015 - Assumes Free Cyanide	1	ug/l	

Metals

Analyte	Point ID	Response Zone Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
Copper	BH102	39.00 - 58.50	09/01/2024	Jan-2024	1.70	EQS 2015 - Bioavailable	1	ug/l	
	BH104	2.00 - 16.00	10/01/2024	Jan-2024	1.50	EQS 2015 - Bioavailable	1	ug/l	
	BH108	3.00 - 17.00	10/01/2024	Jan-2024	2.10	EQS 2015 - Bioavailable	1	ug/l	
	BH202	1.00 - 2.50	09/01/2024	Jan-2024	2.90	EQS 2015 - Bioavailable	1	ug/l	
	BH203	3.00 - 6.00	09/01/2024	Jan-2024	4.40	EQS 2015 - Bioavailable	1	ug/l	
	BH207	1.60 - 2.20	09/01/2024	Jan-2024	11.0	EQS 2015 - Bioavailable	1	ug/l	
Nickel	BH104	2.00 - 16.00	10/01/2024	Jan-2024	6.20	EQS 2015 - Bioavailable	4	ug/l	
	BH203	3.00 - 6.00	09/01/2024	Jan-2024	56.0	EQS 2015 - Bioavailable	4	ug/l	
	BH207	1.60 - 2.20	09/01/2024	Jan-2024	14.0	EQS 2015 - Bioavailable	4	ug/l	
Zinc	BH101	4.00 - 19.50	09/01/2024	Jan-2024	15.0	EQS 2015 - Bioavailable	10.9	ug/l	

Phenols

Analyte	Point ID	Response Zone Depth (m bgl)	Sample Date	Event Name	Result	Criteria Source	Threshold	Units	Stratum
Phenol	BH203	3.00 - 6.00	09/01/2024	Jan-2024	81.0	EQS 2015	7.7	ug/l	

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