REDSTART

Hoover Candy Site

Ground Investigation Report

February 2024

GENERAL DISCLAIMER:

This report has been prepared by Redstart in favour of Methyr Tydfil County Borough Council ("the Client") and is for the sole use and benefit of the Client in accordance with the agreement between the Client and Redstart dated December 2021 under which Redstart's services were performed. Other than in respect of liability which cannot be excluded by law, Redstart accepts no liability to any other party in respect of the contents of this report. This report is confidential and may not be disclosed by the Client or relied on by any other party without the express prior written consent of Redstart.

Whilst care has been taken in the construction of this report, the conclusions and recommendations which it contains are based upon information provided by third parties ("Third Party Information"). Redstart has for the purposes of this report relied upon and assumed that the Third Party Information is accurate and complete and has not independently verified such information for the purposes of this report. Redstart makes no representation, warranty or undertaking (express or implied) in the context of the Third Party Information and no responsibility is taken or accepted by Redstart for the adequacy, completeness or accuracy of the report in the context of the Third Party Information on which it is based.

FREEDOM OF INFORMATION:

Redstart understands and acknowledges the Authority's legal obligations and responsibilities under the Freedom of Information Act 2000 (the "Act") and fully appreciates that the Authority may be required under the terms of the Act to disclose any information which it holds. Redstart maintains that the report contains commercially sensitive information that could be prejudicial to the commercial interests of the parties. On this basis Redstart believes that the report should attract exemption from disclosure, at least in the first instance, under Sections 41 and/or 43 of the Act. Redstart accepts that the damage which it would suffer in the event of disclosure of certain of the confidential information would, to some extent, reduce with the passage of time and therefore proposes that any disclosure (pursuant to the Act) of the confidential information contained in the report should be restricted until after the expiry of 24 months from the date of the report.

Quality Management

Job No	GC/004005		
Project	Hoover Candy Site		
Location	Merthyr Tydfil		
Title	Ground Investigation Report		
Document Ref	GC-4005-Red-75-XX-RP-0002	**Issue / Revision**	P02
File reference	P:\pool\Geot\Schemes TEMP\Hoover site, Merthyr Tydfil\Ground Investigation\Phase 2\GC4005-RED-75-XX-RP-L0002-P02 GIR Final 06-02-2024.docx		
Date	06 February 2024		
Prepared by	Alan Rosier	Signature (for file)	
Checked by	Ian Leek	Signature (for file)	
Authorised by	Neil Greenwood	Signature (for file)	

Revision Status / History

Rev	Date	Issue / Purpose/ Comment	Prepared	Checked	Authorised
P01.1	12/10/22	Draft - client review	NG	NG	AR
P01	30/11/22	Draft	NG	AR	IL
P02	06/02/24	Final	AR	IL	NG

Contents

1. Introduction 1
2. Existing Information 6
3. Ground Investigation 16
4. Ground Strata Summary 23
5. Material Properties 27
6. Contaminated Land Assessment 31
7. Mining 49
8. Engineering Assessment 90
9. Conclusions and Recommendations 94
10. References 96

Drawings

GC4005-RED-75-XX-DR-C-0001: Site Location Plan

GC4005-RED-75-XX-DR-C-0007: Exploratory Hole Location Plan (2 sheets)

GC4005-RED-75-XX-DR-C-0008 Coal Measure Investigation Boreholes (2 sheets)

GC4005-RED-75-XX-DR-C-0009: Contamination Distribution Plan (2 sheets)

GC4005-RED-75-XX-DR-C-0010: Coal Workings Plans with Current Site Boundary Overlaid

GC4005-RED-75-XX-DR-C-0011: Geological Long Section

GC4005-RED-75-XX-DR-C-0017: Anticipated Coal Seam Subcrop and 10T Extents

Appendices

Appendix A Soil Quality Screening Tables

Appendix B Leachate Screening Tables

Appendix C Groundwater Screening Tables

1. Introduction

1.1 Background

Merthyr Tydfil County Borough Council (MTCBC), in partnership with Welsh Government are considering purchasing part of the Hoover site in Merthyr Tydfil. The council's intention is to demolish the existing buildings, remove existing hardstandings, make good any remediation found, reconfigure any services necessary and leave the site ready for future redevelopment, which is likely to comprise residential housing with green areas in the current Hoover production, distribution and cricket ground land sectors. The existing car park and pumping station will be developed for commercial land use (indeed the north-easterly half of the pumping station sub area was being redeveloped as a MTCBC Highways Department salt storage area). This is further detailed in the Hoover Strategic Regeneration Area Framework Masterplan Document, though it is appreciated that the masterplan is fluid and final layouts may change.

Redstart have been appointed to provide a Ground Investigation Report. The remit of the report is to provide an assessment of any ground impacted by contaminants and define the quantum and spatial extent of this contamination to inform an assessment of likely remediation costs. The costing exercise is to be undertaken by the Redstart Quantity Surveying team. The remit also included assessing the quantum and extent of mining voids (and consequent risk of subsidence) and to evaluate any abnormal measures associated with installing new foundations for buildings, hardstands and roads, leading to abnormal costs that might be expected during site preparation phase.

1.2 Proposed Development

The proposed development, between Merthyr Road and the Afon Taf (River Taff), comprises the demolition of existing structures and the construction of residential housing and associated amenities along with a greenspace river corridor and a number of active travel routes. The two smaller zones, lying east of Merthyr Road, are proposed as commercial development sites, of which a Highways Department salt barn is the most progressed development. This was in an early stage of construction as the current ground investigation was progressed.

1.3 Objectives

This Ground Investigation Report (GIR) has the following objectives:

- Summarise the pertinent information identified in the Preliminary Sources (desk) Study relevant to the proposed development.
- Provide a summary of the ground investigation works undertaken and evaluate the quality of the data obtained from the investigation(s).
- Describe the ground conditions that will be encountered during scheme progression.
- Provide a summary of material properties of each stratum that will be encountered during the installation of foundations for new development.

- Produce a ground model and provide geotechnical design parameters required for the proposed mine stabilisation works and foundation selection, to avoid settlements from non-mining related unstable or compressible ground.

- Include limited geotechnical consideration of any ground preparation or non-conventional / deep foundations associated with difficult ground at the site at a concept level design.

- Make an assessment of the scope of measures required to ameliorate contaminated land issues at a concept design level and to produce a conceptual ground model reflecting ground investigation data.

This report includes a Geotechnical Risk Register, which focuses on ground risks relating to cost and programme, and the health and safety of contractors and the general public.

For clarity, undertaking abnormal costing estimates is outside the remit of the GIR. However, the geo-environmental team will assist the Quantity Surveying team employed on the scheme to aid in quantification of abnormal costs.

1.4 Description of Site

The site lies in the southern part of Merthyr Tydfil town, centred around the grid reference E 305737 N 204199, see Drg No GC4005-RED-75-XX-DR-C-0001.

Geomorphologically, Merthyr Tydfil lies close to the head of a steeply incised valley within the upland plateau of the South Wales Coalfield. Due to the coal mining and industrial legacy of the valley, the adjacent Afon Taf lies within a highly engineered river channel.

The northern site boundary extends to the roundabout between Merthyr Road and Pentrebach Road, with the southern boundary extending to Pentre-Bach train station.

Figure 1.0 overleaf shows the general extent of the scheme in relation to the wider geographical area.

Figure 1.0: Site Location

The main site, containing the former Hoover manufacturing plant, lies between the Merthyr to Cardiff railway line and Afon Taf, to the west, and Merthyr Road, to the east.

The southern part of the main site is given to a bowling green, pavilion and cricket pitch. In the far south, adjacent to Pentrebach train station platform is a patch of rough ground to the rear of the bowling green, used for storage. Similarly, to the north of bowling green is another fenced off area used for storage. To the rear of the pavilion is a burning area. A helipad is present in the north and a container in the north-west.

Between the former Hoover manufacturing plant and cricket pitch is a car park, former social club, gatehouse (with gas valves compound to its rear). A new storage building (former polystyrene plant) lies to the west of the car park and social club.

There are access roads from the site entrance, following the external areas of the former Hoover manufacturing plant (in the south) and former assembly plant (in the north) and an access road separating the two plants. This concrete access road is in a poor state of repair with many cracks and areas of settlement. The subsurface drainage is also potentially blocked.

West of the manufacturing plant are many disused buildings and tanks where chemical processes were historically undertaken; the locations and a brief description of these, and other processes across the site, have been defined in the PSSR for the project. Of note, is an 11kV cable passing beneath the access road to the north-west of the manufacturing plant.

The plant has a significant asbestos concrete sheet content, as roofing and cladding, but the current Site Manager believes that most of the loose fibre material has been removed, and a site asbestos register is available. Within the manufacturing plant, several pits have been infilled (with concrete) where presses and sumps were formerly present. The majority of the internal area of the building is now given to the storage of white goods.

Two bridges exit from the manufacturing plant. The bridge to the west, crosses the Afon Taf and has been demolished as far as the east bank. According to the Hoover Candy Manager, this bridge is to be completely removed as part of the land purchase to the west of the river. The bridge adjoining the manufacturing and assembly plants is still in place.

To the west of the assembly plant is a Western Power Distribution (WPD) transformer station and fixed gas cylinder storage area.

The ground level increases in the southern part of the assembly plant, and the southern part of the plant is split level, with an internal vehicular access ramp, leading to the main plant floor. This area is given over to the storage of white goods.

A short retaining wall is present for much of the eastern site boundary, which increases in height to the north. A second exit point (with associated gate house and weighbridge) exists in the north-western corner of the site but is now disused.

To the east of the main site and east of Merthyr Road, is a water pumping station, which is linked to the former manufacturing plant by a tunnel. Access into the tunnel was not available during the investigation. The ground level (to the east) is lower than that of the adjacent Merthyr Road.

In the north-east, the former plant car park lies to the east of Merthyr Road. This car park follows the approximate gradient of Merthyr Road to its west. Within the site, asphalt hardstanding is extensive, but deteriorated, many shrubs are now growing through it. An electricity transmission tower is present in the eastern part of the car park. A gas pipeline marker was observed across the road to the west of the site, in line with the transmission tower.

1.5 Other Relevant Information

The sources of information used in the preparation of this report are presented in Table 1.1 overleaf.

Table 1.1 – Sources of Information

Item	Title	Document Refence	Document Date	Originator	Comments
1	Hoover Candy Site Preliminary Sources Desk Study.		March 2022.	Redstart.	Desk study based on available existing information. Appendices included Groundsure Insights report and mapping reports and Consultants Coal Mining Report.
2	Hoover Candy Site Ground Investigation Factual Report.	Q0838/FR	August 2022.	Quantum Geotechnic Ltd.	Report on ground investigation undertaken for scheme.
3	Mine abandonment Plans.		August 2022.	Coal Authority (CA).	Supplied by MTCBC.
4	Phase II Ground Investigation, Drainage Channel, Dragon Park.	12392/LW/19/SI Rev A)	September 2021.	Intégral Géotechnique.	Available on MTCBC planning portal.

2. Existing Information

2.1 Description of Historical Map Extracts

A map-by-map summary of the site history is provided in the PSSR. The research viewed: 10,000 / 1:10,560, 1:2,500 and 1:1,250 scale mapping.

A summary of key features is presented below.

Table 2.1 – Description of Key Historical Features as Derived from Map Extracts

Key features	Description
Collieries and iron works in environs	Surrounding the site, the land use is dominated by the Pentrebach Iron Works to the east / south-east, the Clyn-Mil Pits #1 and #2 lie to the east / north-east, the Plymouth Iron Works to the north. Running alongside and crossing through the western spur is the Afon Taf. Also running adjacent to the river is the Taff Valley Railway. As early as 1875 there is a disused shaft 150 m west of the site (this correlates with a Willows shaft shown on CA abandonment plans) Pentrebach school is noted to the east of the site. Aber-canaid is located to the west of the Afon Taf and has some residential properties close to the river. Beyond this is predominantly fields and woodland. Additional coal mines comprise the Upper Abercanaid Pit (150 m to the west of the site), Ellis Pit (400 m to the north east – note: Groundsure report indicates from Brit Pit database this was a surface mineral working) and Craig Pit (150 m to the south-west). By 1900 Clyn pits (#1 and #2) are now disused By 1921 Pentrebach Iron works is no longer present, but Gethin Pit No. 2 is located 450 m south-west of the site. There is a further Tai Bach (colliery) to the south-east. By 1900 two old shafts and an engine house are located approximately 15 and 30 m respectively from the eastern side of the current Hoover car park. Note the Groundsure report using Brit Pits information suggest that these features belonged to Pen-cae-bach-Pits (a wholly underground working).
Pre Hoover Factory status of site	By 1987 the site land use was: Western Spur – The western spur is cut off from the rest of the site by the Afon Taf (River Taff), with the western part of this spur possessing some ground workings and a stream. A road also runs through this part of the site. Northern Area – The north of the site is a mixture of cuttings and other mining infrastructure. A sluice runs from the west of the boundary across the northern edge of the site, turning to the south and running down the eastern part of this section. Eastern Spur – Some fields and small buildings are present on site. Southern Area – Open green space to the south, with railway lines running east to west. Railway line runs along the western boundary of the site. Ground workings are present in the north of this section. By 1900 – Station now marked in the southern part of the site along the railway running along the western boundary. Also, there is an open water channel crossing close to the northern boundary of the site and discharging into the Afon Taf just upstream of a weir. This open channel crosses through the whole length of the current Hoover car park.

Factory development of site	By 1948 the first factory building appears on the site in the southern/central area. Then by 1988 additional factory buildings are present to the west and east of the site.
Gas works	There was a gas works present in the eastern environs of the site in the Victorian period.

2.2 Geological Maps and Memoirs

2.2.1 Anticipated Geological Sequence

The underlying geology has been identified from geological maps and historical borehole logs where available. The geological sequences identified within the study area is presented in Table 2.2.

Table 2.2 – Anticipated Site Geology Based on BGS Records

Strata	Top Level (mbgl)	Base Level (mbgl)	Maximum Thickness (m)	Average Thickness (m)
Made Ground	Ground Level	6.40	0.50	6.40
Alluvium	0.50	25.30	2.70	20.80
Glacial till	4.80	5.60	4.60	8.90
South Wales Middle Coal Measures Formation	9.00	25.30	10.50*	29.40*
South Wales Lower Coal Measures	Not known - thought to be 30m below base of deepest hole drilled	Not known	Not known	Not Known

2.2.2 Superficial (Drift) Geology

Geological mapping shows superficial deposits beneath most of the site, apart from a small part to the north of the site where it is absent.

A brief description of each of the various deposits anticipated to underlie the site is presented below.

2.2.3 Made Ground

The Hoover Warehouse and carpark both are shown to be underlain by artificial ground and the deposit continues for some distance beyond the site to the north.

2.2.4 Alluvium

The whole of the site is shown on BGS mapping to be underlain by alluvium. The BGS Lexicon describes this formation as:

‘Alluvium is a general term for clay, silt, sand and gravel. It is the unconsolidated detrital material deposited by a river, stream or other body of running water as a sorted or semi-sorted sediment

in the bed of the stream or on its floodplain or delta, or as a cone or fan at the base of a mountain slope. Normally soft to firm consolidated, compressible silty clay, but can contain layers of silt, sand, peat and basal gravel. A stronger, desiccated surface zone may be present.'

2.2.5 Glacial Till

It is possible that in parts of the site that beneath the alluvium there is glacial till (Devensian). This is a diamicton deposit that comprise poorly sorted and variable clays, sands and gravels.

2.2.6 Solid (Bedrock) Geology

The South Wales Middle Coal Measures Formation is present beneath much of the site. The northernmost tip of the site, the site is shown to be underlain by The South Wales Lower Coal Measures Formation. The distribution of the bedrock deposits is presented in the bedrock geology plan on page 146 of the Groundsure insights report and on the BGS 1:10,000 Scale plan extract presented as Figure 2.0 Overleaf.

2.2.6.1 South Wales Middle Coal Measures Formation

The BGS Lexicon describes this formation as:

'Grey, (productive) coal-bearing mudstones/siltstones, with seat-earths and minor sandstones.'

Thickness is 100 to 200m based on 1:50,000 geological map.

'The base is taken at the base of the Vanderbeckei (Amman) Marine Band (see Stubblefield and Trotter, 1957), where grey, marine, fossiliferous mudstones at the base of the marine band conformably overlie the Amman Rider Coal or the local equivalent where the Amman Rider amalgamates with the underlying coals. In the stream exposures in Cwm Gwrelych - Nant Llyn Fach, the boundary [SN 9010 0533] lies at the top of a 0.18 m thick coal, at the base of 0.10 m of grey mudstone with lingulids and fish fragments (the Vanderbeckei Marine Band).'

'The top is taken at the top of the Cambriense (Upper Cwmgorse) Marine Band (Stubblefield and Trotter, 1957), where grey marine mudstones at the top of the marine band are conformably overlain by non-marine mudstones marking the base of the South Wales Upper Coal Measures or by Pennant sandstones marking the base of the Pennant Sandstone Formation.'

2.2.6.2 South Wales Lower Coal Measures Formation

The BGS Lexicon describes this formation as:

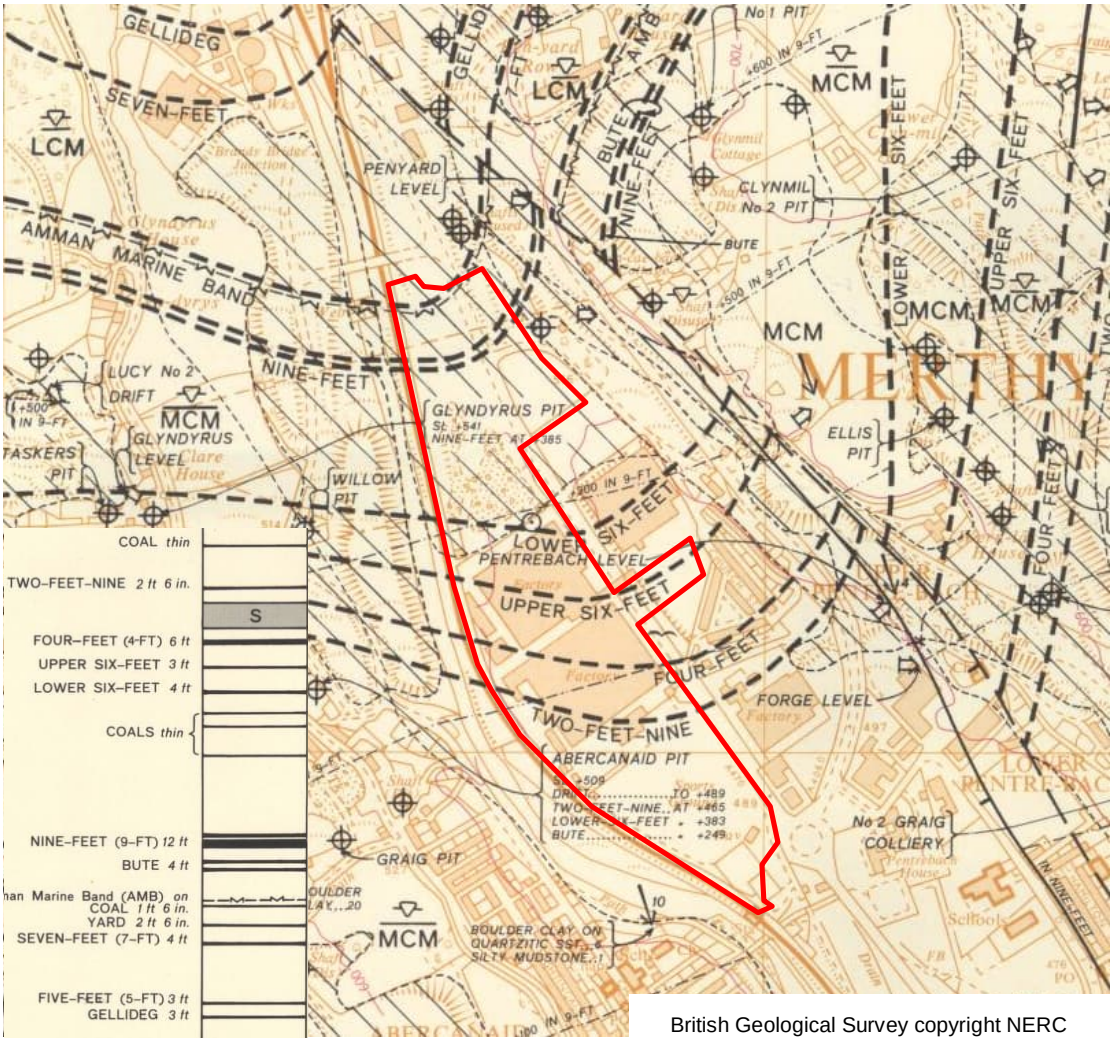
'Grey, (productive) coal-bearing mudstones/siltstones, with seat-earths and minor sandstones.

Thickness c110 m in the Methyr Tydfill area based on BGS geological memoir to 1:50,000 sheet.

'The base is taken at the base of the Subcrenatum Marine Band (as defined by Stubblefield and Trotter, 1957), where marine, fossiliferous mudstones at the base of the marine band conformably overlie the topmost mudstones or sandstones of the Marros Group. The Formation lies over over Marros Group, which themselves overlie Dinantian limestones.

'The top is taken at the base of the Vanderbeckei (Amman) Marine Band (as defined by Stubblefield and Trotter, 1957), where basal fossiliferous, marine mudstone of the marine band conformably overlies the top of the Amman Rider Coal (and its equivalents).'

Figure 2.0 –BGS 1:10,000 Map Extract



British Geological Survey copyright NERC

2.2.7 *Structural Geology*

Bedding is shown on the 1:10,000 scale map as dipping between 4 and 10 degrees, to the SSE.

There are no faults on the site. A fault is shown to running north-west to south-east on the other side of the A4060 (approximately 100m to the east).

2.2.8 *Historical Boreholes*

British Geological Survey (BGS) records of historical boreholes were reviewed for the site. The locations of BGS boreholes in the environs of the site are shown in Drawing GC4005-RED-75-XX-DR-0008_P01 sheets 1 of 2 and 2 of 2. The coal measure geology identified by these boreholes is discussed in Section 7.

2.2.9 *Natural Ground Subsidence*

According to the BGS data presented within Section 17 of the Groundsure report, the risks posed by ground stability hazards in the subject site are classified as follows:

Table 2.3 – Natural Ground Stability Hazards

Stability Hazard	Negligible	Very Low	Low	Moderate	High
Potential for Collapsible Ground	1	2			
Potential for Compressible Ground	2	1		1	
Potential for Ground Dissolution	1/2				
Potential for Running Sand Ground	2	1	1		
Potential for Shrinking or Swelling Clay Ground	2	1			
Landslides	1	2			

1. Alluvium
2. No superficial Deposits

Landslide risk in Groundsure report is noted as being Moderate around 2m north-east of the site and this reflects where the ground begins to slope up beyond the old Hoover car park.

2.3 Hydrogeology

2.3.1 *Superficial Aquifer Designations*

Maps illustrating the distribution and designation of superficial aquifers within the site is presented in Section 5.1 of the Groundsure Report.

Alluvium deposits are designated as Secondary A aquifers, permeable layers capable of supporting water supplies at a local 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.

2.3.2 *Bedrock Aquifer Designations*

The South Wales Middle Coal Measures Formation and the South Wales Lower Coal Measures Formation are designated as a Secondary A aquifer, which means that these rocks are capable of supporting water supplies at a local 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

Transmissivities of the Pennant Sandstone Formation are highly variable and range between 0.15 and 225 m^2/day. Specific yield data are not available for the sandstones but given the lack of

primary porosity it is expected to be in the region of 0.005 to 0.05. Storage coefficients are likely to be around 0.002.

Infiltration of rainwater is diverted from further vertical migration by the argillaceous bands which then emerges as springs/streams or provides baseflow to rivers.

This aquifer is covered by the Water Framework Directive and achieved a chemical rating of poor, a quantitative rating of good and an overall rating of poor at the last monitoring round in 2017.

2.3.3 Groundwater Vulnerability

Groundwater vulnerability mapping (at a gross 1 km grid) shows the site to be split with regards to groundwater vulnerability.

The majority of the playing fields and green space to the south of the site have a superficial geology vulnerability of Low and a bedrock geology vulnerability of Low. The very eastern part of the site here has a superficial geology vulnerability of Medium.

The northern part of the site, which includes the majority of the factory areas have a superficial geology vulnerability of Medium and a bedrock vulnerability of Low.

Groundwater vulnerability mapping is provided in the PSSR. The classification on which these vulnerability ratings are based is provided in Table 2.4 overleaf.

Table 2.4 – Groundwater Vulnerability

Groundwater Vulnerability	Description
High	Areas able to easily transmit pollution to groundwater. They are characterised by high leaching soils and the absence of low permeability superficial deposits.
Medium	Areas that offer some groundwater protection. Intermediate between high and low vulnerability.
Low	Areas that provide the greatest protection to groundwater from pollution. They are likely to be characterised by low leaching soils and/or the presence of low permeability superficial deposits.

- *Definitions sourced from Environment Agency report SC040016/R (Section 5.4)*

2.3.4 Groundwater Protection

There are no Groundwater Source Protection Zones or groundwater abstraction points within 1,000 m of the site.

2.4 Hydrology

A network of drains, ditches, streams and culverts run from the hillside to the base of the valley and the Afon Taf, the main watercourse in the area. This river is covered by the Water Framework Directive and achieved a chemical rating of good, an ecological rating of moderate and an overall rating of moderate at the last monitoring round in 2016.

There is also a number of water courses onsite, including a culverted water course that has appeared on the historical mapping. A review of the currently held site utility plans show potential culverts, however these appear to have been taken from previous plans themselves, with positions assumed.

There are no active surface water abstractions within 1,000 m of the site.

The closest surface water discharge consents located 338 m NW of the site and is linked to Combined Sewer Overflow at Willow Gas Works for a sewage outfall. Given dilution effects and level of the site in respect to flooding levels it is not considered that this could affect the land condition of the site.

2.5 Radon

Radon is a gas produced by certain geologies across the UK and is a cause of lung cancer. Buildings in some affected areas are required to have protection measures, which prevent radon gas from entering enclosed spaces.

The Groundsure report (p110) indicates that radon levels on site are expected to be less than 1% so no radon protection measures are likely to be required.

This data is the highest resolution radon dataset available for the UK and is produced to a 75 m level of accuracy to allow for geological data accuracy and a 'residential property' buffer. The findings of this section should supersede any estimations derived from the Indicative Atlas of Radon in Great Britain.

Additionally, a BGS Radon Report was procured for the site. The two main questions the report looks to answer are:

- *(1) Is the property in an area where radon protective measures are required for new buildings or extensions to existing ones as described in publication BR211 (2015 edition) Radon: Guidance on protective measures for new buildings?*

- *(2) Is the property in a radon Affected Area as defined by the UK Health Security Agency (UKHSA) and if so what percentage of homes are estimated to be above the Action Level?*

The answer to the first question is that *'no radon protective measures are required for the report area'.* The answer to the second question is 'no'. Additionally, the report states that *'The property is in an area where less than 1% of homes are estimated to be at or above the action level. The property is not in a radon affected area'.*

2.6 Waste

2.6.1 Historical and Active Landfills

The PSSR does not highlight any historical or active landfills within 500 m of the site.

The Groundsure Report notes the following waste exemptions within 50 m of the site:

- 3 No. waste exemptions on site. A total of 2 No. are tied to the Hoover Ltd factory and are treating waste exemptions (non-agricultural) for sorting mixed waste and preparatory

treatments. A further on-site exemption is tied to Pentrebach and is recorded as an exemption for treating waste (non-agricultural) and associated preparatory treatments.

- 2 No. exemptions in relation to R Tek Ltd for both treating and storage of (non-agricultural) waste. This firm is located in the Triangle Business Park.

No licensed waste sites are found within 500 m of the site.

2.6.2 Pollution Incidents

The PSSR reported that multiple pollution incidents have been identified within a 500 m radius of the site, ranging from Category 3 (minor incidents) to 4 (no impact incidents). No particular incidents appear to pertain for the site.

2.6.3 List 2 Dangerous Substances Inventory Sites and Part A (2) and Part B Activities Hazardous Sites

List 2 Dangerous Substances Inventory Sites include the Hoover Factory and the Triumph Business Systems, which both held authorisations to discharge chromium, copper, lead, nickel and zinc into the Afon Taf.

Part A (2) and Part B Activities within 100 m include:

- Hoover Ltd, who had a historical permit for coating processes.
- Merthyr Institute for the Blind, Unit 4, Triangle Business Park, Pentrebach, Merthyr Tydfil, CF48 4TQ, who hold a current Part B permit for Timber Manufacture.
- R-Tek Ltd, Unit 1, Triangle Business Park, Pentrebach, who held a Part B permit for solvent emissions.
- Glamorgan Paint Stovers, Unit 7, Triangle Business Park, who held a Part B permit for a coating processes.
- Top Coat Wales Ltd (Formerly Glamorgan Paint Stovers), Unit 7, Triangle Business Park, Merthyr Tydfil, Mid Glamorgan, CF48 4TQ, who held a Part B permit for coating processes
- Southern Vauxhall, Pentrebach Road, Merthyr Tydfil, CF48 1YA, who held a Part B permit for coating processes

2.7 Sub stations and Gas Governors

According to the PSSR there are three substations located on the site. The largest is situated in the northern part of the main site, adjacent to the railway line. There is also a gas governor on site.

2.8 Unexploded Ordnance (UXO)

According to risk maps provided by Zetica UXO Ltd, the site is located within an area that is at low risk with regard to UXO and as such this health and safety matter is not considered further.

2.9 Environmentally Sensitive Sites and Heritage Sites

According to the PSSR the closest Site of Special Scientific Interest (SSSI) is at Cwn Glo a Glyndrys located 478 m west of the site.

2.10 Heritage / Archaeology

There are no designated World Heritage Sites, Areas of Outstanding Natural Beauty, National Parks, Conservation Areas, Scheduled Monuments or Registered Parks and Gardens within 250 m of the site. There are 34no. listed buildings within 250 m of the site, the closest being 85 m south of the site.

2.11 Contaminated Land Status as Found in Desk Study

2.11.1 Study Area History

The PSSR by Redstart identified the following in relation to contamination:

> *The site is in an industrial area therefore Made Ground of various origins (principally colliery waste and iron waste likely) and thickness is anticipated on site. The site has been crossed by railways and a section of the site still borders a live railway line. From early 1940's Hoover has operated at the site and the site has numerous above ground materials storage areas and a variety of plating and metal working processes included a polystyrene plant. Lorries and forklifts are used at the plant currently and parked overnight.*

2.11.2 Sources of Contamination

The PSSR identified the following off-site sources of contamination:

- Collieries (waste and emissions from shafts).
- Iron Works.
- Gas works.
- Modern industries (Triangle Business Park).

Table 2.5 – Potential Contaminant Groups Identified in the Desk Study

Process/Land Use	Contaminant Groups Potentially Present
Made Ground / Engineering Fill	Inorganics including sulphates and heavy metal, phenols, petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and asbestos.
Iron works residues	Iron and phenols
Coal workings	Mine gas and ochreous mine water and combustible coal washings, mine heaps with heavy metals
Spills/leaks	Acids, solvents, effluents with metals, fuels and paints, lubricants, PCB's (transformers)

2.11.3 Contamination Receptors

The following potential land contamination receptors were identified as part of the PSSR:

- Human Health, including Hoover workers, cricket pitch users and construction workers and users.
- Ecosystems / Sensitive Land Use, including the AfonTaf.
- Property and Infrastructure, including an adjacent station and railway line and a trunk road.
- Controlled Waters, including surface waters and groundwater. Additionally, the site contains heightened pathways in that a twin culvert snakes under half of the site and likely discharges into a drainage feed, which in turn almost certainly drains into the Afon Taf and a shorter separate culvert appears to drain into the Afon Taf (after passing under railway land). It is possible there is an existing or perhaps disused well on the site, which serves(ed) the processing / fire water system.

The PSSR concluded that it is possible that contamination is present both in soils and in groundwater as a result of the industrial legacy.

2.12 Other Information

Two geotechnical reports for the former Drainage Channel, Dragon Parc, Merthyr, which lies on the other side of the Afon Taf, were found on the MTCBC planning portal website.

In 2021, Intégral Géotechnique attended a site to the west of the study area (circa 50 m) to undertake a Coal Mining Risk Assessment. A Phase II (ref 12392/LW/19/SI Rev A, this being an intrusive report) was also completed in September 2021. Reliance has not been obtained for any reports tied to this scheme, but they may be able to provide further insight into the site, if this is sought.

The report states that for the Dragon Parc site '*Intrusive site investigation works have been undertaken within the site and one probehole (PH4) encountered evidence of old workings at depths of between 17.6m and 19.1m below existing ground level. Within borehole PH5, soft drilling conditions with poor returns was encountered directly below a coal seam at depths of between 17.3m and 18.1m below existing ground level. These probeholes were located within southwest area of the site in the vicinity of a cluster of mine entries.'*

3. Ground Investigation

3.1 Scope of ground investigation

A preliminary ground investigation has been undertaken at the site. The work was designed to determine as best as possible, given the constraints of an active site, the quantum of abnormal costs associated with the development of the site for land purchase purposes. The investigation was designed by Redstart and carried out by the specialist contractor Quantum Geotechnic Ltd (QGL).

The fieldwork was carried out between the 27 June and 28 July 2022. Full-time on-site supervision and attendance by an Engineering Geologist from QGL was provided for all aspects of the site works and subsequent reinstatement works at all of the exploratory hole locations.

Minor vegetation clearance was undertaken by QGL during the main works under the instruction and supervision of the Redstart ecology team.

All works were conducted within safe working practices set out in the QGL Construction Phase Plan including the intention to carry out a PAS 128 Type B survey and by hand excavated service inspection pits of all exploratory hole locations.

By completion of the intrusive ground investigation works, the following works had been undertaken:

- Authorised vegetation clearance under Ecologist supervision.
- 5 No. Cable percussive rotary follow-on boreholes.
- 6 No. Internal dynamic sample rotary probe boreholes
- 6 No. Cable percussive boreholes including 3 No attempted re-drills following early termination upon refusal.
- 9 No. Rotary core/ rotary probe open-hole boreholes.
- 36 No. windowless sample boreholes.
- 14 No. Machine excavated trial pits.
- 9 No. In situ variable head permeability tests.
- 28 No. Installations of single or double gas/groundwater monitoring wells in selected boreholes.
- Groundwater and ground gas monitoring.
- Laboratory testing.
- Factual reporting.

An exploratory hole location plan, showing positions of all relevant completed exploratory holes is included as Drg. No. GC4005-RED-75-XX-DR-C-0007 (2 sheets). Summaries of completed exploratory holes are tabulated below. Depths are reported as metres below ground level (m bgl).

Table 3.1 – Summary of Boreholes and Window Samplers

Exploratory Hole ID	Termination Depth mbgl	Drill Methods Employed	Terminating strata
RBH101	45.00	Cable Percussion, Rotary Cored, Rotary Openhole	Coal Measures
RBH102	49.00	Cable Percussion, Rotary Openhole	Coal Measures
RBH103	42.00	Cable Percussion, Rotary Openhole	Coal Measures
RBH104	42.00	Cable Percussion, Rotary Cored, Rotary Openhole	Coal Measures
RBH105	30.70	Rotary Cored, Rotary Openhole	Coal Measures
RBH106	40.00	Rotary Openhole	Coal Measures
RBH107	40.00	Rotary Openhole	Coal Measures
RBH108	4.00	Cable Percussion Rotary Openhole	Coal Measures
RBH108A	36.50	Cable Percussion, Rotary Cored, Rotary Openhole	Coal Measures
RBH109	45.00	Rotary Openhole	Coal Measures
RBH110	30.00	Rotary Openhole	Coal Measures
RBH111	44.00	Rotary Openhole	Coal Measures
RBH112	45.00	Cable Percussion, Rotary Cored, Rotary Openhole	Coal Measures
RBH113	6.50	Cable Percussion	Coal Measures
RBH113A	47.00	Cable Percussion, Rotary Openhole	Coal Measures
IBH102	30.00	Dynamic Sampling, Rotary Openhole	Coal Measures
IBH103	28.50	Dynamic Sampling, Rotary Openhole	Coal Measures
IBH104	27.00	Dynamic Sampling, Rotary Openhole	Coal Measures
IBH105	31.20	Dynamic Sampling, Rotary Openhole	Coal Measures
IBH106	33.00	Dynamic Sampling, Rotary Openhole	Coal Measures
IBH107	32.00	Dynamic Sampling, Rotary Openhole	Coal Measures
CP101	13.80	Cable Percussion	Alluvium
CP102	7.90	Cable Percussion	Alluvium
CP103	6.20	Cable Percussion	Alluvium
CP104	5.10	Cable Percussion	Alluvium
CP105	2.00	Cable Percussion	Made Ground
CP105A	3.00	Cable Percussion	Made Ground
CP105B	4.05	Cable Percussion	Alluvium
CP106	0.90	Cable Percussion	Made Ground
CP106A	3.80	Cable Percussion	Alluvium
WS101	4.50	Windowless Sampling	Alluvium
WS102	4.50	Windowless Sampling	Alluvium
WS103	4.30	Windowless Sampling	Alluvium
WS104	6.20	Windowless Sampling	Alluvium

Exploratory Hole ID	Termination Depth mbgl	Drill Methods Employed	Terminating strata
WS105	6.20	Windowless Sampling	Alluvium
WS106	3.55	Windowless Sampling	Alluvium
WS107	6.00	Windowless Sampling	Alluvium
WS108	4.70	Windowless Sampling	Alluvium
WS109	5.10	Windowless Sampling	Alluvium
WS110	4.50	Windowless Sampling	Alluvium
WS111	4.65	Windowless Sampling	Alluvium
WS112	2.20	Windowless Sampling	Made Ground
WS113	3.30	Windowless Sampling	Alluvium
WS114	3.45	Windowless Sampling	Alluvium
WS116	3.70	Windowless Sampling	Alluvium
WS117	1.70	Windowless Sampling	Made Ground
WS118	1.70	Windowless Sampling	Made Ground
WS119	3.70	Windowless Sampling	Made Ground
WS120	2.40	Windowless Sampling	Made Ground
WS121	4.50	Windowless Sampling	Alluvium
WS122	2.40	Windowless Sampling	Alluvium
WS123	2.00	Windowless Sampling	Made Ground
WS124	2.40	Windowless Sampling	Alluvium
WS125	2.45	Windowless Sampling	Alluvium
WS126	6.20	Windowless Sampling	Made Ground
WS127	4.50	Windowless Sampling	Alluvium
WS128	4.54	Windowless Sampling	Alluvium
WS129	5.55	Windowless Sampling	Alluvium
WS130	4.30	Windowless Sampling	Alluvium
WS131	4.80	Windowless Sampling	Made Ground
WS132	6.20	Windowless Sampling	Made Ground
WS133	6.20	Windowless Sampling	Made Ground
WS134	6.00	Windowless Sampling	Made Ground
WS135	6.00	Windowless Sampling	Made Ground
WS136	6.00	Windowless Sampling	Made Ground
WS137	6.20	Windowless Sampling	Alluvium

The IBH (internal boreholes) nomenclature for all holes, except IBH102, reflects a hole drilled in the internals of the production building. For logistic issues, IBH102 was moved outside the building and WS121 was drilled in its place (i.e. within the northern corner of the building).

A summary of the trial pits is provided below:

Table 3.2 Summary of Trial Pits

Exploratory Hole ID	Termination Depth mbgl	Drill Methods Employed	Terminating strata
TP01	4.00	Machine Trial Pit	Made Ground
TP02	4.00	Machine Trial Pit	Made Ground
TP03	4.00	Machine Trial Pit	Alluvium
TP04	4.00	Machine Trial Pit	Made Ground
TP05	4.00	Machine Trial Pit	Alluvium
TP06	4.00	Machine Trial Pit	Made Ground
TP07	4.00	Machine Trial Pit	Alluvium
TP08	3.20	Machine Trial Pit	Made Ground
TP09	0.50	Machine Trial Pit	Made Ground
TP110	4.00	Machine Trial Pit	Made Ground
TP111	1.00	Machine Trial Pit	Made Ground
TP112	3.00	Machine Trial Pit	Made Ground
TP113	3.00	Machine Trial Pit	Made Ground
TP114	2.00	Machine Trial Pit	Made Ground

A summary of the groundwater and gas monitoring installation is provided below:

Table 3.3 Summary of Groundwater and Gas Monitoring Installations

Exploratory Hole ID	Installation Pipe ID (M=3 or more rounds of monitoring apply)	Standpipe Diameter (Internal mm)	Response Zone (mbgl)		Total Standpipe Length (m)
			Top	Bottom	
RBH101	A (M)	50	5.00	9.00	9.00
RBH102	A (M)	50	8.50	22.00	22.00
RBH102	B (M)	30	5.50	8.50	8.50
RBH103	A (M)	50	6.00	12.00	12.00
RBH104	A (M)	50	34.00	36.50	36.50
RBH104	B (M)	30	6.00	8.00	8.00
RBH105	A (M)	50	13.00	15.00	15.00
RBH106	A (M)	50	11.10	14.10	14.10
RBH106	B (M)	30	4.00	7.00	7.00
RBH107	A (2 rounds only)	50	31.00	34.00	34.00
RBH107	B (M)	30	5.50	6.50	6.50

Exploratory Hole ID	Installation Pipe ID (M=3 or more rounds of monitoring apply)	Standpipe Diameter (Internal mm)	Response Zone (mbgl)		Total Standpipe Length (m)
			Top	Bottom	
RBH108	A (M)	50	7.00	12.00	12.00
RBH109	A (M)	50	24.00	25.00	25.00
RBH109	B (M)	30	12.00	13.00	13.00
RBH110	A (M)	50	23.00	25.00	25.00
RBH111	A (M)	50	9.00	11.00	11.00
RBH112	A (M)	50	37.00	38.00	38.00
RBH112	B (M)	30	12.00	13.00	13.00
RBH113A	A (M)	50	25.00	27.00	27.00
RBH113A	B (M)	30	9.00	11.00	11.00
RBH114	A (M)	50	10.00	13.00	13.00
IBH102	A (M)	50	23.00	26.00	26.00
IBH103	A (1 dip only)	50	13.00	16.00	16.00
IBH104	A (3 dips-no gas)	50	21.00	24.00	24.00
IBH104	B (3 dips-no gas)	30	5.00	8.00	8.00
IBH105	A (M)	50	25.00	28.00	28.00
IBH106	A (M)	50	27.00	30.00	30.00
IBH106	B (M)	30	6.00	9.00	9.00
IBH107	`A (M)	50	25.70	28.70	28.70
IBH107	B (M)	30	5.00	8.00	8.00
CP101	A (M)	50	5.00	8.00	8.00
CP102	A (M)	50	4.50	7.90	7.90
CP103	A (M)	50	1.00	6.20	6.20
WS102	A	50	1.00	2.00	2.00
WS117	A	50	1.00	1.70	1.70
WS121	A	50	1.00	4.00	4.00
WS128	A	50	1.00	4.00	4.00
WS129	A	50	1.00	5.00	5.00
WS130	A	50	1.00	4.00	4.00
WS132	A	50	3.00	6.20	6.20

3.2 Monitoring and Water Sampling

Following completion of the siteworks, QGL undertook 4 No. monitoring visits to record land gas and groundwater within selected borehole standpipes. Those boreholes with three or more monitoring rounds are marked with a 'M' in Table 3.3.

Selected installations (as marked with an M in column 2 of the above table) were subject to 6 No. water gauging rounds, whilst some had fewer rounds as shown in the second column of Table 3.3.

The combined gas and water level monitoring were carried out on 26/07/22, 01/08/2022, 10/08/2022, 17/08/22, and 23/08/22. Not all wells were monitored at each date.

Water level only gauging visits commenced earlier than the above dates with the first undertaken on 07/07/22.

The gas monitoring comprised testing for methane, carbon dioxide, oxygen, carbon monoxide and hydrogen sulphide using a GA2000 calibrated gas analyser.

Selected wells were subject to a first purging and groundwater sampling round over 03/08/2022 and 04/08/2022, and a second round on 25/08/2022. In the first round 21 No. groundwater samples were collected, and in the second round 23 No. samples were collected. The sampling wells were selected to provide a wide coverage across the site.

Two water samples from the Afon Taf were collected at the same time as the groundwater samples were collected, one upstream and one downstream.

3.3 In situ Testing

In situ testing comprised SPT (Standard Penetration Tests), in the majority of boreholes, 9 No. variable head permeability tests (and 20 No. further attempts) and Photo Ionisation Detector (PID) headspace testing was undertaken in duplicate environmental samples collected from the majority of the window sample holes and IBH 104.

3.4 Laboratory Testing

A summary of the geotechnical and geo-environmental tests undertaken is provided in the tables below. Discussion of the laboratory results can be found in Section 4 of this report.

Table 3.4 – Summary of Geotechnical Testing-(2nd phase tests shown in brackets)

Test Category	Test Type	Total No Tests
Classification	Moisture Content.	35
	Atterberg Limits.	15
	Particle Size Distribution.	50
	Sedimentation.	13
	Organic matter content.	15
Compaction	Dry Den/MC (2.5kg Rammer Method1 Litre Mould).	5
Strength	California Bearing Ratio on re-compacted disturbed sample at natural moisture content -soaked.	11

Test Category	Test Type	Total No Tests
	Uniaxial compressive strength.	8
	Single measurement of point load strength on irregular rock lump or core sample (either axial or diametral test).	25
Expansion testing	In-house test method (10 day saturation).	5
Soil and Groundwater Chemistry	BRE-SD1 (suite A, B, C and D).	40
	Sulphur containing compounds -BS-EN1744-1.	4

A summary of the geo-environmental testing is as follows:

Table 3.5 Summary of Geo-environmental Testing

Test Medium	Test Type	Total No.Tests
Soils	Suite E (common brownfield suite).	133
	VOC's.	42
	SVOC's.	19
	Waste Acceptance Criteria (WAC).	17
	Calorific value.	14
Leachate	Suite F.	29
Waters	Suite F.	40
	Ammoniacal nitrogen.	25
	Dissolved magnesium and aluminium.	25
	VOC's.	44
	SVOC's.	15
	Dissolved calcium.	2
WAC tests	Inert WAC.	20

The soils suite was selected to include a standard brownfield suite used in the contaminated land industry and this was supplemented by testing for colliery waste contaminants including sulphur, aluminium, iron and manganese. A third of the samples were also tested for Volatile Organic Chemicals (VOC's) and a quarter for Semi Volatile Organic Chemicals (SVOC's).

Calorific value tests were scheduled in two batches, one batch on samples collected from mainly around the cricket pitch, and a second batch on shallow Made Ground samples returning an organic content of 50% w/w or higher as viewed when the initial batch of 133 No. suite E tests were reported.

4. Ground Strata Summary

4.1 Strata Sequence

The strata encountered during the ground investigation was generally found to be in accordance with the published geology for the area. The geological sequence is relatively simple and generally comprises of Made Ground over alluvium with the Coal Measures bedrock beneath. The alluvium can be split into a thick granular layer and a thinner later of finer alluvium at the top. The fine alluvium is present as a lens like deposit and hence is not aways present. The fine alluvium is quite variable in its clay and silt content.

Six separate coal seams were located by the drilling within the length of the site and down to the 49 m maximum depths investigated by QGL. It should be noted that the mining section of this report also takes account of additional BGS borehole logs, a few of which extend down to around 60 m depths.

A summary of the encountered strata and their thicknesses (as found in the QGL investigation) are provided in the table below.

Table 4.1 - Summary of Ground Sequence and Proven Thicknesses

Strata	Stratum Thicknesses (m), Average in Brackets (m)	No of Exploratory Holes Fully Penetrating Stratum
Hard surfacing or internal floor slabs	0.05 - 0.30	46
Topsoil	0.10 - 0.30	17 (an extra 13 were straight into MG)
Made Ground	1.35 - 9.9 (3.65)	70
Superficial Deposits-fine grained (silt or clay)	0.05 to 1.5 (0.85)	32
Superficial Deposits-granular	2.6 – 24.00 (17.6)	20
Sandstone, Mudstone, Siltstone with coals	3.0 – 31.3*	None

* only proved to base of hole

4.2 Hardstands and Floor Slabs

The majority of exploratory holes were progressed through Made Ground. Asphalt was typically 0.08 m thick. Concrete pavements were generally thicker closer to 0.25m thick The internal slab to the production building ranges from 0.20 to 0.30 m thick.

4.3 Topsoil

Turf and topsoil were present in one third of the exploratory holes. The material typically comprised black slightly sandy slightly gravelly SILT.

4.4 Made Ground

Made Ground is present across the site and is generally variable in its material composition and grain size. However, the only exception, is beneath around two thirds of the Production Building footprint the Made Ground appears to be a consistent layer of GRAVEL comprising slag (between 3.3 and 5.3m thick).

Away from the production building, the bulk of the Made Ground was granular ranging from a black silty sandy GRAVEL (in places very silty and in places containing cobbles) to a silty gravelly SAND (locally very silty). Several holes have a reworked alluvial clay in the basal 1.0 m zone. Occasionally, the Made Ground was uniformly graded medium and coarse clean (or silty) GRAVEL. Most of the material comprises a mix of shale and siltstone clasts and there were places where the material had a horizon of coal dust or material rich in coal clasts which suggest that the material is colliery spoil. Examples of the coal rich Made Ground in shallow soils are CP104, CP105, RBH112, WS107, WS109, WS114, WS133, WS137, TP108 and TP113, which shows that the location of coal rich materials are randomly distributed.

The Made Ground gave below detection PID values for VOCs in the headspace testing and the only value above 10 ppm was in WS132 where the value was 13 ppm.

The only observation of a hydrocarbon odour which was described as slight was in WS132 (4.7 m to 5.77 m) and a single observation of a black liquid on gravel surfaces was found in WS121 between 3.3 m and 3.4 m depth (this material had no odour).

In the following areas, Made Ground was found to be thinner than average:

- The salt barn/water pumping station area where it is typically around 2 m thick (in RBH105 it was as thin as 1.35 m).
- Intermittent parts of the strip outside the centre parts of the production building (adjacent to the railway) where the layer can be as thin as 1.45 m to 2.0 m (excluding surfacing).

The thickness of Made Ground in the former car park (as an average value) was thicker than the remainder of the Hoover site with a 6.04 to 9.90 m thickness range being present. The deeper material was often grey or greyish brown with fragments of mudstone and siltstone, resembling colliery spoil.

A number of obstructions were encountered within the upper 4.0 m of the ground surface, and these were located in CP105 (at 2.0 m a rubber tyre), CP106 (at 0.9 m a concrete pipe), WS117 (at 1.7 m unknown obstruction), WS118 (at 1.7 m unknown obstruction), WS120 (2.4 m unknown obstruction), WS123 (2.0 m unknown obstruction), TP109 and TP11 (0.50 and 1.0 m, both gas pipes).

4.5 Fine Alluvium

Where present fine-grained alluvium lies at the top of an alluvial sequence, with a coarse-grained component beneath.

Fine-grained alluvium was present in approximately half the holes drilled or excavated in the main Hoover site lying west of Merthyr Road, and also beneath the former car park sub site. It was absent in the salt barn/water pumping station area..

The material varies from black to brown, soft silty SAND through to a clayey SILT (occasionally containing wood fragments) to sandy CLAY (which can be gravelly).

A possible void was noted at the level of the fine alluvium in RBH111. However, it is considered likely that the rotary flush drilling technique caused wet silty sand to boil, giving the appearance of voided ground.

4.6 Coarse Alluvium

Coarse alluvium is present across the site and it has a substantial variation in thickness, which reflects the variable depth of rockhead. The deepest areas of coarse alluvium (around 21 to 24m thickness) are associated with a depression in rock head. The depression sits beneath most of the Hoover warehouse building and passes through the centre line of the Hoover production building and out through the centre/eastern parts of the cricket pitch. Thinner gravel is associated with the disused car park (where it is around 2.6 m to 3.1 m thick, possibly thicker on the western edge where there are few deep exploratory holes) and a 'buried bedrock ridge', which is positioned close to the railway to the east of the Hoover production building and around the polystyrene production building. Here the coarse alluvium is 10.0 to 10.1 m thick.

Most of the coarse alluvium comprises brown to reddish brown silty GRAVEL, though it ranges from a slightly sandy COBBLE GRAVEL to a very silty SAND and GRAVEL, and in places bands of silty very gravelly sand. The cobble content was found to be as high as 53%. Fines content varies from 1 % to 38 %.

The cobbles in the top of the unit caused many of the cable percussive boreholes to terminate early as chiselling techniques failed to allow hole progression. In several places the very base of the unit was marked by a 2.1m thick layer of 'siltstone boulders', drillers description (the holes were being progressed by rotary open hole techniques so Engineers descriptions are not available).

4.7 South Wales Middle Coal Measures Formation

The South Wales Middle Coal Measures Formation are present beneath the site. Borehole records found the strata to comprise competent layers of dark grey to grey siltstones, mudstones, seat-earth and black coal. Occasional pale grey sandstones strata are also present, and these vary from thin to thick beds. A small portion of the rocks are re-cemented conglomeratic deposits where clasts are mudstones.

Total core recovery of the holes is above 90 % throughout, with the solid core and RQD values not appearing to have much of a correlation with depth. Five dipping coal seams of 0.6 m and greater were identified in the rotary cored and open holed boreholes with the 'best fit' sequence shown in the geological section in Drawing GC4005-RED-74-XX-DR-C-011_P01. Several of the seams appear to show variation in terms of multiple fingers of seam being present along the dip. For example, RBH113 drilled to intercept the 9 Feet seam identified four separate fingers of coal with thin mudstones adding up to a total 5.8 m thickness. In contrast RBH114R only found a single leaf of 1.7 m thickness. In the middle of the site RBH111 (also interpreted to intercept the

9 Feet seam encountered a 3.8 m tall void (old workings) between 39.10 mAOD and 42.90 mAOD.

The Middle Coal Measure rock head in places displays little to no weathering but in others, eg RBH108AR, up to a 3.2 m thickness of highly weathered (and less weathered) material was present. Bedding partings (smooth planar) dipping in the range 5 -10 degrees were noted in many lengths of the logged cores, which is consistent with the dips provided in the Consultants Coal Mining Report.

4.8 South Wales Lower Coal Measures Formation

The South Wales Lower Coal Measures Formation was not encountered in the ground investigation and is thought to lie at least 50 m beneath the base of the holes drilled.

4.9 Groundwater

Given the proximity to the river and the local geology, shallow groundwater was anticipated. This encountered in cable percussive boreholes at a variety of depths between 6.6 and 7.8 mbgl. Groundwater strikes in rotary boreholes generally matched the same depths, though some were deeper.

The IBC holes encountered groundwater strikes at between 5.0 mbgl and 7.5 mbgl.

In general, water strikes were not encountered in the 5.0 – 6.0 m deep window sample holes, with the exception of WS128, where a strike was recorded at 4.0 m.

Groundwater strikes were not encountered in the 4.0 m deep trial pits except for TP106 and TP108, where inflows were recorded at 3.2 mbgl and 2.7 mbgl respectively. Both these trial pits were located in the cricket pitch area.

Equilibrium levels of groundwater in the alluvial sequence for selected holes (for the third dipping round) are provided in the QGL factual report. Water table elevation contours suggest that the Afon Taf (above the weir to the north) is feeding the aquifer. The aquifer drains generally south and south-eastwards through the site. A table of groundwater gauging levels is provided below for selected for wells lying along the flow line (arranged from north to south reading left to right).

Table 4.2 Summary of Alluvium Water Gauging Levels (23/08/22)

Groundwater Levels						
Hole ID	RBH114	RBH113	RBH111	IBH102	IBH104	RBH101
Water Depth mbgl (mAOD in brackets)	11.33 (149.95)	7.87 (149.23)	8.93 (148.35)	3.74 (147.91)	6.0 (145.28)	5.17 (144.23)

Where double standpipes/piezometers were installed with one pipe in the alluvium and one pipe in the Coal Measures, such as BH109, groundwater was slightly elevated in the Coal Measures pipe, e.g. RBH109 had an 18 cm difference in levels. In other dual pipe installations, the difference was less, around 10 cm. This suggests that the Coal Measures may be fed by slightly elevated heads in the hills surrounding the site.

5. Material Properties

The following sections commence by summarising the available material properties data provided in the QGL factual report. Soil aggressivity chemistry results are also included in this section.

Geoenvironmental soil and groundwater chemistry data is presented collectively in Section 6.1.

5.1 Made Ground

Classification tests undertaken on the Made Ground include organic matter content tests and calorific value tests.

The lower parts of Made Ground can comprise reworked fine alluvium and this material is cohesive, albeit of low plasticity. Additionally, in some locations the ash fill was found to be cohesive, of intermediate plasticity.

A total of 152 No. samples were subjected to organic matter content testing (133 No. for geo-environmental purposes and 16 No. for geotechnical purposes). Results ranged between <0.40 % and 100 %[1]. This reflects the heterogeneity in the material. The average value of the tests scheduled for geo-environmental purposes was 17.9 %, which is considered elevated for selected fill material used in the UK. The value suggests that the material often comprises colliery spoil with fragments of coal.

Follow up caloric value tests were undertaken on 7 No. shallow Made Ground samples returning an organic content above 50 %. These test results provided values in the range 12 to 22 MJ/kg. There is no clear pattern as to whether high caloric values were shallow or deep seated in the Made Ground unit. All these samples can be viewed as being potentially subject to smouldering if exposed to a heat source. The seven samples tested from the cricket pitch area provided lower results and are of less concern. It is noted that 'coal dust' was observed in several of the exploratory logs.

Four samples of slag type Made Ground collected from the internal boreholes (ie internal to the process building), and one sample of slag from the pavement outside the building (CP103) were tested for swelling potential (once wetted). The test procedure scheduled was an in house 'rapid assessment' procedure, whereby the samples were soaked and left to swell for 168 hours at a test temperature of 90 degrees centigrade. This was a non-accredited test but one which is accepted as being suitable by many local authorities located in South Wales. The results are provided in Table 5.1 below.

Table 5.1 – Swelling Potential Results on Slag Samples

Soil Type	No. of Tests	Elapsed Time of Swelling (post saturation)	% swelling after Elapsed Time
Red brown to black sandy slag	5	168 hrs	0.15 % to 0.2 %

[1] 100% as an organic content result for a Made Ground material is rare but is considered possible for coal dust

The volume increase of the soils was reasonably low as the maximum change in height was only 0.26 mm. This is comparable to swelling potential seen in many clay soils in dry summer months.

Total sulphur contents on 3 No. samples (comparable with the slag testing for swelling pressure) gave results of 0.26 %, 0.15 % and 0.31 %. These are lower than the 2% limit contained in EN-12620 for the permission use of air-cooled blast furnace slag for aggregates. A different batch of five slag samples (taken from external holes) were found to have Total Sulfur Contents (as S) below the detection limit for the test, ie all results were <0.1%.

SPT N values give an indirect measure of in situ relative density for granular soils and can be used to provide an estimate of undrained shear strength for cohesive soils. Tabulated below in Table 5.2 is a summary of the uncorrected SPT data for the Made Ground layer.

Table 5.2 – Uncorrected SPT N Values

Soil Type	No. of Tests	SPT N – min.	SPT N – max.	SPT N – ave.
Made Ground	99	0	<50	11

The SPT results were highly variable both within and between boreholes, demonstrating the heterogeneity of the material.

A total of 11 No. CBR tests were carried out on re-compacted (at natural moisture content) soaked samples and these provided a wide range of results as indicated in the table below:

Table 5.3 – CBR Results on Recompacted Samples

Soil Type	No. of Tests	CBR – min.	CBR – max.	Comment
Made Ground	11	0.59%	36%	Too variable a data set to give meaningful average. 5 tests out of 11 were below 1.5%

Four variable head permeability tests were undertaken in selected horizons in the Made Ground and these provided results of 2.04 x 10^{-5} m/s, 2.04 x 10^{-5} m/s, 2.83 x 10^{-6} m/s and 1.86 x 10^{-6}. The last test did have fine alluvium exposed at the base of the cylindrical test section.

5.2 Fine Alluvium

Eight Atterberg Limits tests classify the cohesive unit to be of low plasticity (gravelly sandy clay), intermediate plasticity (silts) and high plasticity (sandy clays). One sample of gravelly clay was non-plastic.

The SPT results in the material (summarised in Table 5.4 below). .

Table 5.4 – Uncorrected SPT N Values

Soil Type	No. of Tests	SPT N – min.	SPT N – max.	SPT N – ave.
Fine Alluvium	12	0	18	6

Taking the relationship between N value and strength (approx. N*5 = KN/m^2) SPT values give a range between Extremely Low Strength to High Strength, average Low Strength.

5.3 Coarse Alluvium

In general, the material is dense to very dense with SPT N values (uncorrected) taken at the top of the stratum seldom less than 40. There were a few exceptions with N=7 at the top of WS104 and 15 in CP101 and 24 (followed by 18) in CP102. There is no pattern of increasing N value with depth and there can be medium dense bands in generally dense material. The inability to achieve the full SPT depth was common and this may be the result of the appreciable cobble content up to 55 %. Several of the cable percussion holes failed to progress in the coarse alluvial layer.

Five variable head permeability tests were undertaken in selected horizons in the coarse alluvium and these provided results of 1.86 x 10^{-5} m/s, 6.42 x 10^{-5} m/s, 3.87 x 10^{-4} m/s, 1.97 x 10^{-5} m/s and 1.97 x 10^{-5} m/s.

5.4 South Wales Middle Coal Measures Formation

A total of 25 No. five point load tests were undertaken on cut and trimmed drill cores comprising siltstone. A further four tests were undertaken on coal (anthracite). For the siltstone, the average point load index test strength was I_{s50} = 0.73 MPa. Typically, the intact rock compressive strength (UCS) would be about 15 MPa based on this index value. The results, as is common with point load test results show some scatter and there is no trend in increase with depth. Three unconfined compressive strength tests were performed on sawed and grinding prepared core sub-samples and these gave results of 3, 18 and 52 MPa.

All three SPT results at the top of rock head were greater than N (uncorrected) = 50 as shown in the table below.

Table 5.5 – Uncorrected SPT N Values

Stratum	No. of Tests	SPT N – min.	SPT N – max.	Comment
Weathered Coal Measures	3	50 for 60mm	50 for 15mm	All tests <50

A single variable head permeability test was undertaken in the Coal Measures and this provided a result of 2.36 x 10^{-8} m/s.

5.5 Soil Aggressivity to Buried Concrete

To aid in the design of sulphate resistant concrete for foundations and sub-structures, the available sulphate and pH test data is presented in accordance with BRE Special Digest 1:2005 “Concrete in Aggressive Ground” (SD1). The site has been assessed as being a brownfield site and sulphur contents have also been collated and discussed.

Test data is available from dedicated BRE SD1 testing and from contamination testing of soil and groundwater samples.

All the available data has been assessed collectively. The data ranges are summarised in the table below.

Table 5.6 – Summary of BRE SD1 Testing Related Data

Data Set	pH values for soil and groundwater	Sulphate Content, SO_4			Sulphur Content
		Soil – Acid Soluble (%)	Soil - 2:1 Extract (mg/l)	Groundwater (mg/l)	%
All (undifferentiated)	5.6 to 9.5	0.01 to 3.94	19 to 461	690	0.01 to 1.31

A total of 36 No. pH, water soluble (WS) sulphate tests were also undertaken as part of the geo-environmental testing but the aggressiveness of the ground, excluding one sample, was similar (max WS Sulphate = 670 mg/l taking out WS128 @ 0.2 m as an outlier). WS128 @ 0.2 m provided much higher concentration of Sulphate (2:1 water soluble = 9700 mg/l, pH = 8.7). This sample also contained 1.4 % of total sulphur.

The testing results will provide the geotechnical designer for the scheme with suitable data to derive characteristic values for buried concrete design. The results have been assessed to judge if there are aggressive ground conditions and in this regard the results are not deemed abnormal for a brownfield site in the Welsh Valleys.

6. Contaminated Land Assessment

6.1 Geo-environmental Testing

6.1.1 Soil Chemical Testing

A total of 136 No. soil samples were tested from the samples collected as a part of the ground investigation works. The soil samples were tested for a range of Contaminants of Concern (CoC), with the results screened against current Generic Assessment Criteria (GAC) for residential with plant uptake land use settings. For all determinants other than lead and barium, the plant uptake values have been taken from the LQM/CIEH Suitable for Use Levels (S4uLs), utilising a Soil Organic Matter (SOM) content of 2.5 %. The GAC adopted for lead was the value taken from the C4SL's for residential land use, dated 2012. The GAC for barium is derived from the Dutch Standards.

It is acknowledged that this adopted land use is more sensitive than will apply for the redeveloped car park and the salt barn areas as a commercial end use is anticipated here. For that reason, for all results failing the residential with plant uptake values, a second pass screening has been undertaken using S4uLs for commercial land use, and where this has been undertaken it is flagged in the text.

A human health risk screening (of all the test results obtained in the ground investigation phase) has been completed and is presented in Appendix B and summarised in Table 6.1 overleaf.

The spatial extent of these exceedances, using a residential with plant uptake for the land east of Merthyr Road and commercial to the west of Merthyr Road, is shown in Drawing GC4005-RED-75-XX-DR-C-0009 (sheets 1 and 2). The soil impact is in shallow Made Ground and the boxes on this drawing explain whether it is single analytes that exceed the adopted criteria or multiple analytes. There is asbestos impact at WS108 (located outside the polystyrene building and at WS122 (located at the salt barn).

Due to the higher screening numbers published for metals, there are no failures of metals in the commercial areas and a section of car park shows PAH exceedance. The PAH exceedances relate to concentrations of dibenz(a,h)anthracene, benzo[a]pyrene and benzo[b]fluoranthene and are found in RBH112, which isolated beside the former colliery shafts in the north-east corner of the site. The asbestos contamination already described at WS122 is located within the commercial development area. Soil impact at both proposed commercial areas is in the upper 1.0 m soil zone.

TPH levels are below commercial screening area in the car park (max TPH=2500 mg/kg) and as such remediation for TPH is not warranted (as opposed to the PAH which do require addressing). A possible source for the TPH is handling oils around the historic pit head area which lies adjacent to this part of the site. TPH levels at WS112 (a proposed residential area location) are the highest found on site, and it is noted that this location lies beside the boiler house and the above ground fuel tank.

Table 6.1 Results of Geo-environmental Results Screening (All Site Areas)

Contaminant of Concern	GAC (mg/kg)	No of Samples	No. of exceedances	Max concentration (mg/kg)	Ratio Max / GAC
Inorganics					
pH	<6	136	2	5.3 (min conc)	n/a
Asbestos	Presence	136	2	Not known	n/a
Metals					
Arsenic	37	136	10	96	2.59
Barium	1300	136	1	3100	2.38
Beryllium	1.7	136	4	2.7	1.59
Nickel	1	136	1	190	1.46
PAHs					
Benzo(a)anthracene	11	136	2	64	5.82
Benzo(b)fluoranthene	3.3	136	5	74	22.42
Benzo(a)pyrene	5	136	2	55	11.00
Chrysene	22	136	2	62	2.82
Di-benzo(a,h)anthracene	0.28	136	5	35	35.71
Hydrocarbons					
TPH Aromatic >EC16-21	540	136	1	690	1.27
TPH Aromatic >EC21-35	1,500	136	3	5700	3.80

The elevated calorific values test results in soils (and as a proxy where no CV testing has occurred, elevated organic matter content tests) do pose a risk of soil smouldering should there be an ignition/heat source, such as electric cables or new residents lighting fires. This risk applies equally to a proposed residential or commercial scenario setting. Spots of high CV values are shown on the aforementioned drawing This drawing shows that the occurrences are sparsely scattered over the site (excepting the salt barn area where there are none).

6.1.2 Leaching Chemical Results

A total of 29 No. leachate results were analysed against the UK EQS values to see if there were any potential issues from leaching. There were a number of elevated readings that could be an issue if current building covered, or hardstand covered areas were opened up to soft cover land use such as parks and gardens. The below table summarises the findings from the analysis of the leachate testing.

Table 6.2 – Table of Leachate Results

Leachate Determinant	Highest Conc. Found (No of Exceedance in Brackets) (µg/l)	Redstart Screening Value (µg/l)
Zinc	22 (3)	5.62 (value may be increased if MBAT corrections on values are used)
Copper	20 (13)	1 (value may be increased if MBAT corrections on values are used)
Vanadium	25 (3)	20
Nickel	10 (2)	2.1 (value may be increased if MBAT corrections on values are used)
Lead	3.3 (3)	0.619 (value may be increased if MBAT corrections on values are used)

It is noted that the suite did not include barium, aluminium or manganese, which have quite high concentrations (as total value) in Made Ground soils. When the WAC style leaching testing is reviewed then it is noted that barium leaches as low levels with the highest 8:1 leachate being 47 ug/l. In practice, despite high aluminium concentrations in soils, dissolved aluminium concentrations in groundwater were lower than the chosen EQS value which suggests that leaching of this metal is not of prime concern. However, it is not the case for manganese which is present in groundwater above EQS values.

6.1.3 Water Chemical Results

Two groundwater samples were collected during the first round of monitoring from borehole installations and two more on the second round. These results were screened against the relevant Environmental Quality Standards (EQS) or Drinking Water Standards (DWS), whichever was the lower. The results have been screened against the adopted screening value (Appendix C, and elevated concentrations of key determinants are shown in Table 6.3 overleaf.

It is noted that levels of dissolved vanadium and lead were not found in groundwater despite having a degree of elevation in the leachate tests.

It is noted that neither the groundwater nor the river water had detectable levels of TPH (<10 ug/l), which suggest that the local moderate results in soil are not being mobilised to impact groundwater.

Several samples have laboratory detection limits at a concentration higher than the corresponding GAC. For example, benzo(a)pyrene has a detection limit of 0.1 µg/l yet the EQS is set at 0.00017 µg/l. It is conservatively assumed that these samples recorded a value matching the limit of detection when preparing the screening tables. Specialised laboratory testing would be required to improve these detection limits to meet the EQS standards.

Table 6.3 – Table of Water Results-Round 2

Determinant	Highest Conc. (ug/l) (No of Exceedances in Brackets)	Conc. Found in River - upgradient (ug/l)	Average Conc. in Groundwater (ug/l)	Redstart screening Value (ug/l)
Copper	1.1 (1)	0.96	0.80	1 (value may be increased if MBAT corrections on values are used)
Zinc	39 (10)	6.6	10.88	5.62 (value may be increased if MBAT corrections on values are used)
Nickel	7.4(11)	1.4	2.67	2.1(value may be increased if MBAT corrections on values are used)
Barium	220 (8)	73	88	100
Manganese	660 (4)	140	87	123 (value may be increased if MBAT corrections on values are used)
Ammoniacal nitrogen	0.54 (1)	Not tested	Below 0.1	0.5

When looking at round 1 water sampling results, the same CoC were apparent, though there were marginal exceedances of beryllium in one well, (max 26 ug/l), cadmium in 3 wells (max 27 ug/l), selenium in 1 well (max 16 ug/l) and lead in one well (max 9.06 ug/l). It is possible that better purging techniques employed in round 2 at RBH109 caused a reduction in these dissolved metals by removing solids from the well pipe but additional monitoring rounds would be required to substantiate this assertion.

The single ammonia failure was in RBH110, but this is an up-gradient borehole, and it could be that the ammonia is from an off-site source.

In conclusion the main elevation is with zinc and manganese. The wells with the most elevated zinc (using round 2-thought to be most representative as the more samples taken results in better purging of the well) was IBH104, where an acid spill occurred, but as you pass down the flow path (i.e. moving south-south-east) the wells in this location (i.e. IBH105 and IB106) only show lower values (12 and <2.5 ug/l respectively). This could suggest that dilution is lowering dissolved metal value in the downgradient area and that the source is of small size.

The three wells with the most elevated manganese concentrations are RBH101, RBH109 and RBH110. RBH110 is installed in a deep coal bed and this could explain the elevation here. The reason for elevation in the other alluvial gravel wells is unclear.

It is noted that the soil local to RBH112 has a potential to leach hydrocarbons into the alluvium aquifer if the car park was opened up to soft landscaping.

6.2 Waste Acceptance Testing

Waste Acceptance Criteria (WAC) testing was undertaken on 20 No. samples and of these, 14 No. samples recorded concentrations of contaminants that failed to meet the landfill waste acceptance criteria limits for an inert waste landfill licence. These samples proved unacceptable for the inert category mainly due to TOC content, though in some samples both the TOC and LOI values were too high. It is quite likely that this is a result of the appreciable coal content in failing samples. Additional testing will be required to fully classify the soils for disposal including a Hazardous Waste assessment.

6.3 Ground Gas Monitoring

Ground gas conditions have been assessed using the two to three monitoring visits described in Table 3.3. The visits all returned non detectable levels for methane. Carbon dioxide levels in all pipes remained below the 5 % v/v trigger level at which asphyxiant risk could occur should maintenance workers enter confined spaces in the ground (e.g. manholes), with a maximum value of 4.5 % v/v. Gas flow rates were often below the limit of detection for the equipment used but with a maximum value of 1 l/hour. The highest flow was only linked to a carbon dioxide concentration of 0.2 % v/v (and no detectable methane gas). The results of the gas monitoring are found in the factual report.

The ground gas conditions are consistent with the regime likely to apply at a riverside site with a filling history in the Welsh valleys, and the gas condition is not regarded as an abnormal item at this Site.

6.4 Conceptual Model Production

The information presented in the previous sections of this report has been collated and evaluated to establish a preliminary qualitative (environmental) risk assessment for the site. A preliminary Conceptual Site Model has been generated based on information derived from this assessment.

The site has been considered with regard to current UK legislation and guidance, namely ‘Land Contamination: Risk Management 2020’, Part 2A of the Environmental Protection Act 1990 and the Contaminated Land (Wales) Regulations 2006 and in accordance with current UK good practice guidelines.

The contaminated land ‘Preliminary Risk Assessment’ provides a qualitative evaluation of potentially active “pollutant linkages” at the site; these being plausible scenarios whereby a contamination source is connected to a possible receptor by one more potential migration pathways:

i. Potential sources of contamination: these include any actual or potential contaminative materials and activities, located either on, or in the vicinity of the site.

ii. Potential pathways for contamination migration: these comprise the routes or mechanism by which in-ground contaminants may connect the source to a receptor, including environmental migration pathways and human health exposure pathways; and

iii. Potential receptors at risk from contamination or pollution: these include present and / or future land users, ecological systems, water resources and property.

For a risk of pollution or environmental harm to occur, because of ground contamination, all three of these elements must be present in order for a pollutant linkage to be formed.

If one of these elements is absent, there can be no significant risk. If all are present then the magnitude of the risk is a function of the magnitude and mobility of the source, the sensitivity of the receptor and the nature of the migration pathway.

Potential sources, pathways and receptors have been identified and the risks associated with possible pollutant linkages assessed in Table 6.4.

6.4.1 Update of Potential Sources, Pathways and Receptors

From the information reviewed in this report combined with the ground investigation information, the following on-site and off-site sources of potential contamination, receptors and potential pathways have been identified for the site.

Sources, pathways and receptors are numbered in Table 6.4 and correspond to the features in Table 6.8 below.

Table 6.4 – Post Ground Investigation Conceptual Site Model

Potential Sources of Contamination		Number
On-Site		
Possible underground coal workings (mine gas) in SE corner where rockhead is assumed shallower and workings may be present, but boreholes not drilled to date.		**S1**
Sector of old car park adjacent to former colliery shafts with **proven** ground impacted from PAH's and hydrocarbons. Sporadic and not particularly intense **proven** impact with beryllium, arsenic, nickel and selected PAH's in shallow soils associated with colliery spoil-Made Ground across site in general.		**S2**
Colliery spoil or Iron factory spoil – **proven** risk of leachate with moderate levels of manganese, nickel, barium and zinc. Magnitude would require dQRA to assess in full		**S3**
Proven two spots of asbestos (but one is already within salt barn land sector)		
Hoover factory (recent and dating back to 1930's) in areas beneath process plant, buildings and no-go wayleaves beside gas and electric services/centre of cricket pitch – Potential contamination in relation to the manufacturing processes: paint plant and pipes (including dipping), boiler house, metal plating processes, water treatment plant, waste treatment plant, die cast processing, lubricant oil stores, effluent plants, concrete plant, acid treatment area, substations and tool hardening workshops, battery storage and repair, stripping house and polystyrene plant. Potential heavy metal, PAH's, hydrocarbons, leachates, arsenic, PCB's (electrical sub- station on the site and WPD transformers), chlorinated/fluorinated organic solvents, industrial acids, asbestos and oils. BTEX from polystyrene plant. Also – Potential contamination in relation to fuel and liquid chemical storage: petrol tank, diesel tank, lime tank. There is possibility that vessels and tanks contain hazardous liquids and these could be spilled if decommission and dismantling was not undertaken with care.		**S4** **S5** **S6**
Hoover factory (current) burning ground (metals and PAH's, VOC's) . Untested area -but small		**S7**
Proven likely combustible coal rich mining spoil with moderate occurrences in shallow soils		**S8** **S9**
Off-Site		
Colliery spoil and mine headworks – leachate high in pH, iron, manganese, aluminium and sulphate with low to trace PAH's and ground gas generation. TPH. Closest mine is Pen-cae-bach-Pits approx. 15m from the site.		**S10** **S11**
Mine adits – potential for acid mine drainage and ground gas generation. It is noted that historically a watercourse running across the car park originated from old levels just beyond the site.		
Pentrebach Iron Works and a variety of firms present during recent times in Triangle Business Park undertaking work with solvents and or coatings (solvents, metals)		
Fuel Tanks – potential for leaking hydrocarbon fuels and PCB's form Electrical sub stations		
Possible underground coal workings (mine gas) in north-east corner where rockhead is assumed shallower.		
Identified Pathways		**Number**
Human Health – Airborne Migration Pathways /	Potential **particulate / dust / fibre** inhalation pathways. This pathway includes windblown contaminants from offsite sources.	**P1**
	Vapour inhalation pathways and **gas accumulation** pathways.	

Inhalation also in ground migration		**P2**
Human Health – Direct Contact Exposure Pathways	Direct **dermal contact** with soils and waters.	**P3**
Human Health – Ingestion	**Ingestion** via hand to mouth action from contaminated soils and waters. Especially in the playing field areas.	**P4**
Controlled Waters – Aqueous Migration Pathways	On-site surface / near-surface mobile contaminants have the potential to enter the shallow groundwater regime via **leaching** and migration and impact the underlying aquifers and via seepage outflows and also impact to watercourses travelling in culverts beneath the site and the Afon Taf to the edge of the site. The coarse-grained nature of much of the superficial deposits will aid the mobilisation of any contaminant.	**P5**
	Much of the bedrock and superficial geology is indicated to be a Secondary A aquifer, in which **groundwater migration** pathways may be active.	**P6**
Buildings and Infrastructure	Migration of ground gas and leachate through granular Made Ground and Superficial Gravels or along service trenches.	**P7**
	Direct contact soil/pore water with water supply pipes.	**P8**
	Soil capable of smouldering if heat source present	**P9**
Potential Receptors		Number
Human Health	**Current site users** including members of the public such as cricket pitch users and Hoover workers	**R1**
	Construction workers / contractors who may undergo exposure during construction work (particularly ground works) undertaken at the site.	**R2**
	Future end-users including ongoing use of Hoover workers and users of the cricket pitch, and future users of station car park and residents.	**R3**
	Adjacent **residential properties**	**R4**
Controlled Waters	The **Afon Taf** and tributaries including several **culverted surface water features**	**R5**
	Groundwater within the **Secondary A Aquifer** superficial and bedrock deposits	**R6**
Property and Infrastructure	Adjacent and future buildings. New foundations	**R7**
	Potable water mains and drainage pipes on site	**R8**

6.4.2 Qualitative Ground Contamination Risk Assessment Approach

Based on the refined Conceptual Site Model, outlined in the preceding section, a qualitative ground contamination Preliminary Risk Assessment has been undertaken in-line with the methodology outlined in CIRIA 552 (CIRIA, 2001).

The assessment of risk is considered as a combination of the severity of the potential risk and likelihood of its occurrence in line with the definitions presented in the following tables.

Table 6.5 – Classification of Consequence

Category	Definition – Human Health	Definition – Environment	Definition – Buildings	Definition – Ecology
Severe	Short term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part IIa. e.g., high concentrations of cyanide on the surface of an informal recreation area.	Short term risk of pollution of sensitive water resource. e.g., major spillage of contaminants from site into controlled water.	Catastrophic damage to buildings / property. e.g., explosion, causing building collapse.	A short-term risk to a particular eco-system or organism forming part of such ecosystem.
Medium	Chronic damage to Human Health.	Pollution of sensitive water resources. e.g., leach of contaminants from a site to a Principal or Secondary Aquifer.	Severe damage to building fabric.	A significant change in a particular ecosystem. e.g., death of a species within a designated nature reserve.
Mild	Heath deterioration that lasts several months.	Pollution of non-sensitive water resources. Pollution of non-classified groundwater.	Significant damage to buildings, structures and services. Damage to sensitive buildings / structures / services. e.g., foundation damage resulting in instability.	Significant damage to crops. Damage to sensitive parts of the environment.
Minor	Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.).	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve.	Easily repairable effects of damage to buildings, structures and services. Discoloration of concrete.	The loss of plants in a landscaping scheme.

The likelihood of an event (probability) considers both the presence of the hazard and target, and the integrity of the pathway, and has been assessed based on the categories given below.

Table 6.6 – Categorisation of Probability

Category	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage, and all the elements are present and in the right place, which means that it is probable than an event will occur. Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low Likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place and is less likely in the shorter term.
Unlikely	There is a pollution linkage, but circumstances are such that it is improbable that an event would occur even in the very long term.

The potential severity of the risk and the probability of the risk occurring have been combined in accordance with the following matrix to provide a level of risk for each potential hazard.

Table 6.7 – Risk Matrix Categories

		Potential Severity			
		Severe	Medium	Minor	Negligible
Probability of Risk	High Likelihood	Very High	High	Moderate	Low / Moderate*
	Likely	High	Moderate	Low / Moderate	Low
	Low Likelihood	Moderate	Low / Moderate	Low	Very Low
	Unlikely	Low / Moderate	Low	Very Low	Very Low

N.B. – High Likelihood with Minor Severity has been modified from CIRIA C552 from Low / Moderate to Low Risk in NHBC R. and D. 66.

A qualitative risk assessment has been undertaken for the contaminant linkages to identify any potentially unacceptable risks in relation to the existing site setting and the proposed development. Table 6.8 overleaf details the risk categorisation for each identified potentially significant pollutant linkage.

Table 6.8 – Qualitative Risk Assessment (without mitigation)

Potential Sources of Contamination	Potential Receptor	Potential Pathway	Probability of risk being realised	Consequence of risk being realised	Risk	Justification / Comments
S2, S3 and S4 rail/tramway, colliery spoil and or iron works waste, former Hoover Factory	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation P3: Direct dermal contact P4: Ingestion	Low likelihood	Minor	Low	Public access to the site is not limited in the playing fields but restricted in the factory area, and likely. Dry conditions and bare soils required for dust generation is low in the playing fields.
	R2: Construction workers / contractors		Likely	Medium	Moderate	Given the history of the site, there is a potential for a variety of contaminants to be present in high concentrations with interfaces created during works. Given the large-scale use of asbestos on the site, there is a possibility of finding more asbestos in the soils despite the removal works previously undertaken.
	R3: Future end-users		Likely	Medium	Moderate	There will be residents in indoor spaces and members of the public using the riverside green areas, possible gardens applied to a portion of homes. Arsenic likely an issue in gardens where children could ingest soil/dust
	R4: Adjacent residential properties		Unlikely	Medium	Low	There are limited number of properties within influencing distance of the site. Afon Taf also is in between many of the properties and the site.
	R5: Afon Taf and onsite surface water culverts	P5: Leaching P6: Groundwater Migration	Likely	Medium	Moderate	A thicker mass of colliery material would theoretically have slightly greater leaching potential. Storage tanks and process lines when dismantling/demolition occurs. There is anecdotal evidence there is a well serving the fire water tank which could be a pathway. The main issue is patchy but low-level impact with selected dissolved heavy metals. There is evidence of mine water issues above the site and there are possibly background issues with these elements.
	R6: Secondary A Aquifer		Likely	Medium	Moderate	

Potential Sources of Contamination	Potential Receptor	Potential Pathway	Probability of risk being realised	Consequence of risk being realised	Risk	Justification / Comments
	R7: Adjacent buildings	P7: Migration of mine gas and leachate	Low Likelihood	Medium	Low / Moderate	Potential for explosive atmospheres and asphyxiating gases to migrate to nearby buildings.
	R8: Water supply pipes	P8: Attack of new water supply pipes	Low likelihood	Medium	Low / Moderate	Petroleum hydrocarbons potentially associated with the engine house and factory boiler rooms and fuel storage areas can permeate PVC water pipes, although reported Welsh Water sites are clay and iron.
S1: Mine gas	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation P3: Direct dermal contact P4: Ingestion	Unlikely	Severe	Low / Moderate	The thick cover by alluvium and Made Ground will dilute any gas emission from bedrock.
	R2: Construction workers / contractors		Low likelihood	Severe	Moderate	The thick cover by alluvium and Made Ground will dilute any gas emission from bedrock. Piling contractors may face some emissions.
	R3: Future end-users		Unlikely	Severe	Low / Moderate	The thick cover by alluvium and Made Ground will dilute any gas emission from bedrock.
	R4: Adjacent residential properties		Unlikely	Severe	Low / Moderate	The thick cover by alluvium and Made Ground will dilute any gas emission from bedrock.
S5: Fuel and liquid chemical storage/spillage in areas not investigated	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation P4: Ingestion	Unlikely	Minor	Very Low	The current tank arrangements appear well maintained
	R2: Construction workers / contractors		Low likelihood	Medium	Low / Moderate ow	Construction workers may encounter some contamination when undertaking groundworks.
	R3: Future end-users		Likely	Medium	Moderate	Spills/leakages may have occurred in the past
	R4: Adjacent residential properties		Unlikely	Medium	Low	There is separation with tanks being on the west side of the site

Potential Sources of Contamination	Potential Receptor	Potential Pathway	Probability of risk being realised	Consequence of risk being realised	Risk	Justification / Comments
	R5: Afon Taf and other on-site waterways	P5: Leaching	Likely	Low	Moderate/Low	There is the potential for contaminants to leach into the unconfined aquifer. The Afon Taf was a 'losing' river during Summer 2022, where its waters entered the site rather than the site feeding it. Flows may reverse in winter.
	R6: Secondary A Aquifer	P6: Groundwater Migration	Low likelihood	Medium	Moderate	There is the potential for contaminants to leach into unconfined aquifers. However, there is no abstraction in the area, but the gravels could provide baseflow to the Afon Taf in winter.
	R8: Water supply pipes	P8: Attack of water supply pipes	Unlikely	Medium	Low	Solvents could degrade water pipes, but none have been found in the ground investigation.
S6 Burning ground	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation P3: Direct dermal contact P4: Ingestion	Low likelihood	Minor	Low	Public access to the site is possible. Area is small in scale 5m x 5m
	R3: Future end-users	As above	Likely	Medium	Moderate	Risk of toxicity if area is soft landscaped, or the site of garden.
S7 Combustible coal rich mining spoil	R3: Future end-users R8: Water supply pipes	P9: combustibility	Likely	Medium	Moderate	High coal content of Made Ground at all depths
S8: Off-site colliery spoil	R1: Current Site Users	P1: Particulate / dust / fibre inhalation	Unlikely	Minor	Very Low	The off-site deposits are all well vegetated, decreasing the potential for contaminant particulate migration.

Potential Sources of Contamination	Potential Receptor	Potential Pathway	Probability of risk being realised	Consequence of risk being realised	Risk	Justification / Comments
	R2: Construction workers / contractors	P2: Vapour inhalation	Unlikely	Medium	Low	There is the potential for explosive or asphyxiant gases to accumulate in excavations.
	R3: Future end-users		Unlikely	Minor	Very Low	Similar situation to current site users.
S9: Off-site mine adits/shafts (mine gas and mine water)	R1: Current Site Users	P1: Particulate / dust / fibre inhalation P2: Vapour inhalation	Unlikely	Severe	Low/moderate	The principal risk comes from mine gas, which has a limited impact if it cannot accumulate in a confined space.
	R2: Construction workers / contractors		Unlikely	Severe	Low/moderate	It is unlikely that a pathway exists, down gradient, for explosive or asphyxiant gases to accumulate in excavations.
	R3: Future end-users		Unlikely	Severe	Low/moderate	Similar situation to current site users.
	R5: Afon Taf and other on-site waterways R6: Secondary A Aquifer	P5: Leaching P6: Groundwater migration (several adits lie above the site and mine water discharge may enter the aquifer, pass through site and emerge into surface water course)	Low likelihood	Medium	Low / Moderate	A review of the maps appears to show that at least one adit is discharging water that historically entered the site. It is not known if the discharge is ferruginous or not. No remediation works were noted on the coal mining report as being required to take place in the area.
S10 and S11: surrounding industrial land use -iron works, electricity transformers, coating	R1: Current Site Users	P2: Vapour inhalation P3: Direct dermal contact P4: Ingestion	Unlikely	Negligible	Very Low	There is separation so human health toxicity could only come from vapours.
	R2: Construction workers / contractors		Low likelihood	Minor	Low	Construction workers may encounter some vapours when undertaking groundworks.
	R3: Future end-users		Unlikely	Negligible	Very Low	Similar situation to current site users.

Potential Sources of Contamination	Potential Receptor	Potential Pathway	Probability of risk being realised	Consequence of risk being realised	Risk	Justification / Comments
industries and fuel Tanks	R5: Afon Taff and other onsite waterways	P6: Groundwater Migration	Low likelihood	Medium	Low / Moderate	Potential for leaking Hydrocarbon fuels / PCBs to mobilise to aquifer and river.
	R6: Secondary A Aquifer		Low likelihood	Medium	Low / Moderate	

Note: It is assumed that site conditions are post-development, assuming no mitigation or remedial measures are implemented

6.5 Discussion and Summary of Risk Assessment (moderate risks and greater)

6.5.1 R1 – Current site users including members of the public such as cricket pitch users and Hoover workers

The risk to Hoover workers is low, unless for some reason any maintenance works were planned in the spot of asbestos found or in the very NE corner of the old car park where there is local contamination. The risk to cricket pitch users is low to moderate and there is potential for localised spots of elevated arsenic (one found to date in centre of pitch).

6.5.2 R2 – Construction workers and contractors

Construction workers and contractors represent one of the highest risk categories identified in the qualitative risk assessment, and this possible pollution linkage has been ranked at 'Moderate'. Risks arise from a variety of exposure pathways and given the tanks and large number of chemicals processes which have taken place at the site then it is possible that the vapour risk is greatest. It is likely that the correct use of Personal Protective Equipment (PPE) will reduce this risk and standard safety procedures in operating within confined spaces e.g., excavated trenches. The action of penetrative piling might release mine gas.

6.5.3 R3 – Future site users, car park users, residents and uses of transport corridors and green space

Risk to R3 users could be moderate in areas so far investigated due to access restrictions. For example, there are key process sub-sites, particularly the areas of tanks, chemical processes and close to/beneath the large electrical substation where contamination might be found.

In terms of proven ground impact then the risk is assessed as moderate due to proven sporadic impact with barium and arsenic, selected PAH's and infrequent asbestos. Beryllium was found at variable levels, but it is possible that geo-statistics could be used to argue that remediation would be unnecessary. The same logic might apply for PAH's in the main platform of the site (i.e. not the NE corner of the car park where levels are highest). Adjacent residential property users (R4) can be dismissed as a receptor following the ground investigation.

The black colouration of much of the Made Ground poses an aesthetic issue should this material lie within the garden soil of new gardens. In the same way the red slag deposits would also fall into an aesthetic issue and may be hard to dig through.

6.5.4 R5 – surface waters-Afon Taff and culverted surface water features

Surface waters are a clear target as the Afon Taf lies beside the site, and there is at least one culvert beneath the site. Disturbance of groundwater during the redevelopment such as by driven piling may have an enhanced travel path to watercourses and the development change to more soft landscaping and gardens could increase leaching. The risk is low/moderate, though at least during the summer months it was evident that the Afon Taff is 'losing' river where it supplies waters into the site rather than the other way round. The overall risk is assessed as 'Low to moderate'.

6.5.5 *R6 – Groundwater*

There are no recorded abstraction licences within 1000 m that may be affected by contamination of groundwater which lessens the sensitivity of the aquifer. Impact with a small selection of heavy metals has been identified and these are common contaminants in the Welsh coal mining valleys. A DQRA might be advisable to explore this risk in more detail and additional monitoring of key wells along with the river (and in winter) is likely to be needed to inform such an assessment.

In conclusion groundwater within the aquifer is at 'Moderate' risk due to the proposed works involving some disturbance of Made Ground and the possibility that the new green river corridor may change infiltration rates in the central and northern sectors of the site.

6.5.6 *R7 and R8 – New infrastructure, including foundations and water pipes*

Localised pockets of soil do have elevated sulphates which could be aggressive to buried concrete, but the average condition is not abnormal for a site filled with colliery spoil and in parts slag. A limited programme has been undertaken to assess whether the slag on site has a potential for swelling (when wetting up) and the results only show fractions of a millimetre of movement. None the less, the presence of slag as a founding layer for houses is not outside NHBC guidance due to possible heave concerns.

7. Mining

7.1 Introduction

The PSSR has discussed coal mining based upon the information gleaned from a Coal Authority (CA) site-specific Consultants Coal Mining Report and Mine Entry Data Plan and Sheets, and BGS data and historical borehole logs.

As stated in the PSSR, coal mining mine abandonment plans were available but not obtained in time to be included within the PSSR. These plans have now been received and are reviewed here.

Furthermore, a main site investigation has been undertaken, designed to obtain information on coal bearing strata to supplement the abandonment plans.

A draft document on coal mining was sent to the Coal Authority for their review as a pre-application enquiry. The returned comments and additional information have been included in this assessment.

Within this section of the GIR, factual information on coal mining is reviewed and interpreted to determine data limitations and the perceived risk to the development.

7.2 Coal Authority Consultants Coal Mining Report

The CA online viewer indicates the site to be wholly within the Coal Mining Reporting Area and classified as a high-risk development area. The high-risk classification is due to the presence of recorded mine workings beneath the site. A site-specific Consultants Coal Mining Report and Mine Entry Data Plan and Sheets were obtained based upon this classification and a summary of the findings of the reports is presented below.

The Coal Mining report highlights 6 No. coal seams outcropping beneath the site. Table 7.0 lists the identified seams.

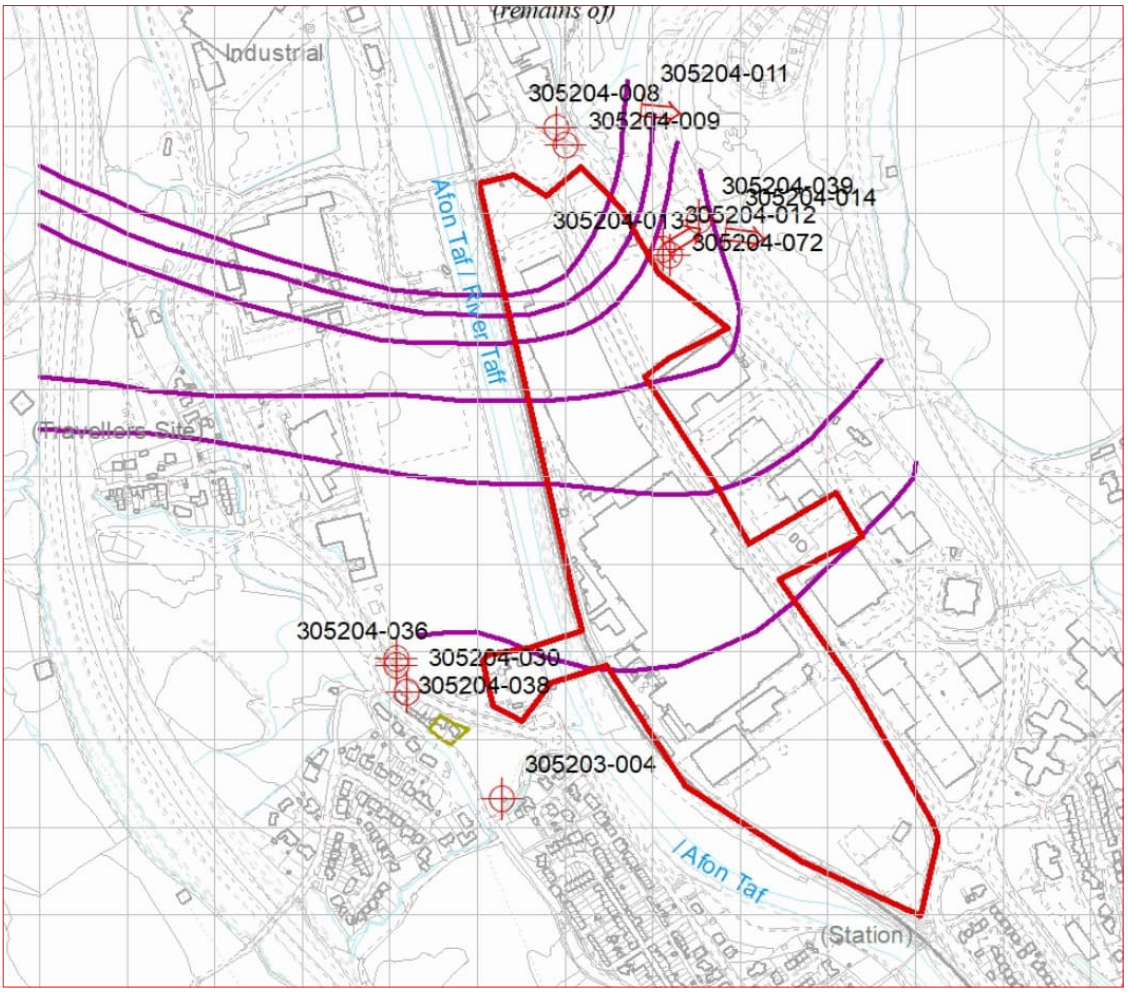
Table 7.0 – Onsite Coal Outcrops

Seam Name	Mineral	Workable	Bearing (degrees)
6FT Bottom Leaf	**Coal**	**Yes**	**252**
Bute	**Coal**	**Yes**	**17**
Lower 9FT and Bute	**Coal**	**Yes**	**198**
Lower Nine Foot Top Leaf	**Coal**	**Yes**	**206**
Red Vein	**Coal**	**Yes**	**255**
Upper 6FT Rider	**Coal**	**Yes**	**223**

It should be noted that the names of the coal seams listed here differ from those on mining abandonment plans and the geological map and are presented in no order.

Figure 7.0 shows the location of the coal outcrops but does not label them individually.

Figure 7.0 – Onsite Coal Outcrops



The Consultants Coal Mining Report also presents the known worked seams within the site area along with the shallowest depth of each seam, and this is presented as Table 7.1 overleaf.

Also shown are several shafts and adits outside of the site boundaries.

Table 7.1 – Onsite Coal Workings

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	UPPER 6FT RIDER	Coal	4WJU	22	Beneath Property	6.2	South	170	1875
unnamed	FOUR FOOT	Coal	49AG	28	Beneath Property	7.2	South	168	1950
unnamed	UPPER 6FT RIDER	Coal	4WJS	29	Beneath Property	4.5	South	170	1875
unnamed	TWO FOOT NINE	Coal	4WLA	42	Beneath Property	6.6	South-East	66	1940
unnamed	LOWER 7FT BOTTOM LEAF	Coal	4E29	42	North-East	7.7	South-East	114	1907
unnamed	FOUR FOOT	Coal	4WIG	44	Beneath Property	5.5	South	210	1854
unnamed	TWO FOOT NINE	Coal	4WJ0	51	Beneath Property	5.2	South	130	1862
unnamed	UPPER 6FT (T.L.)	Coal	4WIL	52	Beneath Property	3.9	South-East	120	1891
unnamed	LOWER NINE FOOT	Coal	49AZ	53	Beneath Property	8.9	South	259	1885
unnamed	UPPER 6FT RIDER	Coal	4WMI	58	North-East	6.9	South-East	170	1900
unnamed	FOUR FOOT	Coal	4WL6	60	Beneath Property	6.6	South	210	1891
unnamed	LOWER 7FT BOTTOM LEAF	Coal	4BDV	64	North-East	6.5	South-East	117	1902
unnamed	LOWER 7FT BOTTOM LEAF	Coal	4E2A	80	Beneath Property	8.6	South-East	117	1889
unnamed	LOWER NINE FOOT	Coal	4WJK	82	Beneath Property	3.3	South-East	145	1932
unnamed	LOWER NINE FOOT	Coal	4WJD	82	Beneath Property	6.6	South-East	145	1868
unnamed	LOWER NINE FOOT	Coal	4BDK	89	North-East	0.0	East	183	1909
unnamed	LOWER NINE FOOT	Coal	4BDL	89	East	0.0	East	183	1909
unnamed	LOWER NINE FOOT	Coal	4WJN	98	Beneath Property	7.1	South-East	145	1932
unnamed	LOWER NINE FOOT	Coal	4WLG	103	North-East	6.9	South	183	1935
unnamed	LOWER 7FT BOTTOM LEAF	Coal	4WK0	115	South	4.3	South-East	117	1899

Table 7.1 – Onsite Coal Workings (cont.)

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	LOWER 7FT BOTTOM LEAF	Coal	4WK1	122	Beneath Property	7.5	South-East	117	1899
unnamed	LOWER 7FT BOTTOM LEAF	Coal	4WK2	123	Beneath Property	5.9	South	117	1899
unnamed	BOTTOM VEIN IRONSTONE	Ironstone	499Y	137	North-East	16.4	South	100	1855
unnamed	GARW NO.1 IRONSTONE	Ironstone	499V	156	North-East	16.0	South-East	100	1855
unnamed	LOWER 7FT BOTTOM LEAF	Coal	4WLQ	157	North-East	6.1	South-East	117	1902

This table provides useful information on the dip, potential extraction thickness of the worked seams and the depth, although not location, of the workings.

7.3 Coal Authority Interactive Viewer

The Coal Authority Interactive Viewer has been used to supplement information from the Consultants Coal Mining Report.

7.3.1 Coal Authority Seam Outcrop and Nomenclature

An extract from the CA Interactive Viewer is provide in Figure 7.1 overleaf and provides a plan of the site area with the pertinent information points marked.

Further information is obtained on the seam codes by interrogating the ‘Underground Working’ series and cross-referencing CA Consultants Report for the seam name corresponding to the particular panel’s seam code.

Table 7.2 overleaf provides the seam codes for the seam names provided by CA. The interpreted seam names are those outcrops tabulated within the CA Consultants Report, but for which no worked panel is provided to directly cross-reference.

Seam codes are not provided for seams that have not been worked.

The abrupt truncation of seam outcrops approx. 300m east of the site and 300 m west of the site are indicative of faulting in a roughly NNW-SSE direction, extending to a significant depth.

Figure 7.1 – CA Interactive Viewer

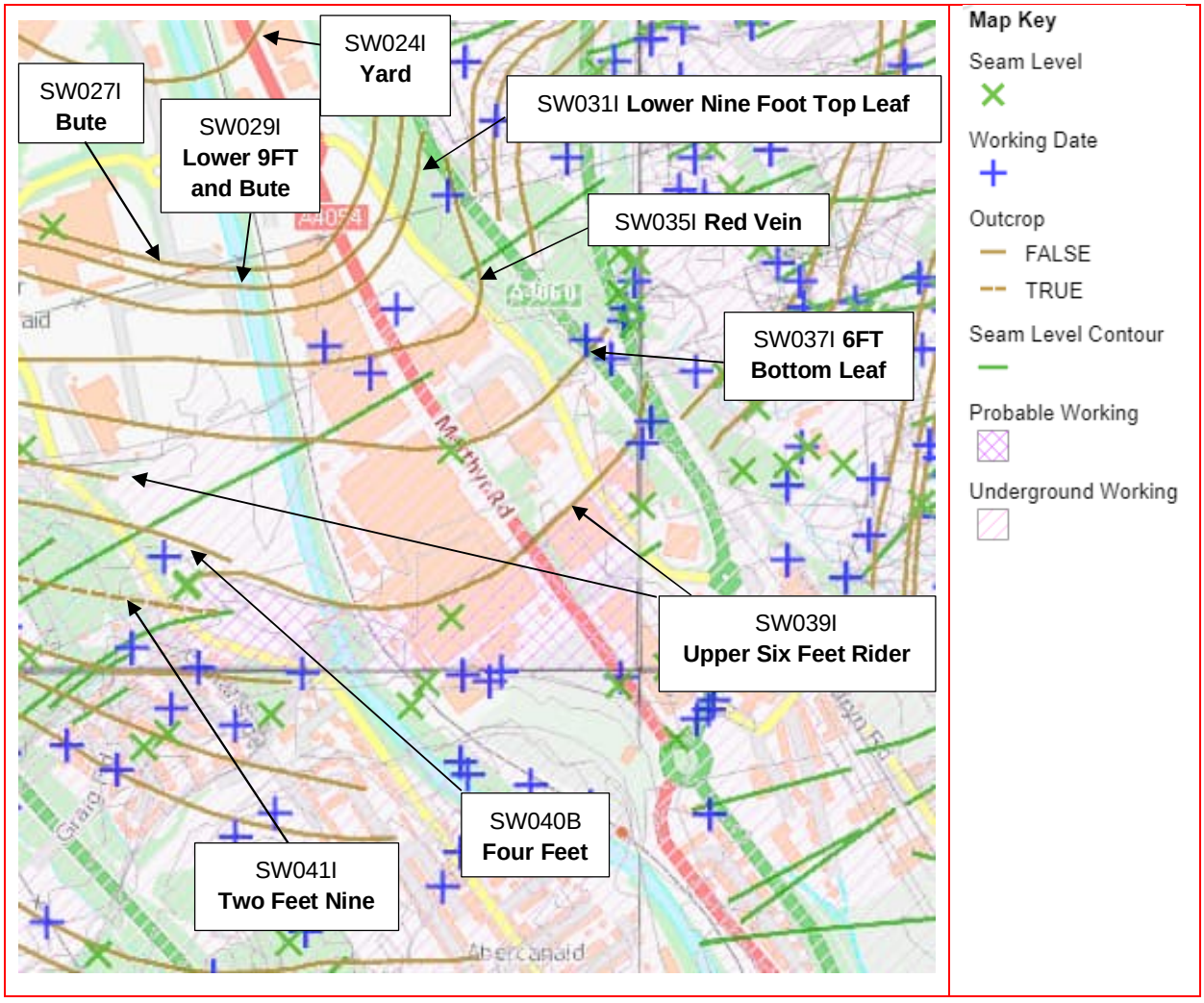


Table 7.2 – Coal Seams by CA Code and Outcrop

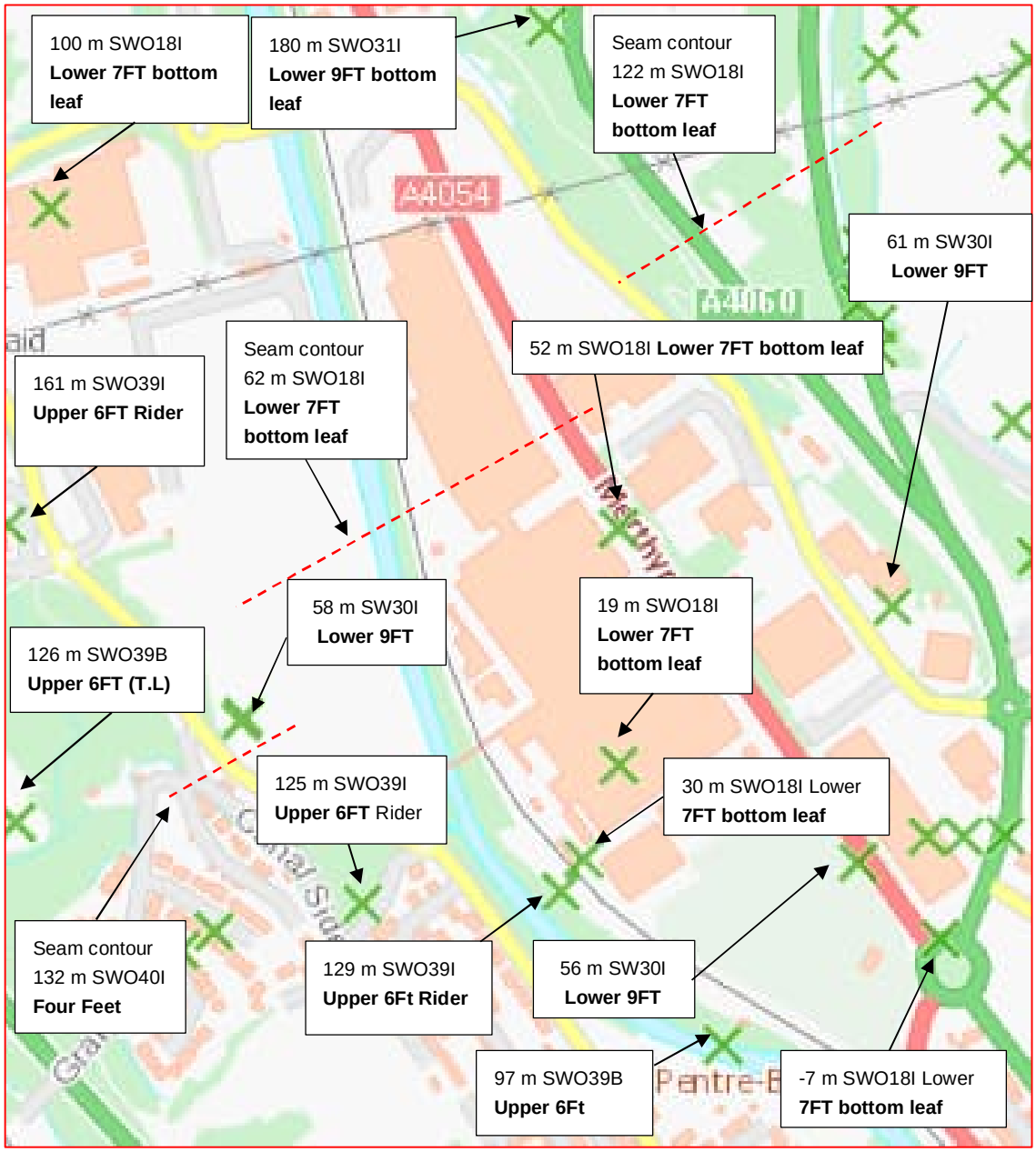
CA Seam Name	Seam Codes in Area	Outcrop Shown
Two Foot Nine	SW041I	West
Four Foot	SW040I	West
Upper 6FT Rider	**SW039I**	**On-site**
6FT Bottom Leaf	**SW037I**	**On-site**
Caerau	SW036I	East
Red Vein	**SW035I**	**On-site**
Upper Nine Foot	SW034I	East
Lower Nine Foot Top Leaf	**SW031I**	**On-site**
Lower 9FT and Bute	**SW029I**	**On-site**
Bute	**SW027I**	**On-site**
Yard (Meadow)	SW025I	North-west
Yard	SW024I	North
Seven Foot	SW022I	North-west
Lower Seven Feet Bottom Leaf *	SW018I	North
Upper Gellideg	SW015I	North-west
Five Foot Gellideg	SW013I	North

7.3.2 *Seam Levels*

An extract from the CA Interactive Viewer is provide in Figure 7.4 and provides a plan of the site area the location of seam levels marked in mAOD.

The two seam contours marked in the Lower Seven Feet Bottom Leaf (Code SW018I) provides evidence of a fault lying between Merthyr Road and the Triangle Park Business Park Road, with a downthrow to the west of over 50 m.

Figure 7.4 – CA Interactive Viewer

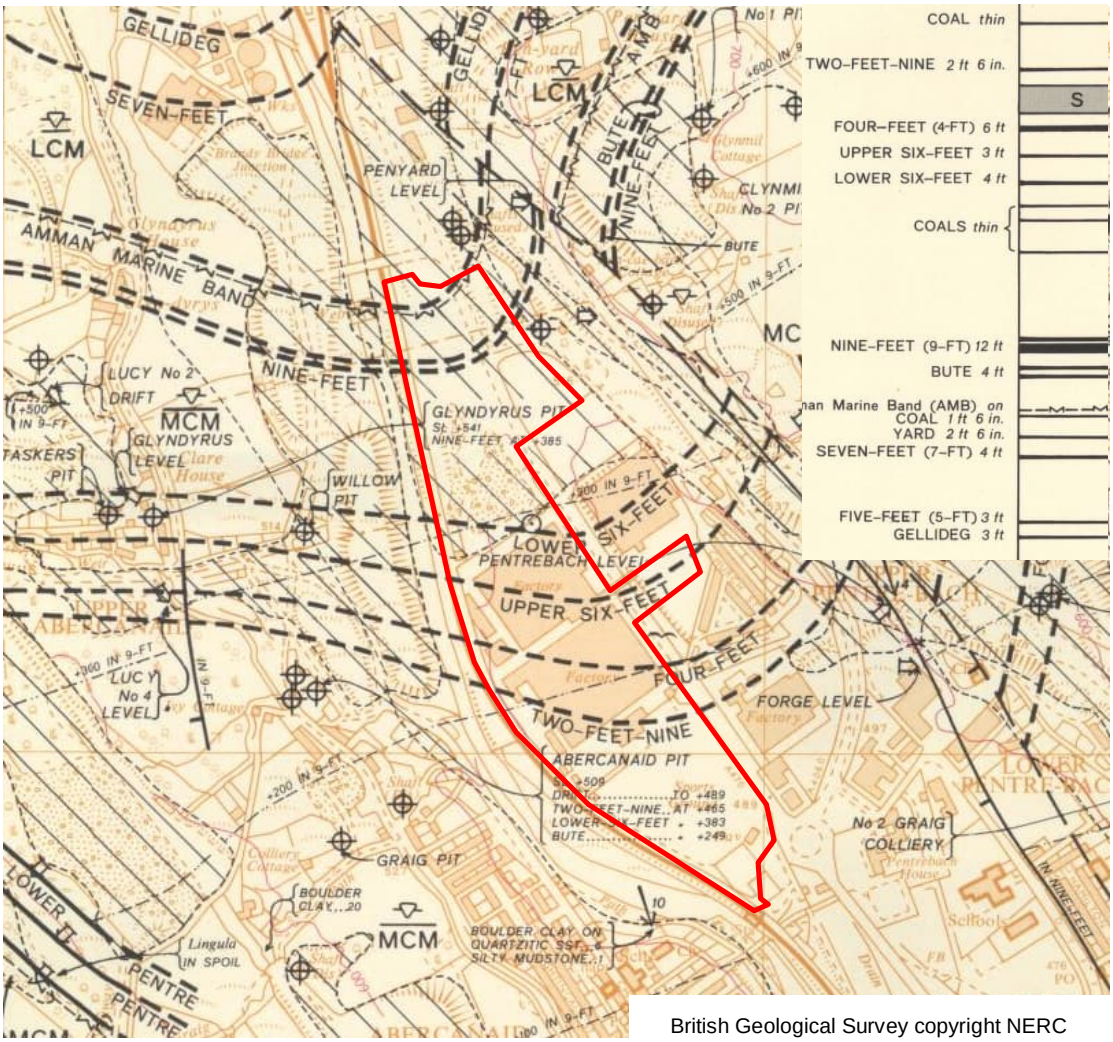


7.4 BGS Information

British Geological Survey (BGS) information utilised in this mining assessment is as follows:

- 1:50,000 scale geological map (Sheet 231, Merthyr Tydfil)
- 1:10:000 scale geological Map (Sheet SO 00 SE), reproduced as Figure 7.2.
- British Geological Survey records of historical boreholes

Figure 7.2 –BGS 1:10,000 Map Extract



British Geological Survey copyright NERC

7.4.1 BGS Seam Information

The BGS coal seam names differ slightly from the Coal Authority nomenclature, i.e. Upper Six Feet vs Upper Six Feet Rider. The outcrop is also slightly different, as described below and illustrated by comparison of Figure 7.1 and 7.2.

1. The BGS Four Feet and Two Feet Nine are not shown on the CA plan.
2. On the BGS plan, the Two Feet Nine seam is shown at the same outcrop location as the CA's Upper Six Feet Rider.
3. The Lower Six Feet / Six Feet Bottom Leaf is shown at the same location on both the BGS and CA plan respectively.
4. The Red Vein is not shown on the BGS plan.
5. The Nine Feet and Bute are shown in similar locations, but the CA plan has an additional outcrop The Lower Nine Feet Top Leaf.

The legend and annotations provided on the BGS 1:10,000 map, provide the following information:

I. The youngest (upper) seam, the Two Feet Nine, is separated from the Lower Six Feet seam by approximately 25 m according to the Abercanaid Pit record presented on the 1:10,000 map.

II. The Two Feet Nine (0.76 m thick) is underlain by a significant thickness of sandstone before the Four Feet seam (1.83 m thick) is encountered.

III. A relatively similar thickness of undifferentiated interburden separates the Four Foot from the Upper Six Feet (0.95 m thick) and the underlying Lower Six Feet (1.22 m thick).

IV. Between the Lower Six Feet and Nine Feet seams are a series of thin coals within a considerable thickness (approx. 40 m in the Abercanaid Pit record) of undifferentiated interburden.

V. The Nine Feet is shown as two leaves (totalling 3.65 m thickness).

VI. The Bute, a short distance beneath the Nine Feet, also comprises two leaves (totalling 1.22 m thickness).

7.4.2 Structural Geology

Bedding is shown on the 1:10,000 scale map as dipping between 4 and 10 degrees to the SSE.

There are no faults within the site indicated on the geological maps. Outside of the site boundaries, a fault is shown approximately 300 m to the east. It runs north-west to south-east, is downthown to the west, and intersects the Nine Feet seam. A smaller fault indicated approximately 350 m to the west of the site. This fault is north-south trending, downthrown to the west and shown intersecting the Nine Feet seam. See section 7.3 for further information on the location of these fault by CA sources.

7.5 Coal Mining Abandonment Plans

In 1872, the Coal Mines Regulation Act made the deposition of plans of abandoned coal mines with the Secretary of State a statutory requirement. Consequently, early mine workings will be unrecorded, and any records produced prior to 1872, are likely to be incomplete and unreliable. It is also worth noting that the earlier mine plans would have been produced using simple surveying equipment, which did not give the accuracy expected in mine plans of today.

The PSSR identified the following mine plan catalogue entries as having information that is pertinent to the site as they intersect with some or all of the boundary.

- SWR1978
- SWR1880
- SWR3622
- SWR3141
- SWR3146
- SWR3601
- SW478
- SW3612
- 6951 *

The Client has obtained 15 No. Abandonment plans, not all of those in the PSSR were obtained (6951 at the bottom of the list above and marked with an asterisk) and several additional plans were received. Table 7.3 below presents the list of mine abandonment plans received along with general summary information.

Table 7.3 – Coal Mining Abandonment Plans

Catalogue Number	Colliery Name	Seam Name	Date Abandoned
SWR3186	PLYMOUTH IRON WORKS	YARD (TWO FEET NINE)	Unknown
SWR3145	CASTLE & GETHIN	UPPER YARD (TWO FEET NINE).	Unknown
SWR3143	CASTLE & GETHIN	TWO FEET NINE (or No 1 YARD of Aberdare Valley)	Unknown
SWR3601	GRAIG NOS 2 & 1 / NORTH DUFFRYN PITS	TWO FEET NINE (YARD)	Unknown
SW478	LUCY NO 4 /LUCY THOMAS NO 4 /LUCY NO 1/ ABERCANAID/ GRAIG /GETHIN/ GETHIN	UPPER TWO FEET NINE & FOUR FOOT	12/03/1955
SWR3144	CASTLE & GETHIN	FOUR FEET	Unknown
SWR3146	CASTLE & GETHIN	SIX FEET.	Unknown
SWR233	GETHIN	NINE FEET	01/01/1866
4357	ABERCANAID	NINE FEET	01/01/1902
SWR1880	ABERCANAID & WILLOWS	BUTE	Unknown
SWR1882	ABERCANAID	SEVEN FEET (locally FIVE FEET SIX)	Unknown
SWR3141	CYFARTHFA /GLYNDYRUS	FIVE FEET SIX (SEVEN FEET)	Unknown
SWR1978	CYFARTHFA / COEDCAE / CARRIAGE / RHYDYCAR	GELLIDEG	Unknown
SW3612	PENCAEBACH PITS	IRONSTONE	Unknown
SW3622	PLYMOUTH / PENCAEBACH	IRONSTONES	Unknown

7.6 Two Feet Nine Workings

7.6.1 Two Feet Nine Abandonment Plan SW478

This plan is of workings in the Upper Two Feet Nine, and the Four Feet seams from multiple pits located to the west of the Afon Taf.

Workings within the Two Feet Nine seam extend west and south-west of the Glamorganshire Canal, well away from the site area.

7.6.2 Two Feet Nine Abandonment Plan SWR3143

This plan indicates the workings the Two Feet Nine seam from the Gethin / Cethin Colliery (Gethin No. 2 Pit) located west of the Glamorganshire Canal, 500 m south-west of the site boundary.

The plan shows the workings to extend eastwards but do not encroach far beyond the Afon Taf and extend little further than the Taff Vale Railway at the southern part of the site.

7.6.3 Two Feet Nine Abandonment Plan SWR3145

This plan is of workings the Two Feet Nine (Upper Yard) seam from the Gethin / Cethin Colliery (Gethin No. 2 Pit) located west of the Glamorganshire Canal, 500 m south-west of the site boundary.

Workings extend eastwards but do not encroach far beyond the Afon Taf and extend little further than the Taff Vale Railway at the southern part of the site.

7.6.4 Two Feet Nine Abandonment Plan SWR3186

This plan is of workings the Two Foot Nine (Yard) seam from the Plymouth Ironworks located south-east of the site boundary.

A section of the coal is provided on the plan which shows a total thickness of 45.5 inches (1.16 m) including three thin shale partings.

No workings from this colliery are located beneath the site.

7.6.5 Two Feet Nine Abandonment Plan SWR3601

This plan is of workings the Two Foot Nine (Yard) seam from the Graig No. 2, located east of the southern site boundary.

The workings end at a fault running roughly north-north-east.

A section of the coal is provided on the plan which shows a total thickness of 39 inches (1.00 m) including single, 4 inch thin, shale parting.

Workings from this colliery are located south-east of the site.

7.6.6 Two Feet Nine - Seam Code SW041I, Panel 4WJO

An extract of the area of workings (from the CA Viewer) is reproduced on Drg No. GC4005-RED-75-XX-DR-C-0010: Coal Workings Plans with Current Site Boundary Overlaid.

According to the CA Consultants report the workings are in the Two Feet Nine Coal at a depth of 51 m with an extraction thickness of 1.3 m.

The seam dips 5.2 degrees and a dip direction of 173 degrees (south).

7.6.7 Two Feet Nine - Seam Code SW041I, Panel 4WLA

An extract of the area of workings (from the CA Viewer) is reproduced on Drg No. GC4005-RED-75-XX-DR-C-0010: Coal Workings Plans with Current Site Boundary Overlaid.

According to the CA Consultants report the workings are in the Two Feet Nine Coal at a depth of 42 m with an extraction thickness of 0.66 m.

The seam dips 6.6 degrees and a dip direction of 156 degrees (south-east).

7.7 Four Feet Workings

7.7.1 Four Feet Abandonment Plan SW478

This plan is of workings in the Upper Two Feet Nine, and the Four Feet seams from multiple pits located to the west of the Afon Taf.

Workings in the Four Feet coal appear to extend east from beneath the Glamorganshire Canal as far as the Afon Taf, but not extending beneath the site.

A note on the Four Feet seam near Abercanaid Pits reads ‘Depth to 4 Feet 22 yards’ and appears to be a replication of the Abercanaid Pit shaft section on Abandonment plan 4357 (above).

An additional note on the old Four Feet workings from Gethin Pit shows a seam section with a seam thickness of 5’ 6” (1.68 m).

7.7.2 Four Feet Abandonment Plan SWR3144

This plan is of proposed workings the Four Feet seam from the Gethin / Cethin Colliery (Gethin No. 2 Pit) located west of the Glamorganshire Canal, 500 m south-west of the site boundary.

A note on the Four Feet workings from Castle Pit shaft shows a seam section with a seam thickness of 5’ 6” (1.68 m).

A further note on the drawing gives an average dip of strata as 1 in 10.6 (6 degrees) to the south-east / south-south-east.

Workings in the Four Feet extend onto the southern part of the site as reproduced on Drg No. GC4005-RED-75-XX-DR-C-0010: Coal Workings Plans with Current Site Boundary Overlaid. The workings stop short of the curving mineral rights boundary.

7.7.3 Four Feet - Seam Code SW040I, Panel 4WIG

An extract of the area of workings (from the CA Viewer) is a reproduction of the Abandonment Plan SWR3144 outline and is considered to be the same.

According to the CA Consultants report the workings are in the Four Feet Coal at a depth of 44 m with an extraction thickness of 2.1 m.

The seam dips 5.5 degrees and a dip direction of 165 degrees (south).

7.7.4 Four Feet - Seam Code SW040I, Panel 4WL6

An extract of the area of workings (from the CA Viewer) is reproduced on Drg No. GC4005-RED-75-XX-DR-C-0010: Coal Workings Plans with Current Site Boundary Overlaid.

According to the CA Consultants report, the workings are in the Four Feet Coal at a depth of 60 m with an extraction thickness of 2.1 m. Extraction completed in 1891.

The seam dips 6.6 degrees and a dip direction of 176 degrees (south).

The panel is shown to stop at the adjacent gridlines to the north and west. Caution needs to be applied in interpreting this as the end of workings. It is possible that the workings extend a short distance further into the site (as far as the outcrop of the Four Feet seam), in a north-west direction following the mineral rights boundary. However, it is also possible that the lines represent the worked-out area shown to the east of the Four Feet abandonment plan SWR3144.

7.7.5 Four Feet - Seam Code SW040I, Panel 49AG

The location of this panel of workings could not be determined from the CA Viewer, however it is described as located beneath the site, at a depth of 28 m, in the CA Consultants Report. A total extraction thickness of 1.68 m is quoted. Furthermore, workings are stated to have ceased in 1950, so records are likely to be available.

Workings east of the mineral rights boundary were completed in 1940 in the Two Feet Nine at 42 m depth, but the same area of the Four Feet was worked out at 60 m depth by 1891, in panel 4WL6 (as described above).

It is possible that the small shallow remnant of coal that crosses the southern part of the Hoover site was mined at this time but this seems unlikely given its limited extent.

It is recommended that this is queried with CA prior to design of any investigative or remedial works.

7.8 Six Feet Workings

7.8.1 Six Feet Abandonment Plan SWR3146

This plan is of workings the Six Feet seam from the Gethin / Cethin Colliery (Gethin No. 2 Pit) located west of the Glamorganshire Canal, 500 m south-west of the site boundary.

Workings extend eastwards but do not encroach far beyond the Afon Taff and extend little further than the Taff Vale Railway at the southern part of the site as reproduced on Drg No. GC4005-RED-75-XX-DR-C-0010: Coal Workings Plans with Current Site Boundary Overlaid.

7.9 Upper Six Feet Rider Workings

7.9.1 Upper Six Feet Rider - Seam Code SW039I, Panel 4WJU

An extract of the area of workings (from the CA Viewer) is reproduced on Drg No. GC4005-RED-75-XX-DR-C-0010: Coal Workings Plans with Current Site Boundary Overlaid.

According to the CA Consultants report the workings are in the Upper Six Feet Rider at a depth of 22 m with an extraction thickness of 1.7 m.

The seam dips 6.2 degrees and a dip direction of 176 degrees (south).

7.9.2 Probable Workings

An extract of the area of probable workings are reproduced on Drg No. GC4005-RED-75-XX-DR-C-0010: Coal Workings Plans with Current Site Boundary Overlaid.

The line of the CA assigned probable workings appears to lie immediately downdip of the Upper Six Feet Rider (SWO39I) which has a bearing of outcrop of 223 degrees and dips in the order of 45.5 to 6.9 degrees.

7.10 Six Feet Bottom Leaf Workings

There are no records of workings in the Six Feet Bottom Leaf.

7.11 Red Vein Seam Workings

There are no records of workings in the Red Vein seam.

7.12 Lower Nine Feet Workings

7.12.1 Nine Feet Abandonment Plan SWR233

This plan is of proposed workings the Nine Feet seam from the Cyfarthfa Colliery (Gethin No. 2 Pit) located west of the Glamorganshire Canal.

The plan shows the proposed workings to extend eastwards beneath the Afon Taff into the southern part of the site and is reproduced on Drg No. GC4005-RED-75-XX-DR-C-0010: Coal Workings Plans with Current Site Boundary Overlaid.

7.12.2 Lower Nine Feet - Seam Code SW030I, Panel 4WJD

This location forms part of the Abandonment Plan SWR233, which indicates that the proposed workings in the Nine Feet occurred.

According to the CA Consultants report the workings are in the Lower Nine Feet Coal at a depth of 82 m with an extraction thickness of 1.45 m.

The seam dips 6.6 degrees and a dip direction of 136 degrees (south-east).

7.12.3 Nine Feet Seam Abandonment Plan 4357

This plan is of the Nine Feet seam workings in Abercaniad Pit located to the west of the Afon Taff.

An extract of the plan, which shows several roadways and galleries beneath the site is reproduced on Drg No. GC4005-RED-75-XX-DR-C-0010: Coal Workings Plans with Current Site Boundary Overlaid.

Written on the CA abandonment plan is a section of strata within Abercanaid Pit shaft. A summary of the coal seams encountered, and a decimalisation of the strata depths, is presented in Table 7.4. This shaft record indicates that the Nine Feet (& Bute) seam was recorded at a depth of 75 mbgl at approximate National Grid reference SO (3)05400 (2)04050.

A note on the BGS 1:10,000 plan also provides details on the Abercanaid Pit shaft as shown on Table 7.4.

Table 7.4 – Coal Seams in Abercanaid Pit Shaft

Description	Abandonment Plan	BGS 1:10,000 Pit Section	
	Depth - m	Depth - m	m AOD
Top of pit	0	0	155.14
Rock head		6.1	149.04
Upper Two Feet Nine (or No 1 Yard of Aberdare Valley) *	12.8	13.41	141.73
Upper Four Feet	20.12		
Top Six Feet (Lower Four Feet) *	33.83		
Bottom Six Feet (Six Feet) *	43.89	38.4	116.74
Nine Feet & Bute	75.89		
Bute		79.24	75.9
Lower Two Feet Nine'	109.73		

* Alternative Names

7.12.4 Lower Nine Feet - Seam Code SW030I, Panel 49AZ

This location forms the majority of the Abandonment Plan 4357.

According to the CA Consultants report the workings are in the Lower Nine Feet Coal at a depth of 53 m with an extraction thickness of 2.59 m.

The seam dips 8.9 degrees and a dip direction of 172 degrees (south-east).

7.12.5 Lower Nine Feet - Seam Code SW030I, Panel 4WJN & Panel 4WJK

These locations form the very southern edge of Abandonment Plan 4357.

According to the CA Consultants report the workings are in the Lower Nine Feet Coal at a depth of 98 m with an extraction thickness of 1.45 m in Panel 4WJN and a depth of 82 m with an extraction thickness of 1.45 m in Panel 4WJK.

The seam dips 7.1 degrees and a dip direction of 149 degrees (south-east) in Panel 4WJN and dips at 3.3 degrees with a dip direction of 155 degrees (south-east) in Panel 4WJK.

These panels show a distinct thinning of the worked seam in the southern area of workings (top of cricket pitch and polystyrene factory).

7.13 Bute Workings

7.13.1 Bute Abandonment Plan SWR1880

This plan is of workings the Bute seam from the Abercanaid Colliery located west of the Glamorganshire Canal.

The plan shows workings in a westerly direction only.

A section description on the plan states that there are between 5 and 9 yards between the Nine Feet and underlying Bute seams. The Bute seam is in two leaves between 1.65 m and 1.88 m overall.

7.14 Seven Feet (Five Feet Six) / Lower Seven Feet Bottom Leaf Workings

7.14.1 Seven Feet Abandonment Plan SWR1882

This plan is of workings the Seven Feet (Five Feet Six) seam from the Abercanaid Colliery (Gethin No. 2 Pit) located west of the Glamorganshire Canal.

The plan shows the proposed workings to extend eastwards beneath the Afon Taf into the southern part of the site and is reproduced on Drg No. GC4005-RED-75-XX-DR-C-0010: Coal Workings Plans with Current Site Boundary Overlaid.

The seven feet is shown on a vertical section of Abercanaid Pit No.1 on the abandonment plan. This shaft and its coals are summarised in Table 7.5 overleaf. The depth of the shallower coal seams correlates well with the shaft section presented on abandonment plan 4357. The Seven Feet lies at a depth of 122.39 mbgl at approximate National Grid reference SO (3)05400 (2)04050.

Table 7.5 – Coal Seams in No. 1 Abercanaid Pit Shaft

Description	ft AOD	m AOD	Depth bgl (m)
Top of pit	513.31	156.46	0
Upper Two Feet Nine	469.38	143.07	13.39
Upper Four Feet	447.31	136.34	20.12
Lower Four Feet (Upper Six Feet Rider)*	400.23	121.99	34.47
Six Feet (Six Feet Bottom Leaf)*	385.06	117.37	39.09
Nine Feet	263.23	80.23	76.23
Seven Feet	111.65	34.04	122.39

* Alternative Names

7.14.2 Seven Feet Abandonment Plan SWR3141

This plan is of workings the Seven Feet (Five Feet Six) seam from the Cyfartthfa Colliery located west of the Glamorganshire Canal.

The plan shows the proposed workings to extend north-eastwards of the canal and Glyndyrus Pond.

7.14.3 Lower Seven Feet Bottom Leaf - Seam Code SW018I, Panel 4WK2

According to the CA Consultants report the workings are in the Lower Seven Feet Bottom Leaf at a depth of 123 m with an extraction thickness of 1.17 m.

The seam dips 5.9 degrees and a dip direction of 117 degrees (south).

7.14.4 Lower Seven Feet Bottom Leaf - Seam Code SW018I, Panel 4E2A

According to the CA Consultants report the workings are in the Lower Seven Feet Bottom Leaf at a depth of 80 m with an extraction thickness of 1.17 m.

The seam dips 8.6 degrees and a dip direction of 165 degrees (south).

7.15 Gellideg Workings

7.15.1 Gellideg Abandonment Plan SW3612

This plan is of workings the Gellideg seam from the Cyfarthfa pit north of the site.

The plan shows workings extending northwards.

7.16 Ironstone Workings

7.16.1 Spotted Pin Abandonment Plan SW3612

This plan is of workings the Spotted Pin ironstone and the Blue Vein from the Pencaebach Pit east of the site.

The plan shows workings extending east.

7.16.2 Upper Pins Abandonment Plan SW3622

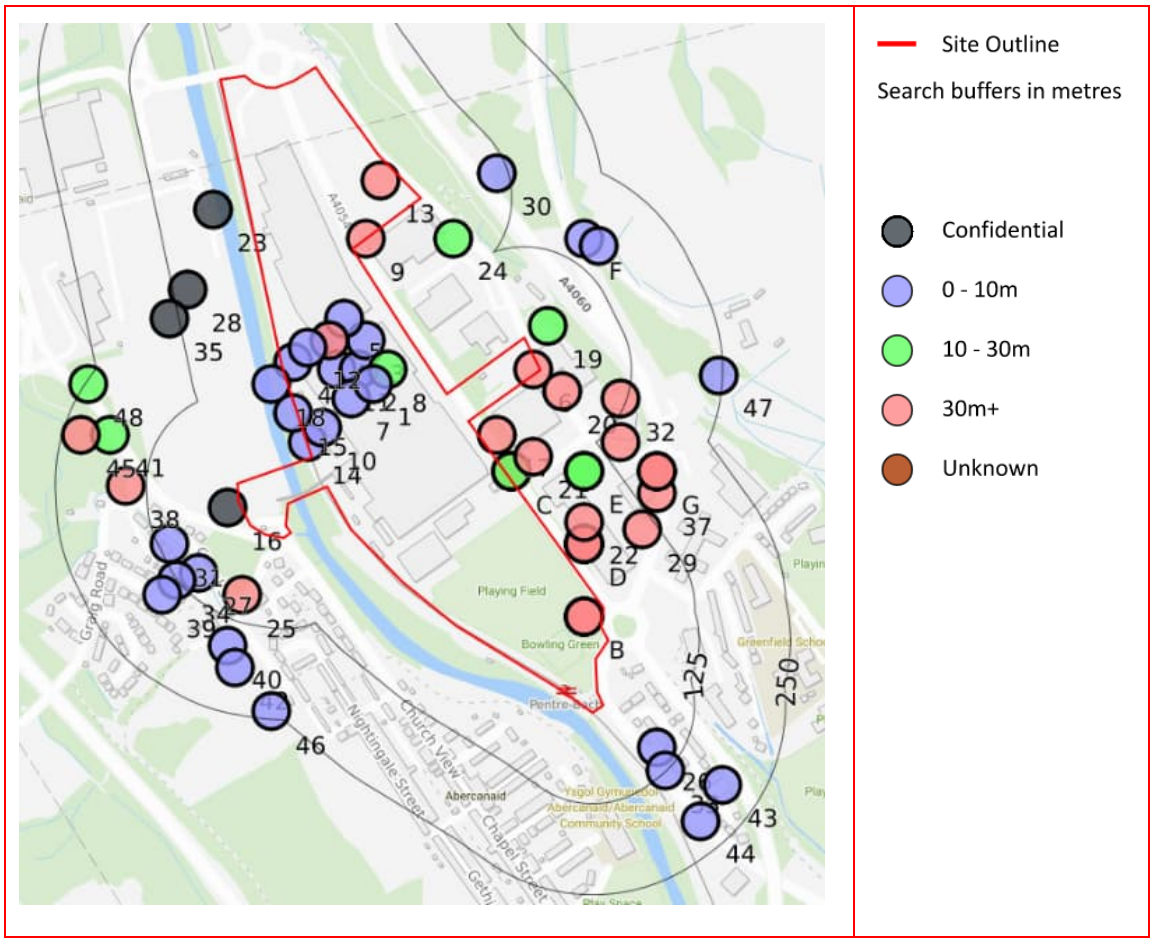
This plan is of workings multiple ironstones with a shaft from the Pencaebach Pit east of the site mining the Upper Pins.

The plan shows workings extending east.

7.17 Historical Boreholes

BGS records of historical boreholes were reviewed for the site. The records were reproduced in Section 16 of the Groundsure report (utilised in the PSSR), an extract of which is presented as Figure 7.3.

Figure 7.3 – BGS Historical Boreholes



A total of 84 No records were identified within 250 m radius of the site.

Four of these were confidential and not obtained.

A further 26 No records were of depths less than 10 m and so of little relevance to the mining assessment.

A large proportion of the boreholes were unobtainable due to other reasons, including 21 No. by Wardell Armstrong, for a proposed development at Pentrebach.

Of the remaining logs, 4 No. were located on-site, and 15 No. were outside of the site, all penetrated rockhead.

Pertinent records are summarised in Table 7.6 (on-site), and Table 7.7 (off-site), overleaf.

Table 7.6 – BGS Borehole Records On-Site

BGS Reference (Log ID) Groundsure ID	NGR	Starting Level (mAOD)	Summary of Log / Ground Conditions (m bgl)
SO00SE261 (WDA BH4A) 6	305930 204240	150.0	Rockhead 14.7 est. **22.4 -23.7 Coal** (1.3 **Upper Six Feet** annotated on logsheet) 23.7 – 25.6 Seat-earth **25.6 – 26.9 Coal** (1.3 **Lower Six Feet** annotated on logsheet) 26.9 – 30.5 Seat-earth over mudstone **30.5 – 31.9 Coal** (very poor quality) with 0.6 m of mudstone separation 31.9 – 33.5 Mudstone
SO00SE262 (WDA BH5A) 9	305700 204420	156.5 (approx.)	15.8 Rockhead 16.5 - 40.5 Mudstone with the occasional band of Siltstone **40.5 - 41.3 Coal** (0.8 moderately good quality, bottom 15 cm very poor quality) 41.3 - 42.1 Seat-earth over Mudstone
SO00SE264 (WDA BH7A) 13	305720 204500	158.95	Rockhead 10.7 10.7 – 36.0 Mudstone **36.0 - 39.2 Coal** (2.1 & 0.7 thick seams with 0.4 seat-earth between) 39.2 - 40.1 Seat-earth

BGS Reference (Log ID) Groundsure ID	NGR	Starting Level (mAOD)	Summary of Log / Ground Conditions (m bgl)
SO00SE549 (FE BH21A) A	305650 204280	151.8 approx.	Rockhead 30.0 approx. 30.0 – 56.0 approx. Mudstone **56.0 approx. Coal** thickness unknown (interpreted as **Nine Feet**) 56.0 - 61.0 Seat-earth to mudstone to sandstone

Table 7.7 – BGS Borehole Records Off-Site

BGS Reference (Log ID) Groundsure ID	NGR	Starting Level (mAOD)	Summary of Log / Ground Conditions (m bgl)
SO00SE260 (WDA BH3A) 17	305880 204150	152.0	26.8 Rockhead 26.8 – 35.8 Siltstone and mudstone **35.8 – 36.9 Coal** (**Upper Six Feet** annotated on logsheet) 36.9 – 38.5 Seat-earth **38.5 – 39.8 Coal** (**Lower Six Feet** annotated on logsheet) 39.8 – 42.3 Seat-earth over mudstone
SO00SE236 (EA BH6) 19	305950 204300	149.27	3.9 Rockhead 3.9 -14.4 Mudstone **14.5 – 16.0 Coal** (1.7 seam) 16.0 – 17.3 Mudstone **17.3 – 19.0 Coal** (1.9 seam) 19.0 – 22.4 Mudstone **22.4 – 23.6 Coal** (0.2 and 0.3 seams separated by 0.5 m mdst) 23.6 - 24.0 Mudstone
SO00SE235 (EA BH5) 20	305970 204210	149.78	15.0 Rockhead 15.0 – 26.4 Sandstone and mudstone **26.4 – 27.5 Coal** (1.3 seam) 27.5 – 28.9 Seat-earth and shale **28.9 – 30.2 Coal** (1.9 seam) 30.2 – 36.3 Seat-earth into mudstone

BGS Reference (Log ID) Groundsure ID	NGR	Starting Level (mAOD)	Summary of Log / Ground Conditions (m bgl)
SO00SE234 (EA BH3) 21	305930 204120	150.87	25.3 Rockhead 25.3 – 27.2 Sandstone and mudstone **27.2 – 28.4 Coal** (1.2 seam) 28.4 – 31.3 Seat-earth and carbonaceous shale **31.3 – 31.7 Coal** (0.4 seam) 31.7 - 33.8 Seat-earth **33.8 – 34.0 Coal** (0.25 seam) 31.7 – 44.4 Sandstone and mudstone (carbonaceous and calcite veins 39.9 – 41.8) **44.4 – 45.1 Coal** (0.9 seam) 45.1 – 45.4 Seat-earth
SO00SE259 (WDA BH2A) 22	306000 204030	148.50	25.5 Rockhead 25.5 – 29.9 Mudstone **29.9 – 30.9 Coal** (1.0 seam annotated **Two Feet Nine**) 30.9 – 37.9 Seat-earth to mudstone **37.9 – 39.1 Coal** (1.2 seam annotated **Upper Four Feet**) 39.1 – 41.7 Seat-earth to mudstone **41.7 – 42.1 Thin Coal** (0.4 seam) 42.1 – 44.1 Seat-earth to mudstone **44.1 – 44.6 Thin Coal** (0.4 seam) 44.6 – 46.7 Seat-earth to mudstone
SO00SE263 (WDA BH6A) 24	305820 204420	156.00	Rockhead 7.9 7.9 – 8.2 Mudstone **8.2 – 9.3 Coal** poor quality with 0.40 mudstone parting 9.3 – 30.7 Mudstone and siltstone

BGS Reference (Log ID) Groundsure ID	NGR	Starting Level (mAOD)	Summary of Log / Ground Conditions (m bgl)
SO00SE258 (WDA BH1A) 29	306080 204020	149.00	20.3 Rockhead 20.3 – 22.7 Mudstone **22.7 – 23.1 Coal** poor quality (0.4 seam) 23.1 – 25.9 Seat-earth to mudstone to siltstone 25.9 – 26.7 Coal with 0.4 m parting of seat-earth 26.7 – 29.9 Mudstone **29.9 – 31.2 Coal** (1.3 **Two Feet Nine** annotated on logsheet) 31.2 – 38.6 Shale to seat-earth to mudstone (carbonaceous bands) **38.6 – 39.7 Coal** (1.1 **Upper Four Feet** annotated on logsheet) 39.7 – 41.12 Seat-earth to mudstone
SO00SE237 (EA BH04) 32	306050 204200	149.37	7.2 Rockhead 7.2 – 11.1 Sandstone and siltstone **11.1 – 12.1 Coal** (1.2 seam) 12.1 – 12.3 Shale 12.3 – 14.4 Seat-earth and shale **14.4 – 14.8 Coal** (0.4 seam) 14.8 – 17.2 Seat-earth **17.2 – 17.4 Coal** (0.25 seam) 17.4 – 26.7 Siltstone and mudstone **26.7 – 28.0 Coal** (1.2 seam) 28.0 – 29.6 Seat-earth and shale **29.6 – 31.0 Coal** (1.2 seam) 31.0 – 33.0 Seat-earth and Siltstone

BGS Reference (Log ID) Groundsure ID	NGR	Starting Level (mAOD)	Summary of Log / Ground Conditions (m bgl)
SO00SE233 (EA BH02) 36	306050 204140	150.33	18.9 Rockhead 18.9 – 23.9 Siltstone and mudstone **23.9 – 24.9 Coal** (1.0 seam) 24.9 – 27.4 Seat-earth to shale **27.4 – 27.8 Coal** (0.4 seam) 27.8 – 30 .0 Seat-earth to shale **30.0 – 30.3 Coal** (0.3 seam) 30.3 – 37.6 Siltstone and mudstone **37.6 – 38.75 Coal** (1.43 seam) 38.75 –40.5 Seat-earth and shale **40.5 –41.7 Coal** (1.1 seam) 41.7 – 42.3 Seat-earth and Siltstone
SO00SE232 (EA BH01) 37	306100 204070	150.80	21.4 Rockhead 21.4 – 21.5 shaley coal 21.5 – 24.4 Seat-earth to shale **24.4 – 25.6 Coal** (1.2 seam) 25.6 – 32.25 Seat-earth to siltstone **32.25 – 33.4 Coal** (1.2 seam) 33.4 – 38.5 Seat-earth to mudstone **38.5 – 39.0 Coal** (0.5 seam) 39.0 – 41.2 Seat-earth and shale **41.2 – 41.4 Coal** (0.3 seam) 41.4 – 41.7 Seat-earth

BGS Reference (Log ID) Groundsure ID	NGR	Starting Level (mAOD)	Summary of Log / Ground Conditions (m bgl)
SO00SE146 (SM BH169) 38	305370 204080	160.62	7.4 Rockhead 7.4 – 12.4 Sandstone **12.4 – 13.0 Coal** 13.0 – 17.5 Seat-earth to siltstone **17.5 – 19.05 Coal** (1.65 annotated **Two Feet Nine** seam) 19.05 – 24.8 Siltstone to sandstone **24.85 –27.25 Coal** (2.5 annotated **Four Feet** seam) 27.25 – 41.2 Seat-earth to siltstone to sandstone **39.85 – 40.75 Coal** (0.9 annotated **Upper Six Feet** seam) 40.75 – 42.7 Siltstone **42.75 – 44.3 Coal** (1.55 annotated **Lower Six Feet** seam) 44.3 – 47.9 Seat-earth to siltstone **47.9 – 48.65 Coal** (0.75 annotated **Red Vein** seam) 48.65 – 49.7 Siltstone
SO00SE147 (SM BH170) 41	305350 204150	155.77	7.4 Rockhead 7.4 – 11.05 Siltstone and sandstone **11.05 – 13.00 Coal** (1.95 annotated **Four Feet Seam**) 13.0 – 25.5 Seat-earth to siltstone to sandstone **25.5 – 26.6 Coal** (1.1 annotated **Upper Six Feet**) 26.6 – 30.0 Siltstone
SO00SE148 (SM BH171) 45	305310 204150	150.35	9.2 Rockhead 9.2 – 13.1 Siltstone and sandstone **13.1 – 15.45 Coal** (2.35 annotated **Four Feet Seam**) 15.45 – 28.35 Seat-earth to siltstone to sandstone **28.35 – 30.0 Coal** (1.65 annotated **Upper Six Feet** seam) 30.0 – 33.7 Seat-earth to siltstone
SO00SE149 (SM BH172) 48	305320 204220	148.85	14.95 Rockhead 14.95 – 18.1 Sandstone

BGS Reference (Log ID) Groundsure ID	NGR	Starting Level (mAOD)	Summary of Log / Ground Conditions (m bgl)
SO00SE149 (SM BH174A) 48	305320 204220	160.83	15.00 Rockhead 15.0 – 18.0 Siltstone **18.0 – 19.1 Coal** (1.1 annotated **Upper Six Feet**) 19.1 – 20.2 Seat-earth 20.2 –24.05 Siltstone **24.05 – 25.3 Coal** (1.3 annotated **Lower Six Feet**) 25.3 – 25.5 Siltstone

7.18 Recent Ground Investigation

During the recent ground investigation 5 No rotary cored, and 9 No rotary open hole boreholes were formed, see Drg No GC4005-RED-75-XX-DR-C-0008 Coal Measure Investigation Boreholes (2 sheets).

Caution must be applied when using the strata depths and descriptions on rotary borehole log sheets as their accuracy varies considerably. Rotary cored holes provide by far the higher quality records, as they obtain relatively undisturbed samples of rock. However, some rock deposits such as coal, seat-earths and weathered mudstone are often poorly recovered or lost from the core recovery process due to their brittle or soft nature and tendency to wash away in the drilling fluid. In this case, an interpretation of the missing core is applied by engineering judgement of the site engineer. Strata records obtained from open hole drilling techniques are drillers descriptions based upon the relative drilling force that is applied to progress the hole and colour and texture of the arisings, often powdered by the drilling process.

Table 7.8 below summarises the relevant strata encountered, with those rotary open hole borehole records shaded grey to indicate the lower quality records.

Table 7.8 – Current GI Borehole Records

Log ID	NGR	Starting Level (mAOD)	Summary of Log / Ground Conditions (m bgl)
RBH101 R	305961 203980	149.4	23.0 Rockhead 23.0 – 31.0 Siltstone **31.0 – 31.45 Thin Coal** (0.45 m) 31.45 – 37.9 Mudstone minor sandstone **37.9 – 40.0 Coal** two thin seams (0.6 and 0.5 m) separated by 1.0 m mudstone 40.0 – 45.0 Siltstone

Log ID	NGR	Starting Level (mAOD)	Summary of Log / Ground Conditions (m bgl)
RBH102	305911 204035 approx	151.65	25.4 Rockhead **29.5 – 31.2 Coal** two thin seams (0.5 and 0.7 m) separated by 0.5 m mudstone **37.6 – 40.5 Coal** two seams (1.2 and 0.5 m) separated by 1.2 m mudstone 49.0 Termination
RBH103	305732 203975	151.0	13.9 Rockhead **19.1 – 23.0 Coal** two seams (0.4 and 0.9 m) separated by 2.6 m mudstone **29.1 – 30.2 Coal** (1.1 seam) 42.0 Termination
RBH104 R	305832 204157	151.03	27.6 Rockhead 27.6 – 36.55 Mudstone minor sandstone **36.55 – 38.2 Coal** (1.65 seam) 38.2 – 39.1 Mudstone **39.1 – 40.0 Coal** (0.9 seam) 40.0 – 42.0 Mudstone
RBH105 R	305892 204229	149.56	20.0 Rockhead 20.0 – 25.5 Mudstone minor sandstone **25.5 – 27.1 Coal** (1.6 seam) 27.1 – 28.2 Mudstone **28.2 – 29.57 Coal** (1.37 seam) 29.57 – 30.7 Mudstone
RBH106	305667 204070	151.35	14.1 Rockhead **16.4 – 17.6 Coal** (1.2 seam) 40.0 Termination
RBH107	305769 204244	151.63	22.5 Rockhead **23.6 – 24.1 Coal** (0.5 seam) **26.2 – 27.4 Coal** (1.2 seam) **29.1 – 30.0 Coal** (0.9 seam) **34.1 – 35.0 Coal** (0.9 seam) 40.0 Termination

Log ID	NGR	Starting Level (mAOD)	Summary of Log / Ground Conditions (m bgl)
RBH108A R	305734 204292	151.62	24.5 Rockhead 24.5 – 28.0 Mudstone **28.0 – 28.6 Thin Coal** (0.6 seam) 28.6 – 36.2 Mudstone 36.2 – 36.5 Sandstone
RBH109	305679 204398	156.39	27.2 Rockhead **34.0 – 36.4 Coal** (0.6 and 1.2 seam separated by 0.6 mdst) **43.3 – 44.4 Coal** (1.1 seam) 45.0 Termination
RBH110	305757 204474	157.22	9.6 Rockhead **21.2 – 23.0 Coal** two seams (0.6 and 1.2 m) separated by 0.6 m mudstone **27.3 – 28.0 Coal** (0.7 seam) 30.0 Termination
RBH111	305654 204446	157.28	26.1 Rockhead **28.1 – 29.4 Coal** (1.3 seam) **39.1 – 42.9 VOID** (3.8 m) 44.0 Termination
RBH112 R	305660 204594	163.2	13.9 Rockhead 13.9 – 19.1 Mudstone **19.1 – 19.55 Thin Coal** (0.45 seam) 19.55 –20.5 Mudstone **20.5 – 21.5 Coal** (1.0 seam) 21.5 – 29.3 Siltstone to mudstone **29.3 – 31.1 Coal** (1.8 seam) 31.1 – 45.0 Mudstone and siltstone
RBH113A R	305533 204519	157.1	27.8 Rockhead **30.1 –35.9 Coal** four seams (1.1, 1.0, 0.7 and 1.5 m) separated by three mudstone bands (0.8, 0.4 and 0.3 m) **44.6 – 45.0 Coal** (0.4 seam) 47.0 Termination
RBH114 R	305559 204604	161.28	22.8 Rockhead **31.2 – 32.9 Coal** (1.7 seam) 39.0 Termination

7.19 Geological Long Section

A simplified geological long section has been plotted as Drg No GC4005-RED-75-XX-DR-C-0011: Geological Long Section. The seam names are those used by the CA.

BGS and current ground investigation borehole logs as well as the Abercanaid shaft record (for determining the approximate anticipated seam separation) have been used to construct the long section. The seam separation is well aligned with those measured in the Abercanaid Pit.

Several of the boreholes are offset from the line of section. The uncertainty of the long section alignment with the dip of the strata means that the named coal seams assigned on the offset boreholes appear to lie several meters above (north-east) or below (south-west) the inferred coal seam location.

Based upon this long section, the following seams are anticipated to subcrop along the line of section are as follows:

I. The Two Feet Nine is anticipated to subcrop at approx. Ch. 890 m.

II. The Four Feet subcrops at approx. Ch. 780.

III. Upper 6Ft Rider subcrops at approx. Ch. 650 m.

IV. 6Ft Bottom Leaf subcrops at approx. Ch.430 m.

V. Red Vein subcrops at approx. Ch.200 m.

VI. Nine Feet subcrops at approx. 60 m north of the site boundary.

Note, chainages are shown on the above-mentioned drawing.

7.20 Mining Subsidence Risks

7.20.1 Introduction

Mine entries typically represent the highest risk mining subsidence hazard, and these are discussed in Section 7.23. This section of the report will focus on surface subsidence related to collapse of shallow mine workings.

There are three main mechanisms of shallow mine workings collapse below rock head, these include deterioration and crushing of support pillars, floor heave and roof collapse of which the latter mechanism has been demonstrated to be the predominant mechanism of collapse in shallow workings.

The collapse of mine roof strata causes settlement within the overlying strata, which bulks as it backfills the void created by the collapse. The void continues to propagate upwards by progressive collapse and bulking forming a chimney and ultimately a crown hole if the chimney reaches the surface.

Grouting contracts and examination of open cast sites in South Wales (Arup 1991) indicate that the vast majority of shallow workings have collapsed and that the remaining voids are principally associated with main roadways and mine entrances, which originally had some degree of support and limited or no rock cover.

Despite the apparent presence of residual voids in coal seam workings, the result of research into all varieties of shallow mine working incidents suggest that 22.7% of incidents occur as a result of subsidence below rock head and subsequent crown hole migration to surface, leading to settlement.

7.20.2 Limitations

The current ground investigation must be viewed as a preliminary investigation, in which budgetary constraints and spatial restrictions, due to the existing factory buildings and infrastructure, have resulted in limited data for analysis. Nevertheless, certain broad-brush assumptions may be inferred from the desk study and ground investigation information, which will permit an initial presentation of surface zones at risk of crown hole development across the site.

7.20.3 Quantitative Assessment of Crown Hole Development

The upper limit of rock cover permitting crown hole development has been investigated by many authors. For subsidence incidents with rock above mine workings (Arup 1991), the relative likelihood of crown hole occurrence is expressed as HT.

H / T = HT

- H = Height of rock cover above a working
- T = Total extraction height

The HT ratios can be calculated for the site based upon desk study and ground investigation data. From the geological long section the following geometries have been determined:

- We have assumed the dip of strata to be on average, 6 degrees (1 V in 10 H slope) in a south-south-east direction.
- Between geological long section Ch. 40 to 480 m, the reduction of rock cover is 1 V in 25 H.
- From Ch. 480 to 800+ m the rockhead depth appears variable but is overall does not reduce significantly across this distance and, with a conservative estimate on depth, can be assumed horizontal.

Areas at risk of crown hole development can be zoned at the grounds surface and supplemented by mine abandonment plan sources. In Arup's study, recorded crown hole developments reaching the surface were proportioned as follows:

- HT ratio >18, no crown hole occurrence was recognised at surface.
- Between HT 10 and 18, circa 5% of recorded crown hole developments.
- Between HT 2 and 10, circa 21% of recorded crown hole developments.
- At HT<2, circa 74% of recorded crown hole developments.

There are many variables to this data including the inclination of strata, overlying strata competency, groundwater depth and overburden thickness.

Literature provides evidence for lesser than 10T cover being adequate. For instance, for flat or gently inclined seams, Taylor (1975) suggested an 8T upper limit to be reasonable. Walton and

Taylor (1977), based on direct observations in opencast faces, suggested the upper limit of migration may well be 7T. In a status review, Walton and Cobb (1984) concluded "it is unusual to find many collapses more than six times the room height". This was later quantified for the South Wales Coalfield, by Statham and Treharne (1991), as 90 per cent of collapses occurring at a cover ratio of less than 6T.

For the Hoover site, the CA pre-application enquiry response states that a 10T cover, to provide assurance against crown hole migration, is appropriate. This advice is in line with CA guidance; Abandoned Mine Workings Manual (C758D).

Considering the on-site borehole information currently available is minimal, further detailed borehole information in combination with a favourable strata inclination and groundwater conditions, may enable CA to reduce the risk zone below the 10T criteria.

7.20.4 Geological Conditions

Within steeply inclined strata, loose material collecting beneath a crown hole collapse may flow under gravity away from the site, which would hinder bulking and permit potentially unrestricted crown hole migration. The dip of the strata at the site is low, typically recorded as between 6 and 8 degrees, which is considered beneficial in choking the crown hole development.

The strength and intactness (fracture spacing) of the seam roof and subsequent overlying strata is critical in the determination of crown hole propagation potential. Strong intact beds can effectively bridge the crown hole development, stopping it from reaching rock head. At the site typical strata are anticipated to comprise those simplified descriptions presented in Table 7.9.

Table 7.9 – Interburden Strata Composition

Between Coal Seams	Typical Strata Forming Interburden
Above Two Feet Nine	Two Feet directly overlain by thin (<1.0 m) sandstone and siltstone (<2.5 m), argillaceous siltstones and thin coals above.
Two Feet Nine to Four Feet	Variable. Records of 7.0 m of wholly (albeit variable) mudstone strata, to a mixture of strata i.e. sandstone (<3.0 m) overlain by arenaceous (2.0 m) becoming argillaceous (<1.0 m) siltstone/mudstone. The Abercanaid Pit shaft records on abandonment Plan No. 4357 (of the Nine Feet Seam) show a sandstone bed lying immediately above the roof of the Four Feet seam. The BGS map legend shows a significant sandstone bed between these two coal seams.

Between Coal Seams	Typical Strata Forming Interburden
Four Feet to Upper Six Feet Rider	Approx 9.0 to 12 m of moderately strong arenaceous siltstone and subordinate sandstones, becoming mudstone towards base of Four Feet. This data was obtained from BGS (SM series) boreholes, undertaken 250 m west of the site along the Taff Trail and it is possible that these may not be the correctly interpreted seam names. The Abercanaid Pit shaft records on abandonment Plan No. 4357 (of the Nine Feet Seam) show a thick sandstone bed lying between the Four Feet and Upper Six Feet
Upper Six Feet Rider to Six Feet Bottom Leaf	Up to 9.0 m of mudstone (shale).
Six Feet Bottom Leaf to Red Vein / Nine Feet	Multiple cyclothems minor coals seat-earths, predominantly mudstone and siltstone and minor sandstones.

From the local borehole information, the strata overlying the Upper Six Feet seam to the base of the Four Feet seam is particularly competent. This is confirmed in the Abercanaid Pit shaft record. However, BGS information shows the only significant sandstone unit occurring between the Four Feet and overlying Two Feet Nine seams.

The difference in the Coal Authority and BGS outcrops of the Upper 6 Feet Rider, and the Four Feet seams is not that great, suggesting that although nomenclature differ, they both suggest competent sandstone strata is located in a relatively similar location at the site. Clearly, this will need to be thoroughly investigated should it be relied upon to reduce the 10T criteria and direct seam grouting remedial works.

The roof of the Four Feet may contain a sandstone unit as shown on the Abercanaid Pit shaft record.

Other coal seams do not appear to contain any significant or reliable thickness of competent material.

7.20.5 Groundwater

The strata at the site are well below river level and permanently beneath the groundwater table, which is mostly beneficial. Where mine workings have a through flow of water passing between hydraulic gradients, this would act to wash away collapse material and reducing the effects of bulking. The detrimental effect of flooded workings is that softening may occur, enhancing the potential for pillars to punch through the seat-earth floor, instigating roof collapse and crownhole development.

7.20.6 Superficial Deposits

Although the bulking and choking effects of superficial deposits above crown holes is not understood in detail, it may be assumed that there is a significant benefit to the thick layer of coarse granular soil above rockhead, which is estimated to be typically in the order of 15 m in most locations at this site.

In inclined seam workings, close to rockhead, granular soils that are carried into crown hole by groundwater will not bulk and choke the void, rather they will be carried deeper into the workings. However, it is apparent that will low angle bedding dips, this situation is not applicable at the Hoover site.

Settlement at the ground surface aside, should crown holes propagate above rock head, a settlement bowl within the gravels may affect deep or piled foundations bearing upon them.

7.20.7 Two Feet Nine Crown Hole Risk Zone

According to CA information (Panels 4WJO & 4WLA), workings in the Two Feet Nine seam are recorded in the very southern corner of the site, extending to the east and south, with a maximum extraction thickness of 1.3 m. A narrow, sterile area, probably due to mineral rights ownership boundaries, lies between the two worked panels.

No boreholes within the site are interpreted to have encountered the Two Feet Nine. However, the far southern end of the site did not contain any deep boreholes.

Abercanaid Pit shaft records suggest that only 7.0 or 8.0 m separates the Two Feet Nine from the underlying Four Feet seam. If the rockhead along the geological section line is consistent, then the subcrop would lie in the region of Ch.890 m, below the cricket pavilion. However, it is anticipated that rockhead rises significantly to the west and that the subcrop will swing in a north-westerly direction closer to the river Taff.

The maximum extraction thickness (T) = 1.3 m, and at outcrop HT = 0. With a coal seam dip of 1 in 10, and an anticipated relatively level rock head, HT increases by 1, every 13 m south-south-east.

As the outcrop and workings are so close to the site's southern extremity, the crown hole risk zone (beyond the 130 m limit of 10T), would lie well outside of the development area.

7.20.8 Four Feet Seam Crown Hole Risk Zone

According to CA information workings in the Four Feet seam are recorded in Panel 4WL6 & 4WIG, in the cricket pitch area. The workings are at a depth of 44 m & 60 m, with a maximum extraction thickness of 2.1 m, and a dip to the south. Furthermore, Panel 49AG, which is missing its location information on the CA website, records worked depths of 28 m. Presumably this panel must lie closer to the Four Feet seam sub crop than the other identified panel workings, if it is located within the site boundaries.

The Four Feet seam sub-crop is interpreted at Ch. 780 m on the geological section line, at a depth of 127.00 mAOD.

Using the same method as described for the Two Feet Nine coal, the Four Feet workings approx. HT increases by 1 every 21 m south from outcrop, or 210 m at 10T. This intersects the 10T of the overlying Two Feet Nine seam.

The BGS map legend suggests that a significant sandstone unit lies between the Two Feet Nine and underlying Four Feet seam, and the Abercanaid Pit record shows a sandstone roof to the seam. However, this is unproven at the within the current Hoover site ground investigation. If this barrier to potential crown hole migration from the Four Feet seam is absent, there would be an increased risk of interaction where the Two Feet Nine overlies the Four Feet.

7.20.9 Upper Six Feet Rider Seam Crown Hole Risk Zone

In the south-western corner of the site abandonment plans show workings in the Six Feet.

Recorded mine workings in the Upper Six Feet Rider are shown by the blue outlined panel, 4WJU, on Figure 7.5 below, which are taken from a Coal Commission Plan, which the CA no longer hold. The 'end' of the workings at the horizontal gridline is indicative of the missing data. Workings in panel 4WJU have extraction thickness of 1.7 m and a dip to the south.

The workings are recorded at a depth of 22 m, but, given the thickness of superficial soils is nearly this, the subcrop position may be located further south, along with the associated extent of potential workings.

Probable workings abut CA's assumed Upper Six Feet Rider sub-crop, shown outlined black in Figure 7.5. These probable workings are an interpretation of the workings shown by the missing Coal Commission Plans described above.

Figure 7.5: Screenshot of CA Interactive Viewer: Probable Workings and Panel 4WJU.

The Upper Six Feet Rider is considered to lie at Ch.620 m on the geological section line based upon IBH105.

We recommend that a HT zonation is plotted with T of 1.7 m, in which HT increases by 1 every 17 m from outcrop. Therefore, 10T extends 170 m from the estimated line of subrop.

As mentioned previously, the composition of the coal roof and interburden are important factors in crown hole propagation, with the strata above the Six Feet being more competent than those above the Four Feet. RBH102R and RBH103R although not cored, provide descriptions of strata that are of predominantly lower competency material. This requires further ground investigation to confirm the anticipated strata lithologies.

7.20.1 Bottom Six Feet Seam Crown Hole Risk Zone

No abandonment or extraction records have been obtained for the Bottom Six Feet seam. However, records indicate the seam is substantial enough to be economically viable, approximately 4 ft thick on the BGS 1:10,000 map legend.

We recommend that a HT zonation is plotted with T of 1.5 m, in which HT increases by 1 every 15 m from outcrop. Therefore, 10T zone extends 150 m from the estimated line of subrop.

The lack of competent strata overlying the Bottom Six Feet Leaf suggests that if crown holes developed in workings, these could migrate upwards and destabilise the Upper Six Feet Rider Workings.

As the CA require proof of absence of workings, it should be a ground investigation requirement to locate and prove the unworked nature of the Bottom Six Feet Leaf.

7.20.1 Red Vein Seam Crown Hole Risk Zone

No workings in the Red Vein are shown on the CA interactive viewer and no abandonment plans for the Red Vein are available from the CA. However, the presence of the Red Vein seam should be investigated, or a 10T zone is required to be assumed under CA advice.

A lack of information would require seam extraction thickness to be conservatively estimated, which would likely create an overlapping 10T zone between the Red Vein and the overlying Bottom Six Feet.

7.20.2 Nine Feet and Bute Seam Crown Hole Risk Zone

Abandonment plans 4357 and SWR233 indicate that the site is underlain by workings in the Nine Feet seam apart from the far north.

The seam depth, thickness and location of the Nine Feet seam (and likely the closely underlying Bute seam) is not determined with certainty, in this preliminary investigation.

There is a lack of good quality ground investigation data to confidently identify the Nine Feet seam but the interpreted spacing between the Nine Feet and Lower Six Feet (34 m) is close to that anticipated from the separation observed on the Abercanaid pit shaft record (37 m) located to the west.

A void is recorded in RBH111 around 3.8 m thick. We propose three possible explanations for this:

1. The void was formed by coal extraction within the Nine Feet Seam. The height of the void encountered is considerable and could possibly be a main roadway.
2. Fractured ground, the result of drilling into a zone of vertical crown hole migration.
3. Fractured ground due to a fault at this location; note the yellow, coloured fault zone marked close to RBH111 on Abandonment plan SWR1883

The multiple seam section in BH113AR (four seams within a 5.8 m section) could be the Nine Feet (and potentially Bute) seams at this location are composed of several closely spaced leaves that lend themselves to being extracted *en masse*, but this would require confirmation by further drilling.

Conservatively, we would initially assign a thickness value (T) of 3.8 m to the Nine Feet seam, subject to confirmatory investigations. CA data relating to Panel Code 49AZ indicates a worked thickness of 2.59 m beneath the site, which may be more representative of the general extraction thickness.

Extraction thickness (T) = 2.6 m, and at outcrop HT = 0. As discussed previously, rock head appears to reduce in elevation in the same direction as the dip of strata, by approximately 2 degrees, or a 1 in 25 slope, thereby reducing the relative dip of strata to 4 degrees or a 1 in 14 slope. Therefore, HT increases by 1, every 36.4 m (2.6 m x 14 m) south-south-east.

Extrapolated from the geological long section, the interpreted Nine Feet seam subcrop lies around 80 m north of the Hoover site. Consequently, we recommend that a HT zonation starting at 80 m north of the site in which HT increases by 1 every 36.4 m from subcrop; giving a 364 m (10T) crown hole risk zone. The crown hole risk zone lies at approximate Ch. 285 m on the line of section, or approximately 60 m north of the Warehouse buildings southern edge.

7.20.1 Yard (Meadow) / Lower Two Feet Nine Seam Crown Hole Risk Zone

There is no record of this seam being worked beneath the site.

There is an anticipated separation between the Yard and the overlying Nine Feet and Bute seams of approx. 35 m, as shown on the nearby Abercanaid Pit shaft records.

We have no seam thickness records, so the HT ratio cannot be established.

Further work will be necessary to prove or disprove the Yard seam's location, thickness and intactness beneath the site, to see whether the 10T zone impinges upon the very northern part of the site. However, if 10T ratios are followed the total extraction height would need to be in the region of 3.5 m to trigger possible risks of multiple seam interactions with the overlying Nine Feet seam.

7.20.2 Seven Feet Seam Crown Hole Risk Zone

With an anticipated separation between the Seven Feet and Nine Feet coals of approx. 46 m, as shown on the nearby Abercanaid pit, and the Nine Feet coal outcropping to the north of the site, the Seven Feet is assumed to underlie the site at depths where the HT ratio is >10. The potential for crown hole development in the Seven Feet workings and propagating through to the overlying Nine Feet workings is considered negligible and for this reason the Seven Feet is excluded from further analysis.

7.21 Crown Hole At-Risk Zone Summary

Following the production of the geological long section and risk zoning exercise, a Drawing has been produced (GC4005-RED-75-XX-DR-C-0017: Anticipated Coal Seam Subcrop and 10T extents) showing the anticipated 10T Crown Hole At-Risk Zone for the Two Feet Nine, Four Feet, Upper Six Feet Rider, Lower Six Feet and Nine Feet & Bute coals.

From these drawings initial observations on each of these seams can be made.

7.21.1 Two Feet Nine

In the far south of the site, workings within in the Two Feet Nine seam, shown on the CA interactive viewer, are within the 10T zone, which extends beyond the site southern site boundary.

7.21.2 Four Feet

In the south of the site, workings within in the Four Feet seam, shown on the CA interactive viewer and abandonment plan, are within the 10T zone, which extends beyond the sites southern boundary.

There is an overlap between the underlying Four Feet and overlying Two Feet Nine 10T zones.

7.21.3 Upper Six Feet Rider

The Upper Six Feet Rider seam subcrop is considered to lie close to the southern edge of the Hoover Production building.

The majority of workings within in the Upper Six Feet Rider seam, shown on the CA interactive viewer and abandonment plan, are within the 10T zone, which extends approximately halfway into the cricket pitch.

There are additional ‘possible workings’ close to the seam subcrop, shown on the CA interactive Viewer. These possible workings also lie within the 10T zone

There is an overlap between the underlying Upper Six Feet Rider and overlying Four Feet 10T zones.

7.21.4 Bottom Six Feet

The Bottom Six Feet seam subcrop is considered to lie close to the northern edge of the Hoover Production building.

No workings are shown on the CA interactive viewer and no abandonment plans are available from the CA. However, the seam is present and economically viable so the 10T zone is applicable until proven otherwise and this extends a short distance from the assumed Upper Six Feet Rider Subcrop.

The proposed subcrop position suggests there is no overlap between the underlying Bottom Six Feet and overlying Upper Six Feet Rider 10T zones. If this proposed strata distribution is proven by investigation, there would likely be no interactions between workings, if found to be present in both seams.

7.21.5 Red Vein

The Red Vein is located at the CA presumed subcrop location due to a lack of reliable GI information.

Confirmatory drilling is considered appropriate to prove or disprove its presence, location and thickness beneath the site.

7.21.6 Nine Feet and Bute

Although the subcrop of the Nine Feet and Bute seams are interpreted to lie north of the site boundaries, the 10T zone extends south, approximately 60 m from the southern edge of the Hoover Warehouse buildings.

Workings are shown on the CA interactive viewer and abandonment plan, within the 10T zone, in the central area of the Hoover warehouse and the south-western corner of the nearby car park.

Based upon their assumed locations, there is an overlap between the underlying Nine Feet and Bute and overlying Red Vein 10T zones.

7.21.7 Yard (Meadow) / Lower Two Feet Nine Seam

No workings are shown on the CA interactive viewer and no abandonment plans are available from the CA. However, the Yard's presence should be investigated in the far north of the site, via deep boreholes, to determine if the assumed seam depth and thickness are correct and that no workings are encountered.

7.22 Uncertainties and Obtaining Missing Data

The data obtained through the desk study, ground investigation and correspondence with CA has a limited accuracy when attempting to define the extent of potential crown hole subsidence. Consequently, it is necessary to undertake the following in advance of a detailed remedial solution:

1. Additional drilling works to prove:
    a. the location of the Bottom Six Feet and Red Vein coal seams, and
    b. that they are unworked.

    Should these two seams be proven as unworked, and consequently free from the risk of crown holes, then the central part of the site is more likely to be developed without the need for remedial or preventative engineering solutions.

2. Additional drilling works to prove:
    a. the location of the Six Feet Rider subcrop, and
    b. proving the ground where probable workings are identified by the CA.

    This can potentially increase the area that does not require remediation further south of the CA identified line of probable workings.

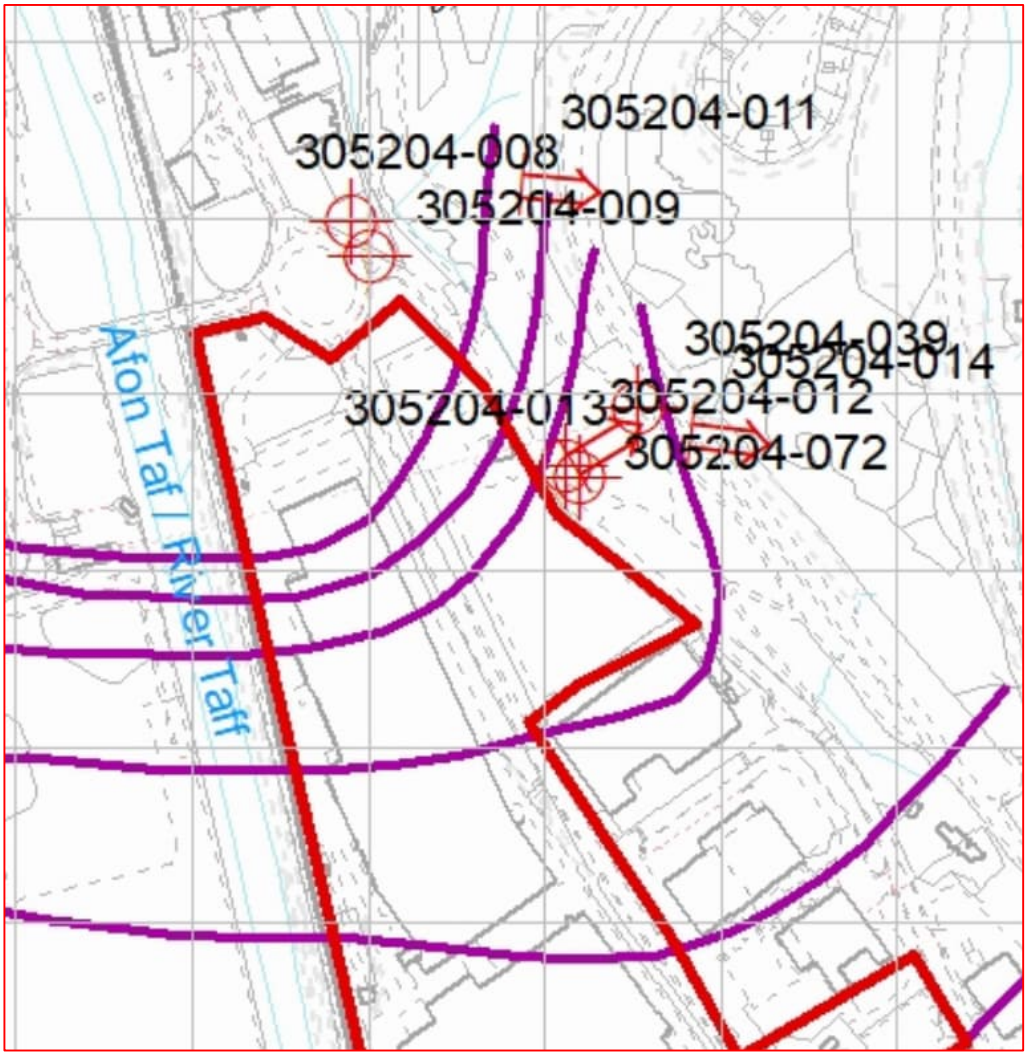
3. Drilling in the north of the site to prove:
    a. the location of the Nine Feet and Bute seams, as the Redstart presumed subcrop differs significantly from the CA & BGS subcrop position, and
    b. the extent of workings in the Nine Feet and Bute seams is as shown on the abandonment plans.

    We would also advise on incorporating deeper drilling to locate and prove the unworked nature of the Yard seam, which could potentially remove the need for remedial or preventative engineering solutions in the far northern part of the site.
4. Locating with confidence the Upper Six Feet Rider, Four Feet and Two Feet Nine seams to plan grouting works. Panel 49AG in the Four Feet seam was recorded as worked at 28 m depth, although no location or extents of these workings was identified. Drilling close to the subcrop will be required to confirm or discount whether workings in this panel are beneath the site.
5. Determining of the quality of interburden between the Upper Six Feet Rider, Four Feet and Two Feet Nine seam. This is important to assess the interaction between overlapping workings.
6. Additional drilling to determine the depth of superficial soil and rock head along the western edge of the site, as it is thought to increase in elevation significantly.
7. Additional drilling to determine the cause of the void described in RBH111 drilling records.
8. Install monitoring wells to assess groundwater pressures and mine gas generation in workings and undertake a quantitative risk assessment based upon the data obtained.
9. Provide a refined ground model to the CA with a view to reducing the 10T risk zone. This should include queries on the advantageous effects of any proven competent interburden and the thick superficial soil cover beneath much of the site.
10. Consult with the CA on remedial and preventative options.

7.23 Mine Entries

The Coal Authority report shows two shafts and an adit close to the eastern edge of the car park area and a further two shafts to its north, see Figure 7.6 below.

Figure 7.6: Plan Extract from CA Consultants Report



Interrogation of CA data provides the additional information, collated into Table 7.10 overleaf.

The Local Authority may hold additional records on the location or treatment of these shafts and adit as they are located beneath or adjacent to the public highway.

Table 7.10 – CA Mine Entry Details

Entry Type	Reference	Name	Grid Ref	Notes, etc.	Treatment
Shaft	305204-008	Old air shaft	305592 204697	Assumed diameter 2.5 m	-
Shaft	305204-009	Old air shaft	305602 204677	Assumed diameter 2.5 m	-
Shaft	305204-012	Pencae Bach North	305713 205558	Assumed diameter 2.5 m.	-
Shaft	305204-013	Pencae Bach South	305722 204552	Assumed diameter 2.5 m.	-
Adit	305204-072		305719 204561	Adit Angle 59 degrees. Assumed diameter 3 m.	-

At present, no treatment details are known for these mine entries, but their location is relatively certain. Typically, a 10m variation from the CA provided grid reference is a suitably conservative estimate on its accuracy, particularly where additional OS plans and abandonment plans are available to confirm their location. Consequently, the closest mine entry is still located on the opposite side of the highway to the car park.

In the development proposals, the car park area will retain its current use. Consequently, there is a very low risk to life and a low economic risk to the development from ground settlement associated with the collapse of a nearby shaft, beyond damage to any drainage runs and pavement cracking / subsidence. Nevertheless, it would be prudent to ascertain the type and depth of superficial soils and / or fill at the edge of the site closest to the mine entries. This data can be used to determine if a catastrophic shaft collapse could potentially affect the stability of the ground within the development site; a 45 degree angle from the shafts rock head aperture to the ground surface is a typically conservative estimate of the extents of ground disturbance. If the car park is in the potential zone of influence of a collapse, then geosynthetic reinforcement of the pavement and strengthened/flexible service runs may be required to guard against such an eventuality.

8. Engineering Assessment

A preliminary review of the geotechnical issues likely to feature at this study area with respect to any proposed construction are described below and based on consideration of the foregoing information.

8.1 Geotechnical Hazards

The ground investigation has identified the following geotechnical hazards within the study area:

- Soils of low load bearing capacity.
- Uneven settlement and high total settlement in Made Ground (also in places a soft cohesive soil up to 1.5 m thick at base of the alluvial sequence).
- Unstable Made Ground deposits when exposed in open excavations.
- Localised areas containing sulphates and low pH soils in Made Ground.
- Soil smouldering risk.
- Mine instability (refer to Section 7), mining voids and two old shafts within 15 – 20 m of site boundary.
- Slag deposits used as a sub-base to existing process building floor, which is an excluded material in NHBC guidance in the event that new residential building ground bearing floors are proposed.
- Underground road ‘underpass’ and water transfer culverts.

The first five of these hazards are generally related to alluvial deposits and Made Ground. The Made Ground is up to 9.9 m thick and due to this appreciable thickness, it suggests that either deep penetrative foundations will be required to support new residential buildings or raft foundations. Deep penetrative foundations may include piles, vibrated concrete columns (where Made Ground/cohesive alluvium is 8 m deep or less) or vibro-replacement stone columns (again, where Made Ground/cohesive alluvium is 8 m deep or less) that transfer the structural loads to more competent strata at depth. Piles will transfer loads closer to the worked seams, which will tend to increase the risk of mine collapse. This means that at least a portion of piles placed in high risk (and possibly in low risk) mining areas will need to be installed post a phase of mine stabilisation grouting.

All penetrative foundation techniques will face challenges in penetrating through the dense or very dense gravel with cobble layers as there is existing evidence that the light cable percussion borehole rigs utilised in the ground investigation failed to advance through these layers even with chiselling techniques.

During trial pitting works, the pit walls were found to be unstable through spalling and collapse and this particularly evident in the loosest colliery spoil-type materials, though this was not always the case, and 4.0 m target depths were achieved in some pits. This could be an issue if trenches, soakaway pits or deep basements are planned for the development, such as may be required on

some development schemes for basement car parks or perhaps if modification is required to the routes of existing storm water culverts.

Low to moderate levels of aggressive ground have been identified, which may necessitate the use of chemically resistant cement or materials for underground services.

The site is in a Development High Risk Area in respect of mine instability. Section 7 describes an initial mining assessment and draws conclusions that a programme of mine stabilisation will almost certainly be required. Plans showing risk variation across the site and seam extraction thicknesses have been provided, which if combined with assumed extraction percentages can be used to assess the volume of void in the rock that requires treating. Treating by drilling holes from the surface and injecting grout is the most likely solution envisaged for the site.

Mine gas conditions at the site are low risk, based on the gas wells and monitoring conducted to date.

A highway underpass/tunnel is known to link the Hoover manufacturing area with land lying on the eastern side of the A4054. It is unclear whether there is an intention to include this feature into the final masterplan for the scheme. If it is to be preserved and incorporated into the development scheme, then a full structural inspection should be considered as the tunnel's lining may have become compromised over its extended lifetime. An option may be to wall off the entrances and leave the tunnel section open but this might bring into force a long term maintenance and inspection regime and filling the tunnel with foam concrete would be a solution avoiding longer term maintenance,

Drainage plans provided by Hoover Candy (unlabelled) show there to be an arcuate water culvert extending beneath a portion of the site and the feature could pose a constraint to the developable footprint of the site. The drainage plans also show a second feature running in an east / west alignment, which is described as an 'unknown line' that lies between the Hoover warehouse and the production building and is inferred to have an outfall into the Afon Taf. This feature may pose an additional constraint to the area proposed for development (unless re-routed).

8.2 Site Clearance and Early Works

The Hoover buildings are likely to have sizeable foundations and it is understood that there are former process sumps filled with mass concrete. In addition, the production building has a split-level configuration. This suggests that clearance and grubbing out of existing foundations and slabs will be a major exercise in order to provide a site free of obstructions to new foundation piles, pile caps and ground beams. In the multiple process areas of the Hoover factory, specialist actions may be required in the pre-demolition period to remove pipework, tanks and vessels that carry hazardous substances. For example, the process plans for the site show areas of pipes carrying paint and specialist firms may be required to decommission the effluent plant.

Obstructions have been encountered when attempting to progress the ground investigation exploratory holes and a description of these is presented in Section 5.

8.3 Drainage and Electrical Services

Sustainable drainage systems (SuDS) are championed in the masterplan for the site. The use of infiltration type systems will be a challenge at this site due to the large thickness of Made Ground

present and issues the material poses with leaching of contamination and general instability in soils This suggests that alterative SuDS may be need designing at this site used such as oversized pipes and /or underground storage box solutions.

Should new electric cables (and connectors) be laid directly in Made Ground with a high coal content there would be an unacceptable risk of smouldering or soil combustion initiated by heat escape or sparking. To reduce this risk, electrical services should be laid in inert corridors of select granular fill, and this is considered an abnormal cost for the development.

8.4 Foundations

Due to extensive Made Ground deposits mantling the site, deep foundations such as piles may be required, particularly for multi-storey structures. Piling, in certain places, will need to be applied in combination with mine stability works. The types of pile or penetrative method (eg vibro-replacement stone columns) will depend on the ability to penetrate into and through the coarse alluvium, which may prove difficult due to the presence of very dense cobble layers. A boulder layer was found at one location overlying rock head, which may be relevant if a decision to seat piles in the top of rock head was taken and machinery was not suited to rock coring.

The site lies adjacent to a live railway so there may be constraints on maximum vibration levels.

Raft foundations are a clear foundation option in those parts of the site where the Made Ground layer has been consolidated by Hoover's factory floors, the storage of materials and lorry movements over many tens of years. Hard spots with caused by old foundations will require grubbing up and removal. The Made Ground materials will however be less consolidated in the current sports ground area, and it is possible that some type of compaction treatment (or possibly deep soil mixing) may be required to provide satisfactory performance.

As previously mentioned, there are slag deposits up to 5.0 m thick beneath sectors of the site and whilst a small-scale programme of swelling testing (and sulfur content) has been undertaken, which does not show problematic heave amounts, it is likely that mitigation works will be required to allow NHBC (or other insurers) to deliver appropriate guarantees. As a minimum this may involve additional testing and use of suspended floors in all buildings (which fall on the slag footprint).

8.5 Waste and Environmental Management

The following environmental considerations will be relevant to the scheme:

- A review of the available asbestos registers and plans will enable conclusions on any potential areas of concern to be highlights and more targeted investigation to the presence of asbestos in soils to be designed.
- Sight of COSHH registers for the factory or alternative data on chemicals used/stored in buildings or tanks or vessels.
- Waste generated as part of the works and potential for excess soils will require appropriate classification and management. A Materials Management Plan will be required prior to remediation works commencing.
- If the site is to be demolished in stages, there may be complex issues around exposure of remaining workers to dust and vapours.

A portion of arisings from excavations may be suitable for re-use, subject to discard of any high coal content material, chemical testing to confirm that there is no contamination in the material; and geotechnical testing to determine compliance with earthworks requirements. Removing excavation spoil (with its coal impact) and paying a suitable landfill to take the material is seen as an abnormal cost in developing this site.

9. Conclusions and Recommendations

It is noted that the pre-acquisition process requires the preparation of a Phase 1 Cost Consultant Demolition/Remediation Report. This requires a high-level budgetary estimate for the demolition, removal (of structures) and remediation works for the site. The information collected and evaluated in this GIR has revealed that the pattern of ground impact at the site could involve remediation of multiple but small-scale soil pockets. A drawing has been produced that identifies sub-areas of the site requiring remediation for contamination and combustible soil control and depths of treatment are assessed as being 0.6 m to 1.0 m deep. It is noted that a watching brief, supplemented by a testing programme beneath current un-investigated buildings will be required and this could identify additional measures. Some tanks and process vessels and their foundations will also need to be subject to extra testing, which may identify additional areas of ground requiring remediation.

The remediation drawing solely looks at the remediation of soils. The groundwater testing programme has identified some impact with zinc and manganese and there is a degree of concern as to whether levels of these contaminants could increase following demolition of buildings and hardstands when infiltration may be expected to increase. As a minimum measure some additional surface water and groundwater sampling is recommended to allow a Detailed Quantitative Risk Assessment (DQRA) to be performed to fully assess the risk. In the Hoover site setting, adjacent to the river, where pile or vibro-replacement stone/concrete column type ground disturbance is planned is it likely that a planning condition will be set requiring construction phase groundwater monitoring.

It is recommended that all electrical services are lain in a surround of select granular material.

Removal of coal rich excavation spoil will impart an abnormal cost on the scheme and liaison with the Phase 1 Cost Consultant will be necessary to estimate these costs.

In preparing this report it was recognised that a quantitative crown hole development risk assessment would be required to help assess abnormal costs in relation to treating mine voids. The assessment was completed and is presented in section 7 of the report. This has proposed crown hole migration 10T Risk Zones and presented the outcome on a plan to define areas likely requiring treatment. The information is suitable to assess likely and possible void extents within the rock strata. It is evident, that any mine grouting would as a minimum extend to 1000's of cubic metres if not the low to mid 10,000's of cubic metres.

It is thought that there is an existing mine water extraction well on site (possibly not used) serving the fire water pumping station and formerly used in manufacturing processes. Communication with Hoover should confirm or refute this. Any well present will require decommission by grouting in line with NRW guidance.

Sealing the ends of the underpass tunnel will be an abnormal cost and could then require small 'no build' zones to be imposed on the development so as not to overstress the feature. Enquiries as to what access is required to the void in the long term would be prudent as it passes beneath the highway. In the worst case the whole tunnel may require filling of some type and this would be an abnormal cost.

Slag deposits up to 5.2 m thick are present beneath sectors of the site and whilst a small-scale programme of swelling testing (and sulphur content) has been undertaken and does not show problematic heave amounts, it is likely that mitigation works will be required to allow NHBC (or

other insurers) to deliver appropriate guarantees. As a minimum this may involve additional testing and use of suspended floors in all buildings (which fall on the slag footprint).

The identified potential crown hole migration zones extend across areas where existing buildings or cricket pitch blocked coverage and additional mine investigation boreholes will be required when demolition clears the site or special arrangements are made with Hoover/sports operator to drill on key access roads/cricket pitch and within the warehouse building. A list of priority targets for intrusive investigation is presented in Section 7 of this report.

10. References

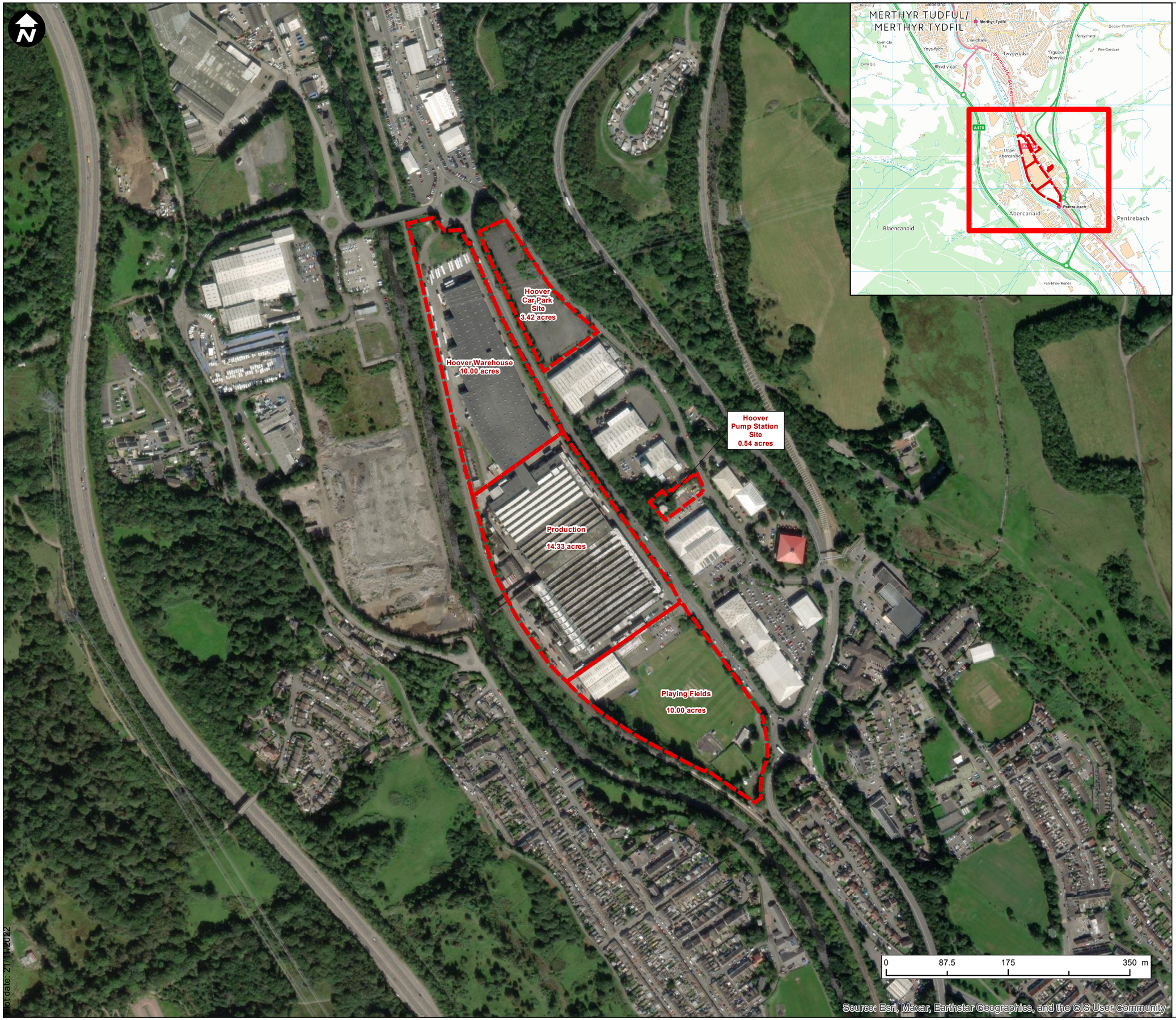
1 Redstart Hoover Candy Site Preliminary Sources (desk) Study Report Ref GC4005-RED-XX-RP-L-0001 dated March 2022

2 Quantum Geotech Hoover Candy Site Ground Investigation Factual Report ref Q0838/FR August 202

REDSTART

REDSTART

DRAWINGS



Legend

Site Boundaries

Rev	Drwn	Chk'd	App'd	Description	Date
P05					
P04					
P03					
P02					
P01	AC	AR	NG	FOR ISSUE	21/11/2022

Purpose of Issue

S2 - For Information

Classification

Commercial in Confidence

Client

Merthyr Tydfil CBC

Cyngor Bwrdeistref Sirol MERTHYR TUDFUL / MERTHYR TYDFIL County Borough Council

Project

Hoover Candy Site

Drawing

Site Location Plan

Scale @ A3	Drawn	Checked	Approved
1:5,000	AC	AR	NG

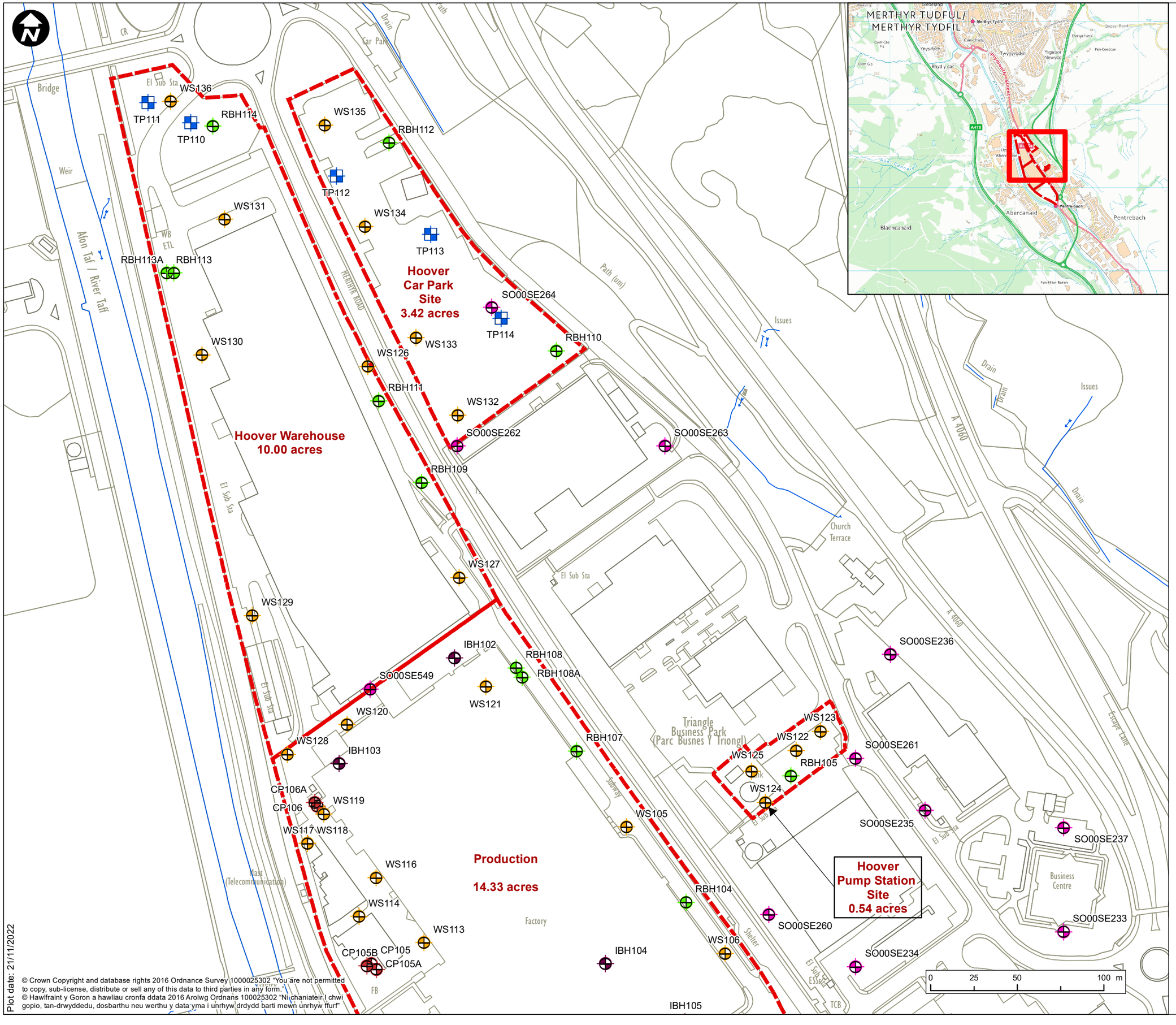
Project No	Date
GC004005	21/11/2022

Drawing Identifier

Project Code-Origin-Asset-Location-Type-Role-File Number	Revision
GC4005-RED-75-XX-DR-C-0001	P01

REDSTART
St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com

ol date: 21/11/2022



© Crown Copyright and database rights 2016 Ordnance Survey 1000025302 "You are not permitted to copy, sub-license, distribute or sell any of this data to third parties in any form."
© Hawlfraint y Goron a hawliau cronfa ddata 2016 Arolwg Ordnans 100025302 "Ni chaniateir i chwi gopio, tan-drwyddedu, dosbarthu neu werthu y data yma i unrhyw drydydd barti mewn unrhyw ffurf"

Plot date: 21/11/2022

Legend

- Site Boundaries
- Rotary Borehole
- Cable Percussion
- Internal Borehole
- Window Sample
- BGS Borehole
- Trial Pit

Rev	Drwn	Chk'd	App'd	Description	Date
P05					
P04					
P03					
P02	AC	AR	NG	FOR ISSUE	21/11/2022
P01	AC	LM	NG	FOR ISSUE	10/10/2022

Purpose of Issue
S2 - For Information

Classification
Commercial in Confidence

Client
Merthyr Tydfil CBC

Cyngor Bwrdeistref Sirol MERTHYR TUDFUL / MERTHYR TYDFIL County Borough Council

Project
Hoover Candy Factory

Drawing
Exploratory Hole Location Plan

Page 1 of 2 Plan

Scale @ A3	Drawn	Checked	Approved
1:2,000	AC	AR	NG

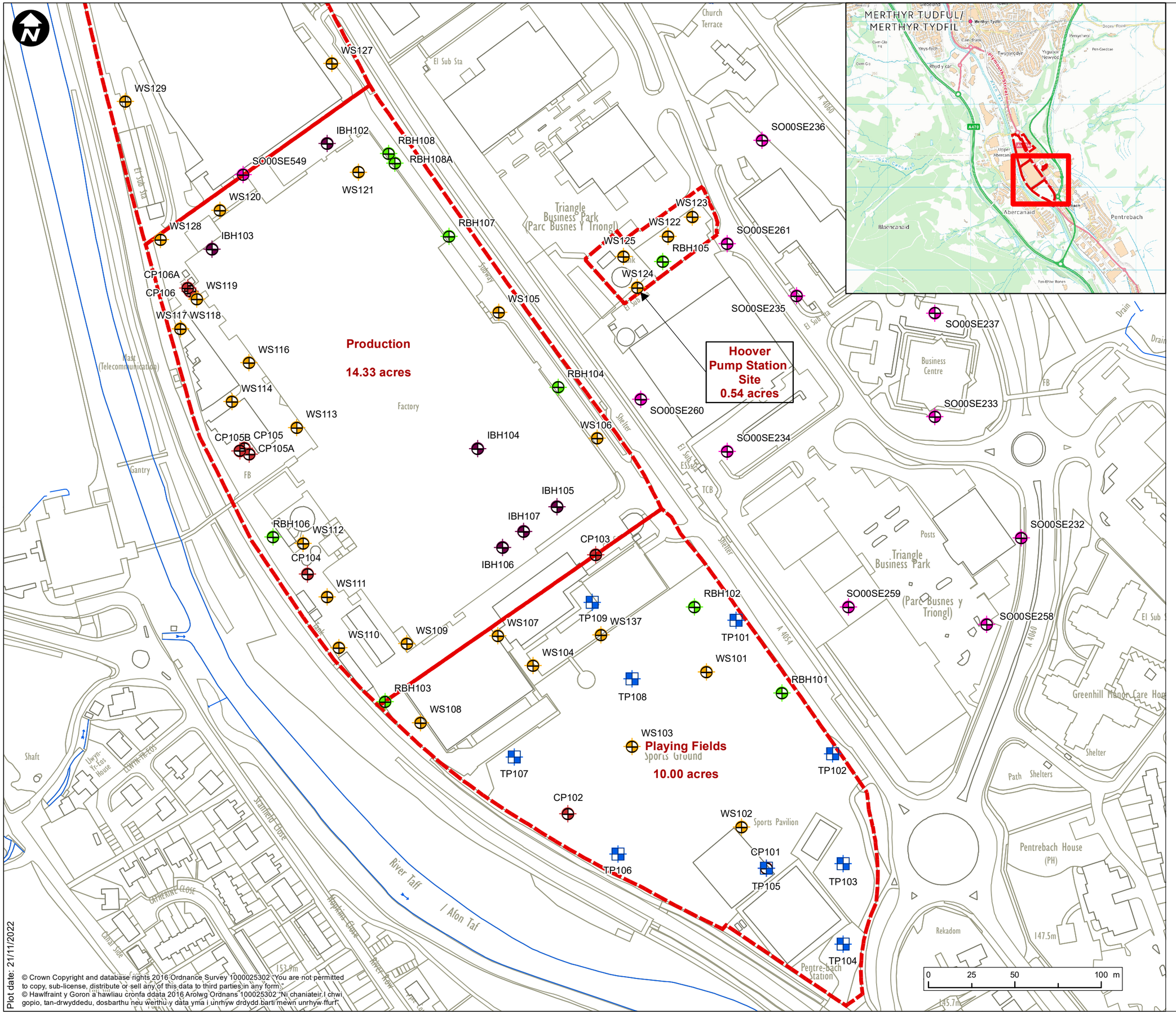
Project No
GC004005

Date
21/11/2022

Drawing Identifier
Project Code-Origin-Asset-Location-Type-Role-File Number
GC4005-RED-75-XX-DR-C-0007

Revision
P02

REDSTART
St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com



Legend

- Site Boundaries
- Rotary Borehole
- Cable Percussion
- Internal Borehole
- Window Sample
- BGS Borehole
- Trial Pit

Rev	Drwn	Chk'd	App'd	Description	Date
P05					
P04					
P03					
P02	AC	AR	NG	FOR ISSUE	21/11/2022
P01	AC	LM	NG	FOR ISSUE	10/10/2022

Purpose of Issue

S2 - For Information

Classification

Commercial in Confidence

Client

Merthyr Tydfil CBC

Cyngor Bwrdeistref Sirol MERTHYR TUDFUL MERTHYR TYDFIL County Borough Council

Project

Hoover Candy Factory

Drawing

Exploratory Hole Location Plan

Page 2 of 2 Plan

Scale @ A3	Drawn	Checked	Approved
1:2,000	AC	AR	NG

Project No: GC004005

Date: 21/11/2022

Drawing Identifier

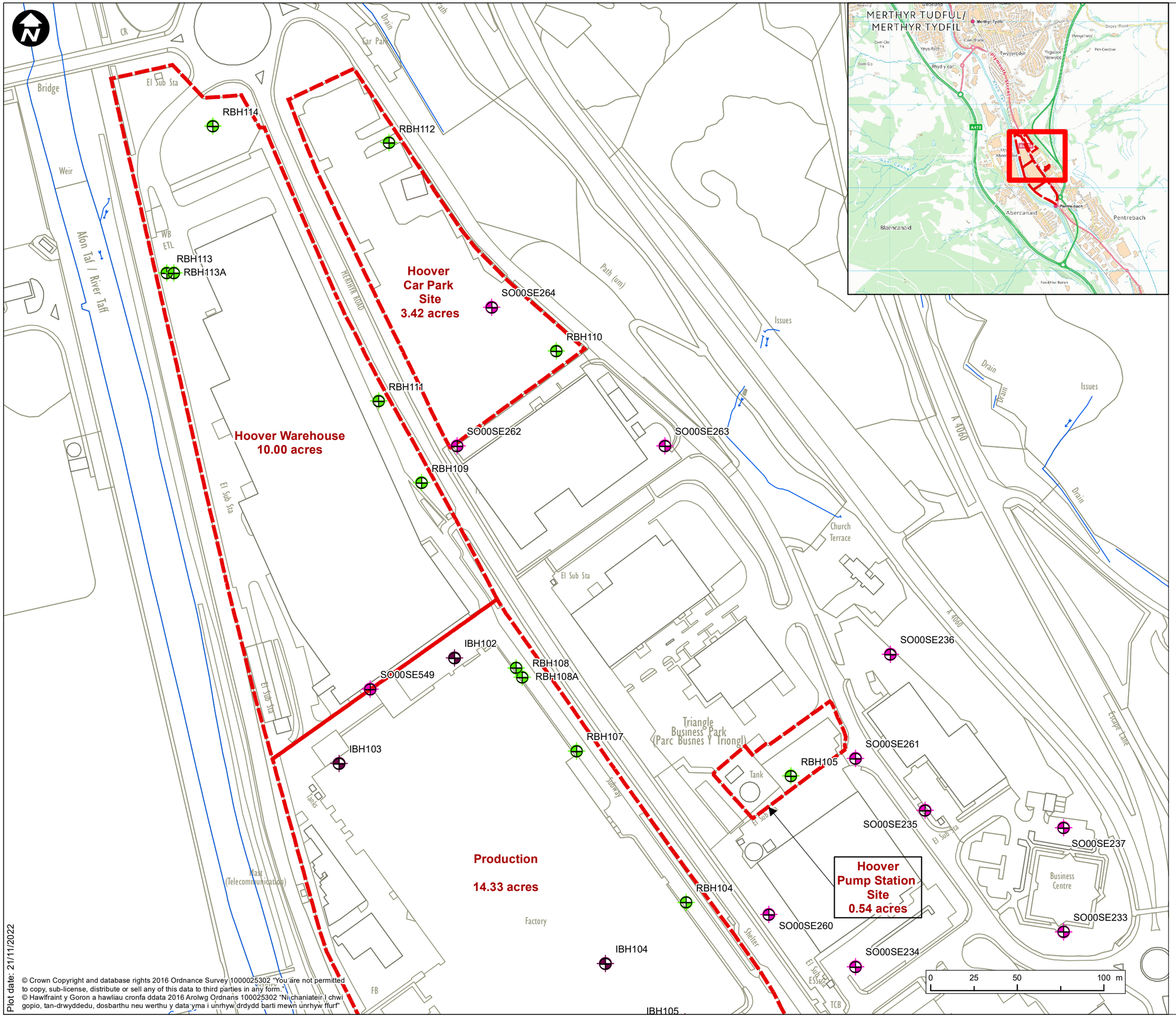
Project Code-Origin-Asset-Location-Type-Role-File Number: GC4005-RED-75-XX-DR-C-0007

Revision: P02

REDSTART
St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com

Plot date: 21/11/2022

© Crown Copyright and database rights 2016 Ordnance Survey 1000025302 "You are not permitted to copy, sub-license, distribute or sell any of this data to third parties in any form."
© Hawlfraint y Goron a hawliau cronfa ddata 2016 Arolwg Ordnans 100025302 "Ni chaniateir i chwi gopio, tan-drwyddedu, dosbarthu neu werthu y data yma i unrhyw drydydd barti mewn unrhyw ffurf"



Legend

- Site Boundaries
- Rotary Borehole
- BGS Borehole
- Internal Borehole

Rev	Drwn	Chk'd	App'd	Description	Date
P05					
P04					
P03					
P02	AC	AR	NG	FOR ISSUE	21/11/2022
P01	AC	LM	NG	FOR REVIEW	10/10/2022

Purpose of Issue

S2 - For Information

Classification

Commercial in Confidence

Client

Merthyr Tydfil CBC

Cyngor Bwrdeistref Sirol
MERTHYR TUDFUL
MERTHYR TYDFIL
County Borough Council

Project

Hoover Candy Factory

Drawing

Coal Measure Investigation Boreholes

Page 1 of 2 Plan

Scale @ A3	Drawn	Checked	Approved
1:2,000	AC	AR	NG

Project No

GC004005

Date

21/11/2022

Drawing Identifier

Project Code-Origin-Asset-Location-Type-Role-File Number

GC4005-RED-75-XX-DR-C-0008

Revision

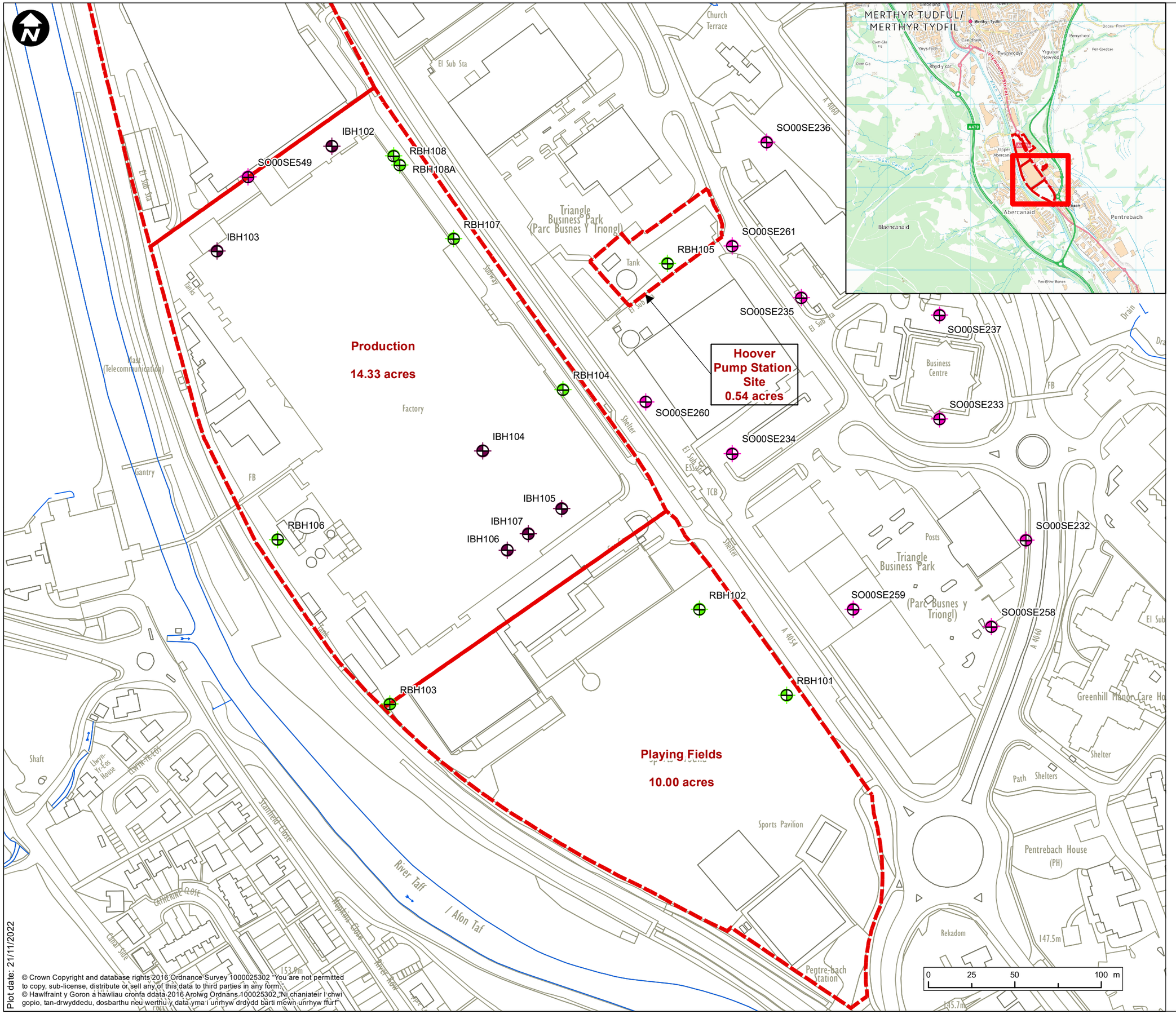
P02

REDSTART

St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com

Plot date: 21/11/2022

© Crown Copyright and database rights 2016 Ordnance Survey 1000025302 "You are not permitted to copy, sub-license, distribute or sell any of this data to third parties in any form."
© Hawlfraint y Goron a hawliau cronfa ddata 2016 Arolwg Ordnans 100025302 "Ni chaniateir i chwi gopio, tan-drwyddedu, dosbarthu neu werthu y data yma i unrhyw drydydd barti mewn unrhyw ffurf"



Legend

- Site Boundaries
- Rotary Borehole
- BGS Borehole
- Internal Borehole

Rev	Drwn	Chk'd	App'd	Description	Date
P05					
P04					
P03					
P02	AC	AR	NG	FOR ISSUE	21/11/2022
P01	AC	LM	NG	FOR ISSUE	10/10/2022

Purpose of Issue
S2 - For Information

Classification
Commercial in Confidence

Client
Merthyr Tydfil CBC

Cyngor Bwrdeistref Sirol MERTHYR TUDFUL MERTHYR TYDFIL County Borough Council

Project
Hoover Candy Factory

Drawing
Coal Measure Investigation Boreholes

Page 2 of 2 Plan

Scale @ A3	Drawn	Checked	Approved
1:2,000	AC	AR	NG

Project No
GC004005

Date
21/11/2022

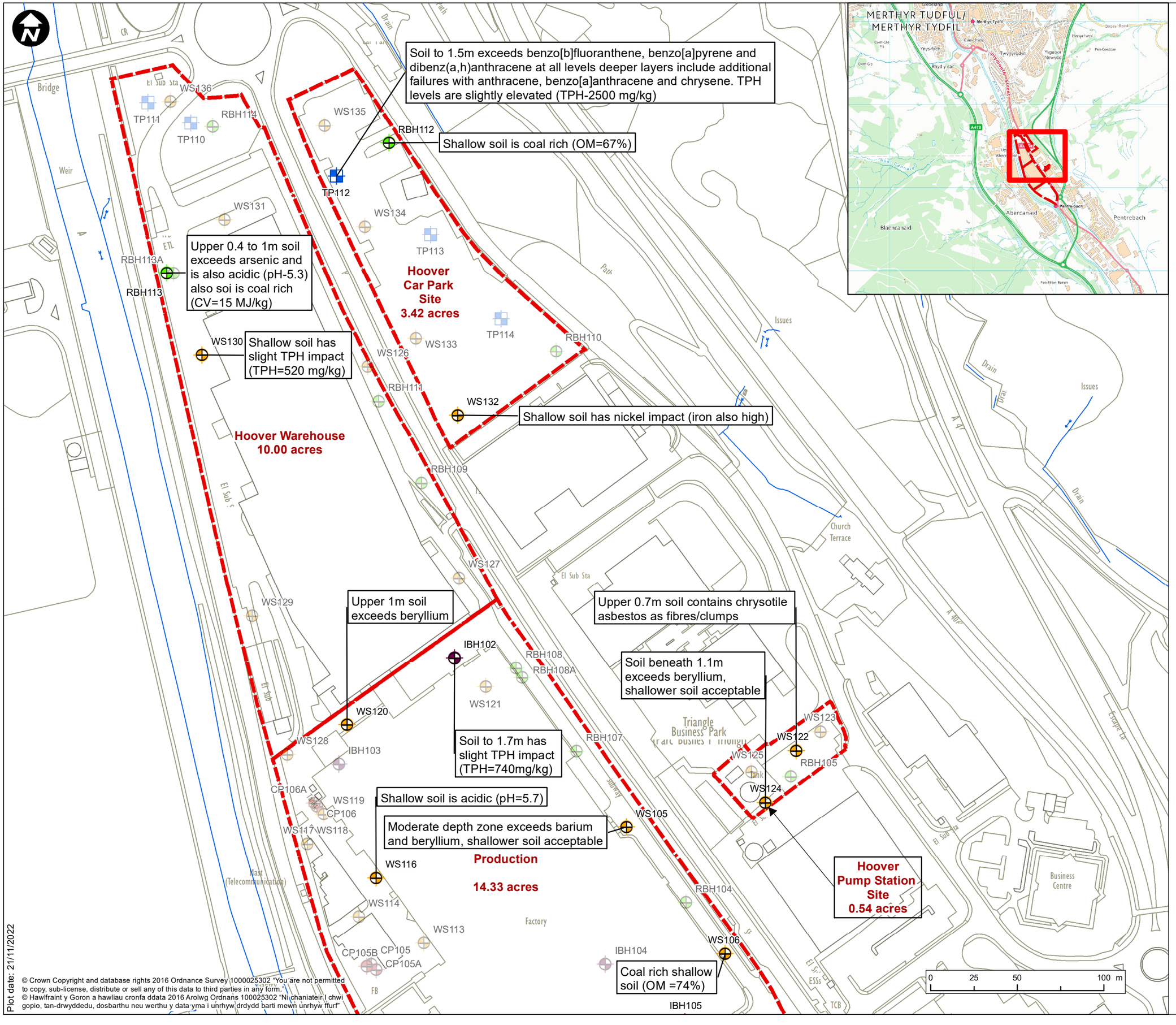
Drawing Identifier
Project Code-Origin-Asset-Location-Type-Role-File Number
GC4005-RED-75-XX-DR-C-0008

Revision
P02

REDSTART
St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com

Plot date: 21/11/2022

© Crown Copyright and database rights 2016 Ordnance Survey 1000025302 "You are not permitted to copy, sub-license, distribute or sell any of this data to third parties in any form."
© Hawlfraint y Goron a hawliau cronfa ddata 2016 Arolwg Ordnans 100025302 "Ni chaniateir i chwi gopio, tan-drwyddedu, dosbarthu neu werthu y data yma i unrhyw drydydd barti mewn unrhyw ffurf"



Legend

- Site Boundaries
- Rotary Borehole
- Cable Percussion
- Internal Borehole
- Window Sample
- Trial Pit

Rev	Drwn	Chk'd	App'd	Description	Date
P05					
P04					
P03					
P02	AC	AR	NG	FOR ISSUE	21/11/2022
P01	AC	LM	NG	FOR ISSUE	10/10/2022

Purpose of Issue

S2 - For Information

Classification

Commercial in Confidence

Client

Merthyr Tydfil CBC

Cyngor Bwrdeistref Sirol MERTHYR TUDFUL MERTHYR TYDFIL County Borough Council

Project

Hoover Candy Factory

Drawing

Contaminated Land Impact

Page 1 of 2 Plan

Scale @ A3	Drawn	Checked	Approved
1:2,000	AC	AR	NG

Project No: GC004005

Date: 21/11/2022

Drawing Identifier

Project Code-Origin-Asset-Location-Type-Role-File Number: GC4005-RED-75-XX-DR-C-0009

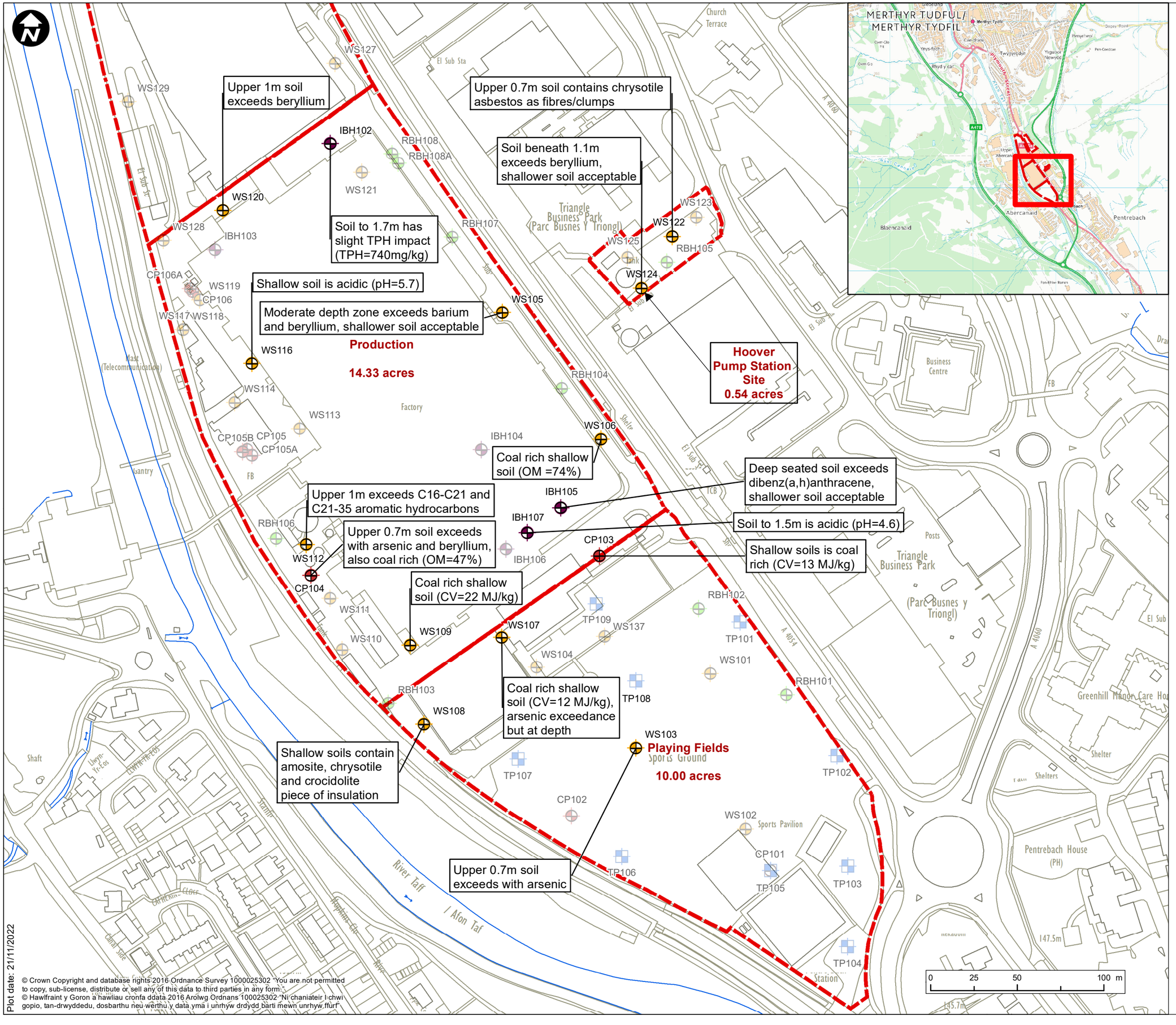
Revision: P02

REDSTART

St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com

Plot date: 21/11/2022

© Crown Copyright and database rights 2016 Ordnance Survey 1000025302 "You are not permitted to copy, sub-license, distribute or sell any of this data to third parties in any form."
© Hawlfraint y Goron a hawliau cronfa ddata 2016 Arolwg Ordnans 100025302 "Ni chaniateir i chwi gopio, tan-drwyddedu, dosbarthu neu werthu y data yma i unrhyw drydydd barti mewn unrhyw ffurf"



Rev	Drwn	Chk'd	App'd	Description	Date
P05					
P04					
P03					
P02	AC	AR	NG	FOR ISSUE	21/11/2022
P01	AC	LM	NG	FOR ISSUE	10/10/2022

Purpose of Issue
S2 - For Information

Classification
Public

Client
Merthyr Tydfil CBC

Project
Hoover Candy Factory

Drawing
Contaminated Land Impact

Page 2 of 2 Plan

Scale @ A3	Drawn	Checked	Approved
1:2,000	AC	AR	NG

Project No
GC004005

Date
21/11/2022

Drawing Identifier
Project Code-Origin-Asset-Location-Type-Role-File Number
GC4005-RED-75-XX-DR-C-0009

Revision
P02

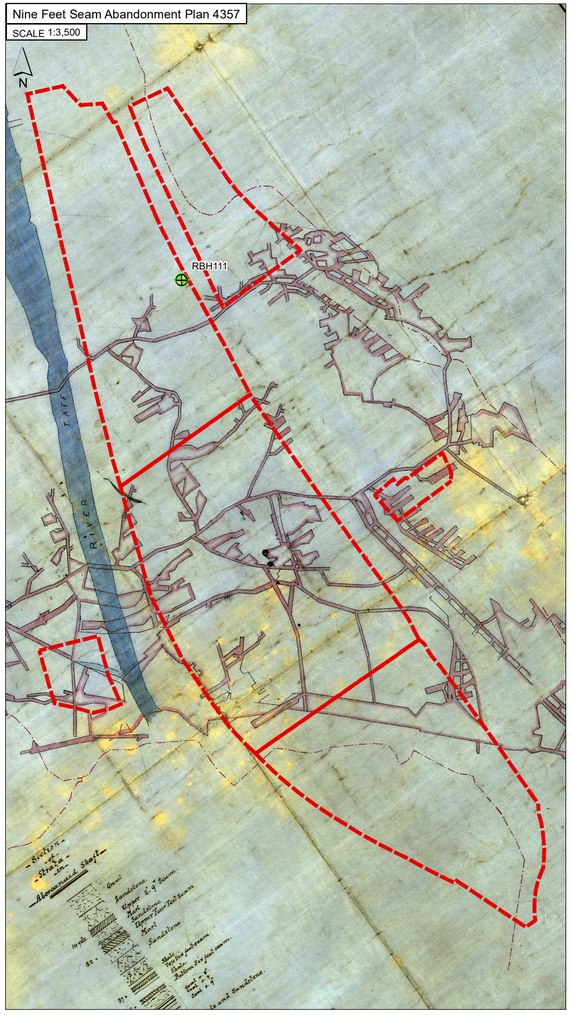
REDSTART
St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com

Plot date: 21/11/2022

© Crown Copyright and database rights 2016 Ordnance Survey 1000025302 "You are not permitted to copy, sub-license, distribute or sell any of this data to third parties in any form."
© Hawlfraint y Goron a hawliau cronfa ddata 2016 Arolwg Ordnans 100025302 "Ni chaniateir i chwi gopio, tan-drwyddedu, dosbarthu neu werthu y data ymâ i unrhyw drydydd barti mewn unrhyw ffurf"

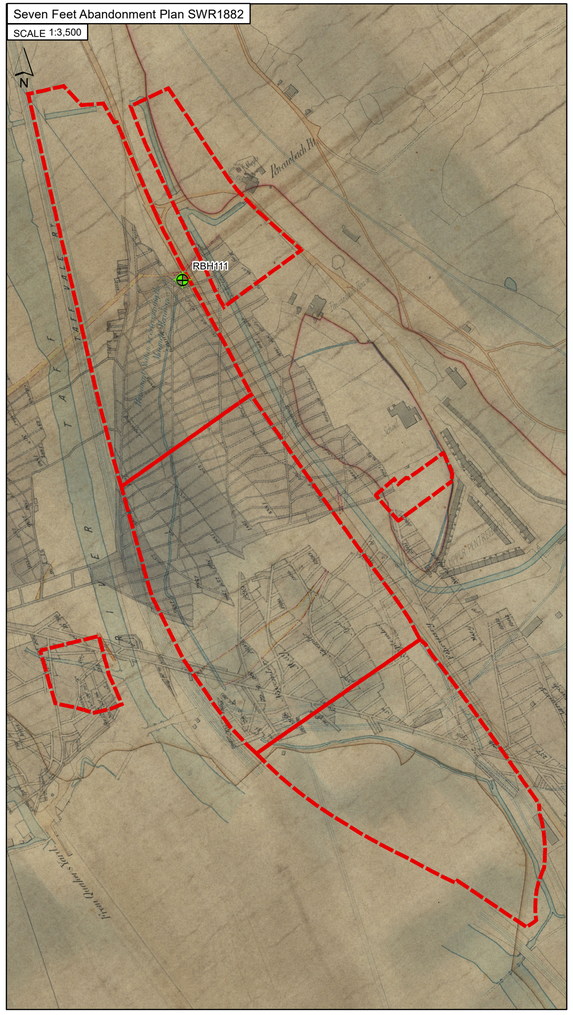
Nine Feet Seam Abandonment Plan 4357

SCALE 1:3,500



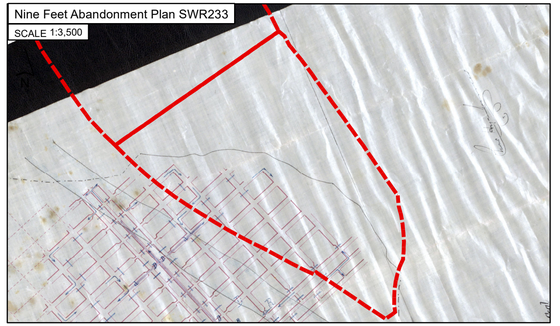
Seven Feet Abandonment Plan SWR1882

SCALE 1:3,500



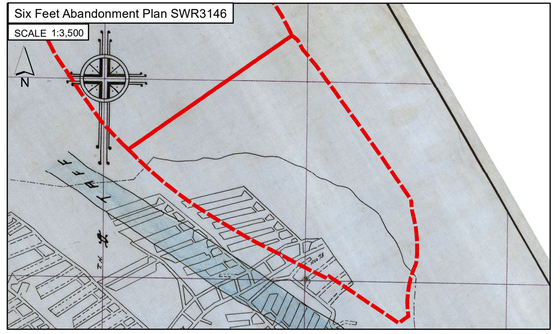
Nine Feet Abandonment Plan SWR233

SCALE 1:3,500



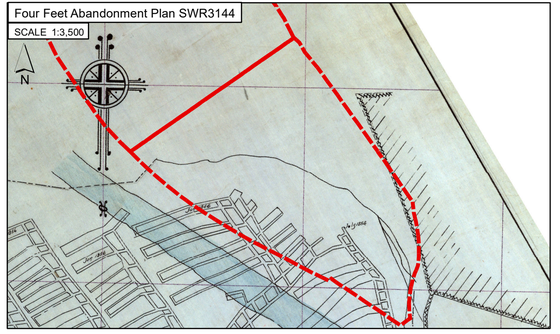
Six Feet Abandonment Plan SWR3146

SCALE 1:3,500



Four Feet Abandonment Plan SWR3144

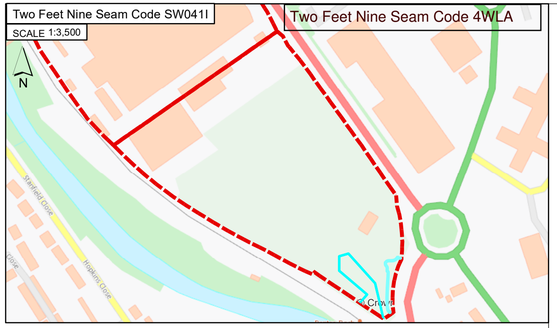
SCALE 1:3,500



Two Feet Nine Seam Code SW041I

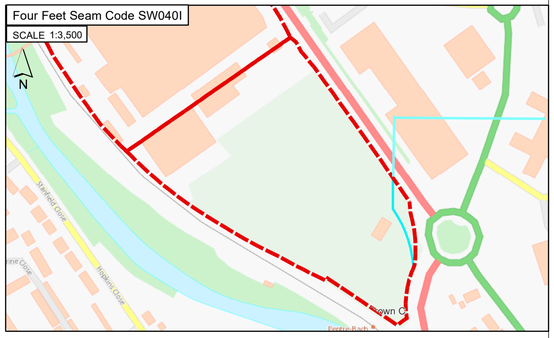
SCALE 1:3,500

Two Feet Nine Seam Code 4WLA



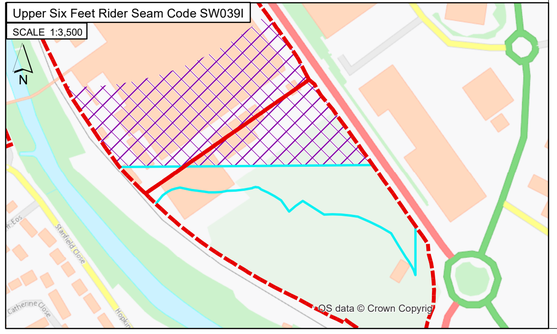
Four Feet Seam Code SW040I

SCALE 1:3,500



Upper Six Feet Rider Seam Code SW039I

SCALE 1:3,500



Legend

- Site Boundaries
- Rotary Borehole
- Coal Authority Interactive Viewer Working
- Probable workings

Rev	Drwn	Chkd	Apprd	Description	Date
P05					
P04					
P03					
P02	AR	IL	NG	Additional Panel in 2ft 9	31/02/2024
P01	AC	AR	NG	FOR ISSUE	21/11/2022

Purpose of Issue

S2- For Information

Classification

Commercial in Confidence

Client

Merthyr Tydfil CBC

Cyngor Bwrdeistref Sirol MERTHYR TUDFUL / MERTHYR TYDFIL County Borough Council

Project

Hoover Candy Factory

Drawing

Coal Workings Plans with Current Site Boundary Overlaid

Scale @ A3	Drawn	Checked	Approved
1:3,500	AC	AR	NG

Project No: GC004005

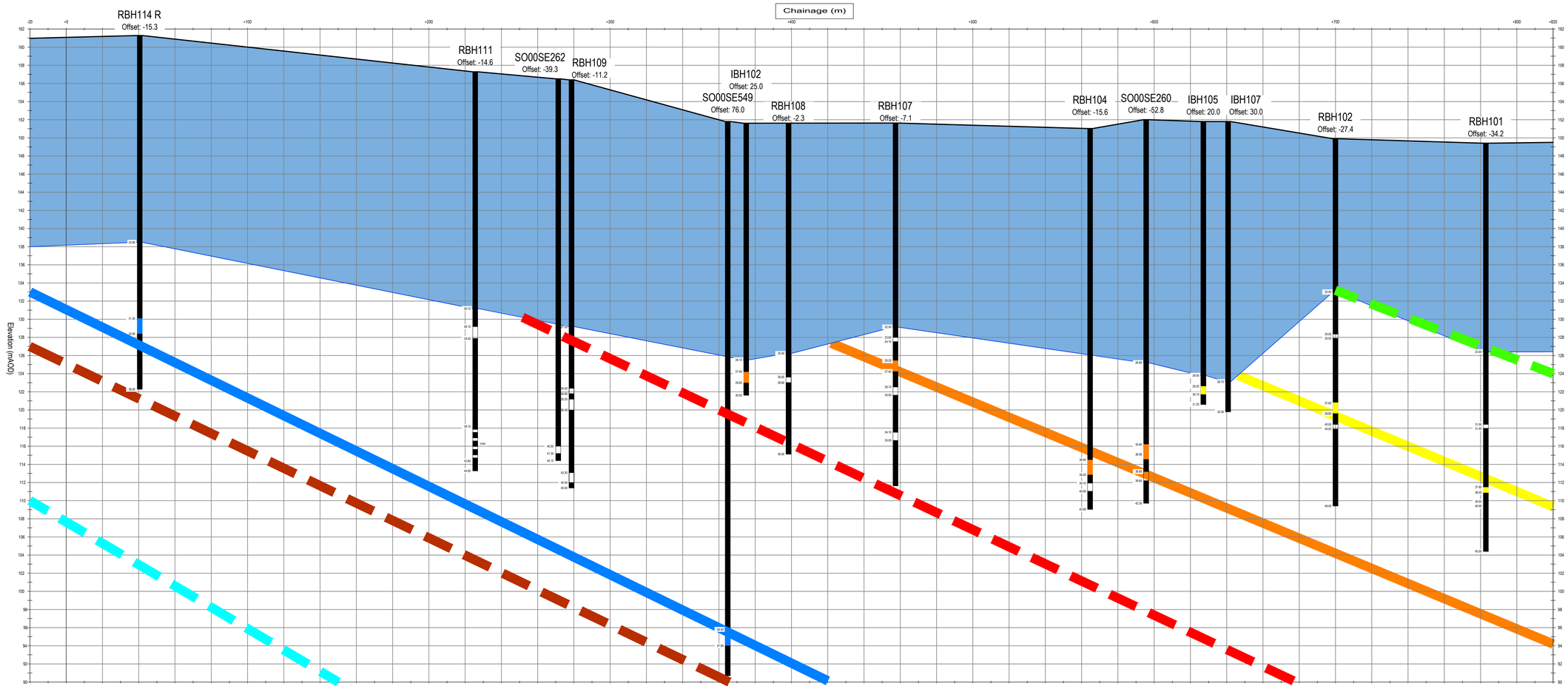
Date: 21/11/2022

Drawing Identifier

Project Code-Origin-Asset-Location-Type-Role-File Number: GC4005-RED-75-XX-DR-C-0010

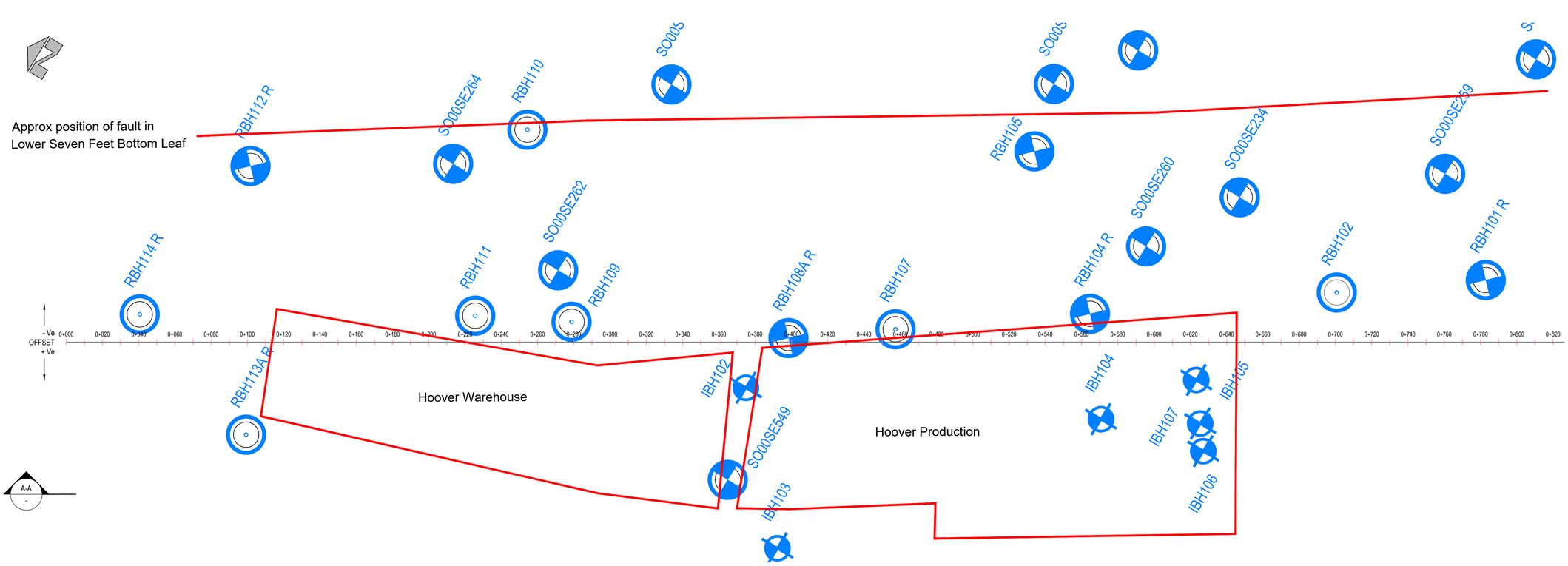
Revision: P02

REDSTART
St David's House, Fiscal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com



SCHEMATIC GEOLOGICAL LONG SECTION

(1 VERICAL : 10 HORIZONTAL)



BOREHOLE LOCATION PLAN

NOTES

1. DO NOT SCALE FROM THIS DRAWING.
2. ALL DIMENSIONS AND ALL LEVELS ARE IN METRES ABOVE ORDNANCE DATUM.
3. CONJECTURED SEAM LOCATION IS DRAWN ON A BEST FIT BASIS AND WHERE THE LOCATION DOES NOT TIE IN PERFECTLY WITH SEAMS SHOWN ON THE BOREHOLE LOGS THIS IS ATTRIBUTED TO THE COAL SEAM STRIKE NOT BEING ALIGNED WITH THE DIRECTION OF CROSS SECTION AND CONSEQUENTIAL ERRORS IN TRANSPOSING HOLES FROM EITHER SIDE OF THE LINE (REFER LOCATION PLAN FOR EXTENT OF OFF SET).
4. DASHED LINES INDICATE NO EVIDENCE OF SEAM OBTAINED IN THE SITE LOCATION.
   SOLID LINES DENOTE POTENTIAL SEAM EVIDENCED IN BOREHOLES.

KEY

- Superficial Deposits
- 4 Feet
- Upper 6 Feet Rider
- 6 Feet Bottom leaf
- Red Vein
- 9 Feet
- Bute
- Yard (Meadow)

SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION

IN ADDITION TO THE HAZARDS/RISKS NORMALLY ASSOCIATED WITH THE TYPES OF WORK DETAILED ON THIS DRAWING, NOTE THE FOLLOWING

NO SHE HAZARD IDENTIFIED

IT IS ASSUMED THAT ALL WORKS WILL BE CARRIED OUT BY A COMPETENT CONTRACTOR WORKING, WHERE APPROPRIATE, TO AN APPROVED METHOD STATEMENT

Rev	Drwn	Chkd	Appr'd	Description	Date
P03	CJS	AAR		Third Issue	31/01/2024
P02	SV	AAR	NG	Second Issue	30-01-2024
P01	CJS	AAR	NG	First Issue	10/10/2022

Purpose of Issue
S2 Suitable For Information

Classification
Confidential

Client
Merthyr Tydfil
County Borough Council

Project
Hoover Candy Factory

Drawing
Geological Long Section
And Borehole Location Plan

Scale @ A1	Drawn	Checked	Approved
1:1250	CJS	AAR	NG

Project No.: GC/004005
Date: 10/10/2022

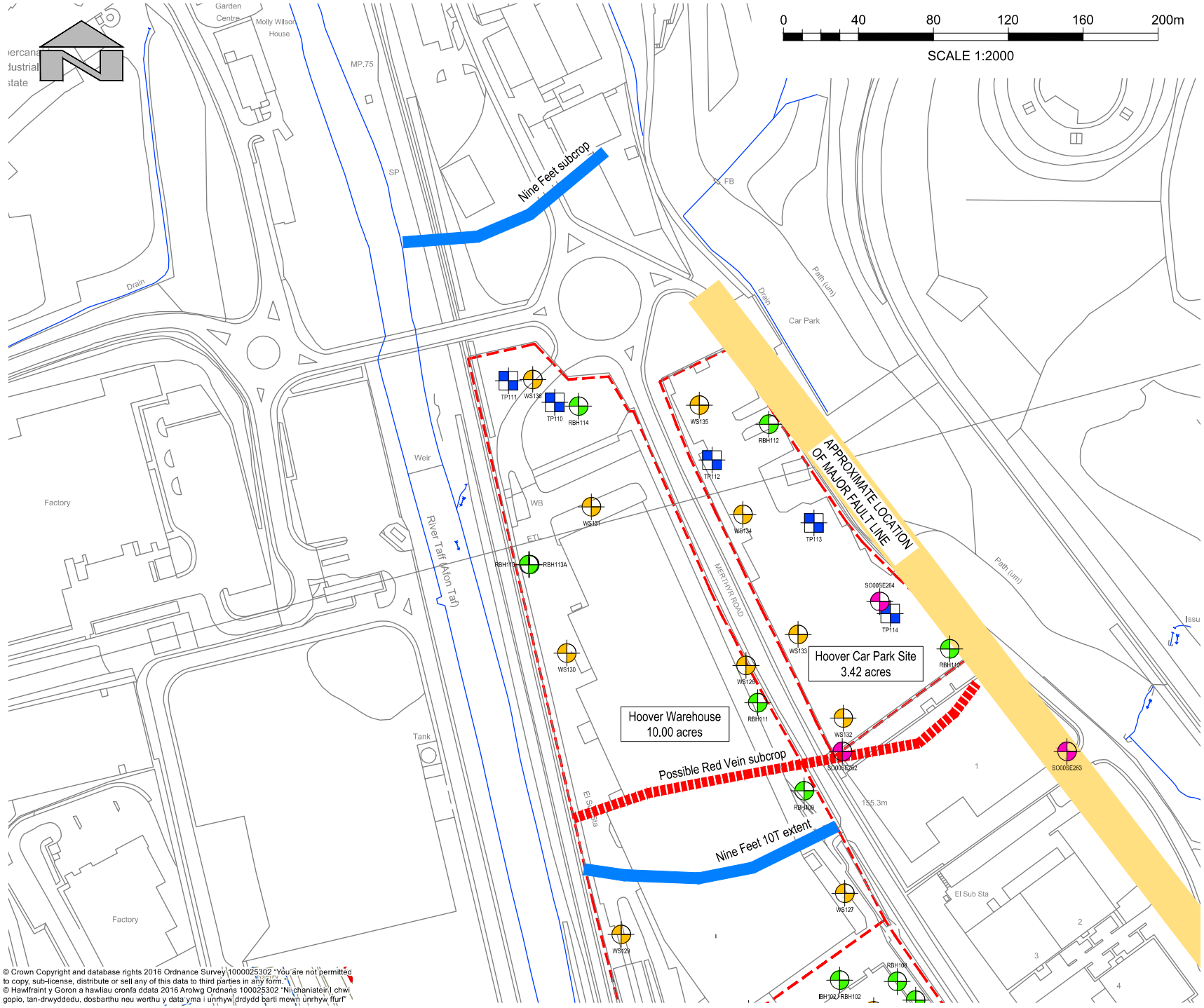
Drawing Identifier (Project - Originator - Zone - Level - File Type - Role - Number): GC4005-RED-74-XX-DR-C-0011
BS1192 Compliant revision: P03

REDSTART
St David's House, Pascal Close, St Mellons, Cardiff, CF3 0LW
www.redstartwales.com

© Redstart Wales

Print Date: 31/01/2024 15:15:32

P:\pool\Geot\Schemes TEMP\Hoover site, Merthyr Tydfil\COAL MINING SECTION\GC4005-RED-74-XX-DR-C-0011 - P01 - Geological Long Section.dwg



© Crown Copyright and database rights 2016 Ordnance Survey 1000025302 "You are not permitted to copy, sub-license, distribute or sell any of this data to third parties in any form."
© Hawlfraint y Goron a hawliau cronfa ddata 2016 Arolwg Ordnans 100025302 "Ni chaniateir i chwi gopio, tan-drwyddedu, dosbarthu neu werthu y data yma i unrhyw drydydd barti mewn unrhyw ffurf"

LEGEND

- Site Boundary
- Rotary Borehole
- Cable Percussion
- Internal Borehole
- Window Sample
- BGS Borehole
- Trial Pit

- Two Feet Nine
- 4 Feet
- Upper 6ft Rider
- 6ft Bottom Leaf
- Red Vein
- 9 Feet

1. Dashed lines indicate no evidence of seam obtained in the site location. Solid lines denote potential seam evidenced in boreholes.

Rev	Drwn	Chk'd	App'd	Description	Date
P01	CJS	-	-	First Issue	31/01/2024

Purpose of Issue
S2 - For Information

Classification
Commercial Confidence

Client
Merthyr Tydfil
County Borough
Council

Project
Hoover Candy Factory

Drawing
Anticipated Coal Seam Subcrop and 10T Extents

Page 2 of 2

Scale @ A3	Drawn	Checked	Approved
1:2,000	CJS	AR	NG

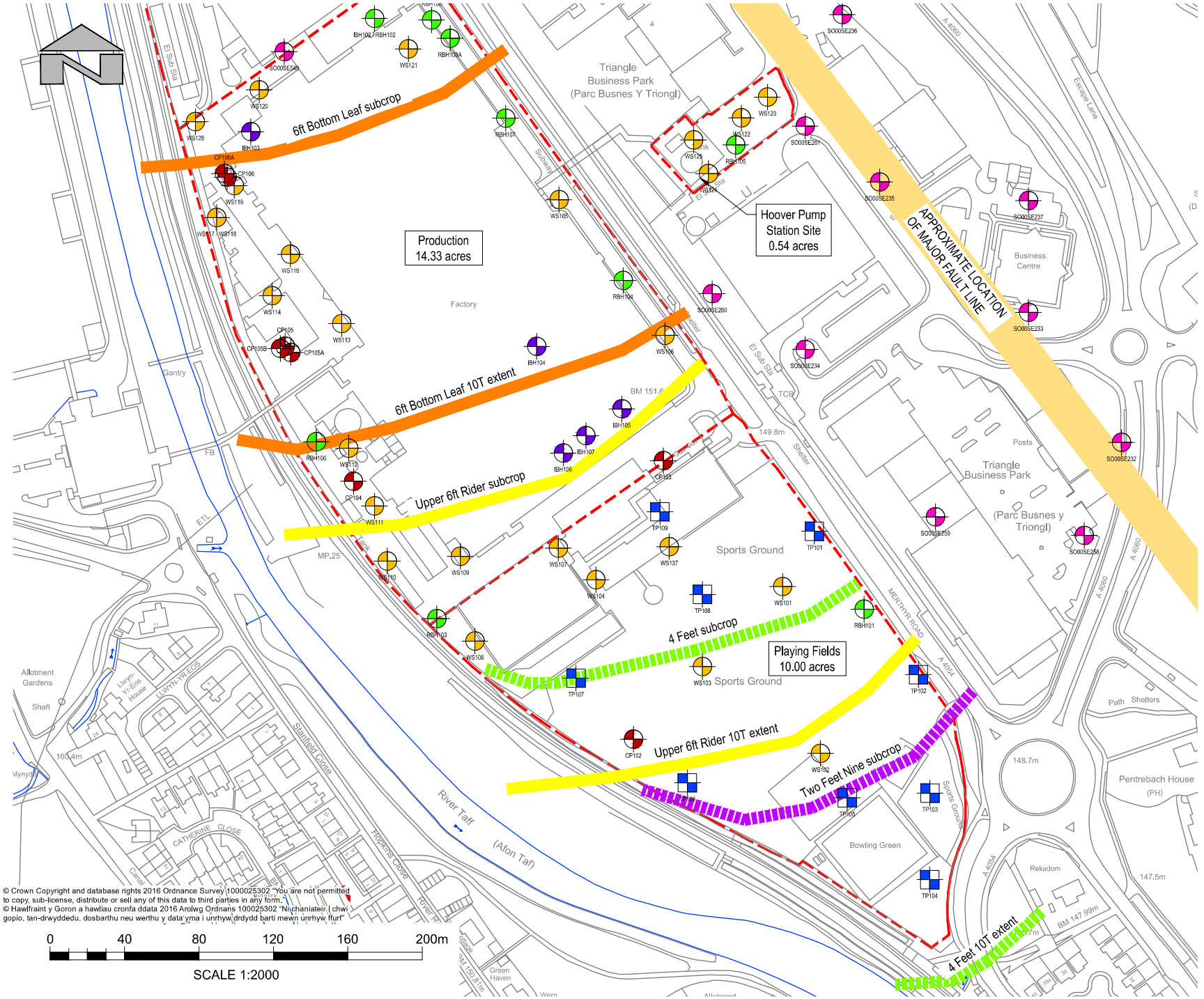
Project No.
GC/004005

Date
06/02/2024

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC4005-RED-75-XX-DR-C-0017/2

Revision
P01

REDSTART
Quest House, St Mellons Business Park,
Fortran Road, St Mellons, Cardiff, CF3 0EY
www.redstartwales.com



LEGEND

- Site Boundary
- Rotary Borehole
- Cable Percussion
- Internal Borehole
- Window Sample
- BGS Borehole
- Trial Pit

- Two Feet Nine
- 4 Feet
- Upper 6ft Rider
- 6ft Bottom Leaf
- Red Vein
- 9 Feet

1. Dashed lines indicate no evidence of seam obtained in the site location. Solid lines denote potential seam evidenced in boreholes.

Rev	Drwn	Chk'd	App'd	Description	Date
P01	CJS	-	-	First Issue	31/01/2024

Purpose of Issue
S2 - For Information

Classification
Commercial Confidence

Client
Merthyr Tydfil
County Borough
Council

Project
Hoover Candy Factory

Drawing
Anticipated Coal Seam Subcrop and
10T Extents

Page 1 of 2

Scale @ A3	Drawn	Checked	Approved
1:2,000	CJS	AR	NG

Project No.
GC/004005

Date
06/02/2024

Drawing Identifier
Project - Originator - Zone - Level - File Type - Role - Number
GC4005-RED-75-XX-DR-C-0017/1

Revision
P01

REDSTART
Quest House, St Mellons Business Park,
Fortran Road, St Mellons, Cardiff, CF3 0EY
www.redstartwales.com

© Crown Copyright and database rights 2016 Ordnance Survey 1000025302 "You are not permitted to copy, sub-license, distribute or sell any of this data to third parties in any form."
© Hawlfraint y Goron a hawliau cronfa ddata 2016 Arolwg Ordnans 100025302 "Ni chaniateir i chwi gopio, tan-drwyddedu, dosbarthu neu werthu y data yma i unrhyw drydydd barti mewn unrhyw ffurf"

Print Date:31/01/2024 16:09:48

© Redstart

P:\pool\Geot\Schemes TEMP\Hoover site, Merthyr Tydfil\GIS\Hoover Candy\02-DATA\CAD\GC4005-RED-75-XX-DR-C-0017 - Anticipated Coal Seam Subcrop & 10T Extents.dwg

APPENDIX A

SOIL QUALITY SCREENING TABLES

HOOVER factory - soil screening
Residential with plant uptake
2.5%

Client: Quantum Geotechnic Ltd				Chemtest Job No.:	22-28185	22-28185	22-28185	22-28209	22-28209	22-28209	22-28209	22-28203	22-28203	22-27110	22-27110	22-27200	22-27200	22-25576	22-25794	22-25794	22-28211	22-28211	22-28211	22-28185	22-28185	22-28185	22-28706	22-25583	22-25794	22-28706	22-28706	22-25762	22-25576	22-25576	22-25762	22-28202	22-28202	22-28202	22-28202	22-28202	22-25576	22-25762	22-27200	22-27200	22-27200	22-28047	22-28047	22-28047	22-28047	22-28047	22-28047	22-28706	22-28706	22-26488	22-26488	22-26488
Quotation No.: Q22-27297				Chemtest Sample ID.:	1474837	1474840	1474841	1475005	1475008	1475000	1475001	1474936	1474938	1470164	1470167	1470560	1470563	1463196	1464118	1464117	1475012	1475014	1475016	1474843	1474844	1474845	1477523	1463226	1464121	1477521	1477522	1464001	1463192	1463194	1464001	1474925	1474926	1474920	1474921	1474923	1463190	1464002	1470571	1470568	1470569	1474214	1474216	1474219	1474221	1474223	1474224	1477519	1477520	1467037	1467038	1467039
Order No.:				Client Sample Ref.:	ES1	ES4	ES5	ES2	ES5	ES2	ES3	ES1	ES3	1	4	2	5	2	4	7	ES1	ES3	ES5	ES2	ES3	ES4	5	5	2	1	2	ES	1	3	ES	ES2	ES3	ES1	ES2	ES2	2	ES	2	4	5	1	3	1	3	2	3	1	3	1	2	3
				Sample Location:	WS101	WS101	WS101	WS102	WS102	WS103	WS103	WS105	WS105	WS106	WS106	WS107	WS107	WS108	WS108	WS108	WS109	WS109	WS109	WS110	WS110	WS110	WS110	WS111	WS112	WS112	WS113	WS113	WS113	5	WS114	WS114	5	WS116	WS116	WS117	WS117	WS118	WS119	4	WS120	WS121	WS121	WS122	WS122	WS123	WS123	WS124	WS124	WS125	WS125	WS126	WS126
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	WS114	SOIL	SOIL	WS114	SOIL	SOIL	SOIL	SOIL	SOIL	WS119	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	0.20	2.50	4.00	0.50	4.00	0.50	1.00	0.50	2.50	0.2	2.0	0.50	3.80	0.50	1.9	3.3	0.30	1.00	4.00	1.00	2.50	4.00	4.00	2.0	0.5	0.50	1.80	SOIL	0.20	1.00	SOIL	1.00	2.50	0.50	1.00	1.00	0.50	SOIL	1.00	3.30	4.00	0.20	1.00	0.30	1.00	0.50	1.10	0.10	1.00	0.2	0.5	1.0
				Bottom Depth (m):	18-Jul-2022	18-Jul-2022	18-Jul-2022	18-Jul-2022	18-Jul-2022	18-Jul-2022	18-Jul-2022	21-Jul-2022	21-Jul-2022		2.2		4.00		2.1	3.5	20-Jul-2022	20-Jul-2022	20-Jul-2022	19-Jul-2022	19-Jul-2022	19-Jul-2022	2.2				2.00	3.00			3.00	19-Jul-2022	19-Jul-2022	19-Jul-2022	19-Jul-2022	19-Jul-2022		2.50		3.40	4.20						1.30					
				Date Sampled:										14-Jul-2022	14-Jul-2022	15-Jul-2022	15-Jul-2022	04-Jul-2022	05-Jul-2022	05-Jul-2022							27-Jul-2022	04-Jul-2022	05-Jul-2022	27-Jul-2022	27-Jul-2022	05-Jul-2022	04-Jul-2022	04-Jul-2022	04-Jul-2022	05-Jul-2022						04-Jul-2022	05-Jul-2022	15-Jul-2022	15-Jul-2022	15-Jul-2022	13-Jul-2022	13-Jul-2022	13-Jul-2022	13-Jul-2022	13-Jul-2022	13-Jul-2022	13-Jul-2022	27-Jul-2022	27-Jul-2022	11-Jul-2022	11-Jul-2022	11-Jul-2022
				Asbestos Lab:	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	COVENTRY	COVENTRY	DURHAM	DURHAM	COVENTRY	COVENTRY	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	COVENTRY	COVENTRY	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	NEW-ASB	NEW-ASB	NEW-ASB
Determinand	**Accred.**	**SOP**	**Units**	**LOD**																																																			
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-	-	-	-	-	Insulation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192		N/A	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	Amosite Chrysotile Crocidolite	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	Fibres/Clumps	Chrysotile	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
Inorganics																																																						
Moisture	N	2030	%	0.020	2.3	13	17	9.0	18	9.0	12	4.1	21	15	12	14	21	15	35	20	13	19	20	9.1	4.1	24	19	13	19	17	10	18	13	11	18	14	11	13	6.8	12	4.7	2.8	1.6	7.5	8.1	6.2	8.7	4.1	4.9	6.0	7.3	6.5	7.1	10	6.4	3.3
pH	U	2010		4.0	6.7	8.3	7.4	7.4	6.3	7.1	8.1	8.6	8.4	8.6	7.1	7.9	8.9	8.8	6.8	7.4	8.3	7.3	7.6		8.1	7.7	8.5	8.8	7.5	9.1	8.6	8.0	8.9	8.7	8.0	5.7	7.3	8.9		8.6	9.1	9.0	9.8	7.2	8.7	9.2	8.8	9.4	9.0	9.3	8.8	9.5	9.1	7.5	8.5	8.9
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	0.57	0.43	< 0.40	< 0.40	0.63	0.51	< 0.40	< 0.40	0.52	0.87	0.8	0.64	0.54	0.78	0.84	< 0.40	< 0.40	< 0.40	< 0.40		0.72	0.96	0.40	22	56	< 0.40	< 0.40	2.6	1.4	1.3	2.6	8.1	1.1	1.1		1.4	1.1	1.2	0.50	0.74	< 0.40	< 0.40	0.59	< 0.40	0.52	0.55	1.0	0.58	0.84	0.43	< 0.40	0.80
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/L	0.010	0.038	0.023	0.013	0.031	0.026	0.023	0.026	0.024	0.022	0.042	0.22	0.087	0.077	0.041	0.040	0.057	0.014	0.031	0.016		0.036	0.014	< 0.010	0.062	0.13	0.012	0.015	0.17	0.079	0.11	0.17	0.080	0.094	0.030		0.037	0.055	0.044	0.13	0.27	0.087	0.058	0.055	0.032	0.087	0.038	0.22	0.077	0.018	< 0.010	< 0.010	0.061
Total Sulphur	U	2175	%	0.010	0.019	0.051	0.035	0.18	0.67	0.68	0.058	0.13	0.064	0.39	0.81	0.58	0.52	0.34	0.36	0.039	0.52	0.61	0.044		0.058	0.17	0.068	0.56	0.60	0.094	0.045	0.92	0.73	0.76	0.92	3.9	0.067	0.58		0.63	0.089	0.039	1.0	0.31	0.44	0.25	0.41	0.24	0.059	0.033	0.52	0.15	0.40	0.083	0.28	0.028
Cyanide (Total)	U	2300	mg/kg	0.50	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Sulphide (Easily Liberatable)	U	2325	mg/kg	1.0	1.1	0.95	0.97	1.1	1.1	1.2	1.1	22	79	4.9	2.0	28	4.4	62	1.9	5.0	32	23	9.3		0.95	0.53	13	14	42	13	12	21	29	3.7	21	3.8	70	390		93	25	1.9	1.5	15	4.7	1.4	1.4	2.5	1.1	1.1	2.2	15	28	2.2	240	2.4
Metals																																																						
Aluminium (Total)	N	2430	mg/kg	100	2300	11000	8700	12000	3100	2800	5100	9200	13000	6300	8900	3100	6100	8600	7400	5000	2900	2500	3600		6900	2400	3700	9600	5000	8200	3500	6800	7100	8800	6800	24000	4300	15000		11000	7100	11000	24000	1200	1900	2500	4900	5400	2300	2300	26000	1300	4500	9900	14000	2900
Iron (Total)	N	2430	mg/kg	100	24000	6000	13000	21000	12000	16000	12000	28000	25000	23000	19000	32000	28000	22000	19000	18000	28000	30000	18000		13000	9000	18000	26000	14000	14000	19000	30000	21000	19000	30000	29000	17000	26000		24000	14000	21000	4500	17000	5200	14000	15000	15000	12000	7500	17000	6700	18000	29000	20000	5500
Arsenic	U	2455	mg/kg	0.5	19	2.8	18	23	3.8	96	9.7	29	21	16	18	14	44	25	21	6.9	11	10	4.2		3.2	5.5	4.6	58	16	21	5.3	5.6	76	55	5.6	96	4.7	20		15	6.4	4.5	0.9	12	6.6	7.3	11	6.0	6.8	4.1	9.0	3.9	5.7	9.6	7.3	0.8
Barium	U	2455	mg/kg	0	220	650	260	740	66	110	240	670	3100	150	58	110	580	720	320	85	130	170	54		180	88	60	700	210	1100	78	68	260	210	68	86	120	180		130	140	48	430	39	53	1200	210	820	90	52	400	640	75	86	150	15
Beryllium	U	2455	mg/kg	0.5	0.6	1.3	0.7	1.3	< 0.5	< 0.5	< 0.5	1.2	2.3	< 0.5	< 0.5	< 0.5	1.2	1.6	0.8	0.6	< 0.5	< 0.5	< 0.5		0.7	< 0.5	< 0.5	0.7	0.6	1.5	< 0.5	0.6	1.3	0.6	0.6	0.6	< 0.5	0.9		0.6	1.1	0.5	2.3	< 0.5	< 0.5	0.6	0.8	0.8	0.7	0.5	2.7	< 0.5	0.5	< 0.5	0.6	< 0.5
Cadmium	U	2455	mg/kg	0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.19	< 0.10	0.21	< 0.10	< 0.10	< 0.10	< 0.10	5.3	0.20	0.10	0.14	< 0.10	< 0.10		< 0.10	< 0.10	< 0.10	0.83	0.62	< 0.10	< 0.10	0.24	0.20	0.32	0.24	0.23	< 0.10	0.20		< 0.10	0.13	0.15	< 0.10	< 0.10	< 0.10	0.10	0.14	0.14	0.14	< 0.10	0.16	0.10	< 0.10	0.26	0.13	< 0.10
Chromium	U	2455	mg/kg	0.5	34	7.5	13	15	4.7	3.0	7.9	28	37	9.0	9.8	47	33	47	16	11	23	16	5.6		12	5.5	5.8	18	11	11	6.6	37	16	16	37	14	11	16		10	13	28	22	8.0	2.8	8.6	7.2	11	4.9	1.8	34	4.7	7.0	14	12	2.9
Manganese	U	2455	mg/kg	1.0	490	230	690	350	160	49	150	460	610	200	120	470	300	490	340	890	360	210	530		280	350	520	96	240	230	580	420	310	66	420	100	150	680		460	270	480	3200	83	100	< 1.0	440	1300	400	160	< 1.0	760	650	760	570	52
Copper	U	2455	mg/kg	0.50	46	13	17	45	11	40	17	71	67	28	28	39	63	300	120	12	240	590	18		30	18	15	32	88	34	16	33	83	22	33	22	30	48		36	37	19	2.5	24	18	14	39	23	37	24	26	8.1	18	17	22	6.6
Mercury	U	2455	mg/kg	0.05	0.09	< 0.05	< 0.05	0.12	< 0.05	0.34	< 0.05	0.23	< 0.05	0.17	0.18	0.05	< 0.05	0.69	0.11	< 0.05	0.10	0.05	< 0.05		< 0.05	0.06	< 0.05	2.0	0.09	< 0.05	< 0.05	0.10	0.47	0.34	0.10	< 0.05	0.07	0.11		0.09	0.05	0.06	< 0.05	< 0.05	< 0.05	0.08	0.15	0.09	0.07	< 0.05	0.08	< 0.05	< 0.05	0.06	0.08	< 0.05
Nickel	U	2455	mg/kg	0.50	19	13	49	35	13	5.4	7.8	64	63	16	8.9	18	46	49	36	17	19	21	13		32	14	18	16	25	39	19	29	22	14	29	8.2	18	23		16	35	25	3.1	80	22	12	29	22	46	17	11	7.0	21	12	19	8.4
Lead	U	2455	mg/kg	0.50	29	4.1	18	33	8.4	33	9.5	43	14	31	21	41	3.3	170	57	15	39	17	12		20	13	10	32	36	3.4	11	35	57	48	35	100	33	47		22	27	21	1.7	5.1	5.4	13	74	25	15	10	39	38	13	51	26	2.9
Selenium	U	2455	mg/kg	0.25	1.2	0.66	0.48	1.1	0.36	2.1	0.42	0.64	1.8	0.56	1.9	0.88	2.3	1.4	0.91	0.66	0.73	0.79	< 0.25		0.40	0.46	0.27	4.5	0.70	0.97	0.31	0.84	2.2	4.7	0.84	1.3	0.45	1.3		1.1	0.64	0.57	1.4	0.38	0.30	0.64	0.80	0.42	0.89	0.65	1.8	< 0.25	0.38	1.3	1.0	< 0.25
Vanadium	U	2455	mg/kg	0.5	68	16	24	40	6.4	8.1	21	40	66	14	12	75	61	50	33	12	39	30	6.8		9.2	9.3	8.0	23	23	29	8.9	42	28	26	42	24	11	19		13	10	31	47	21	12	7.9	13	9.1	6.7	3.5	66	6.0	9.7	20	15	1.8
Zinc	U	2455	mg/kg	0.50	45	9.6	64	29	27	15	6.0	260	15	57	37	28	8.6	280	64	71	67	24	33		75	21	39	130	44	11	42	73	65	48	73	40	120	110		82	87	51	7.0	70	12	36	93	62	81	39	71	43	46	77	52	15
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Organic Matter	U	2625	%	0.40	1.9	1.2	2.6	19	41	36	0.69	3.5	0.48	74	33	67	19	34	67	2.1	62	93	4.5		1.1	17	7.8	8.1	14	0.90	5.9	50	12	1.9	50	< 0.40	3.3	4.8		6.2	1.7	1.0	1.5	19	16	12	45	5.5	22	16	22	5.5	26	4.8	24	3.8
Aliphatics																																																						
Aliphatic TPH >C5-C6	N	2680	mg/kg	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	< 1.0	< 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	< 1.0	< 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
Aliphatic TPH >C6-C8	N	2680	mg/kg	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	< 1.0	< 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	< 1.0	< 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
Aliphatic TPH >C8-C10	U	2680	mg/kg	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	< 1.0	< 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	< 1.0	< 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
Aliphatic TPH >C10-C12	U	2680	mg/kg	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	68	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C12-C16	U	2680	mg/kg	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	88	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C16-C21	U	2680	mg/kg	1.0	16	< 1.0	< 1.0	< 1.0	< 1.0	22	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.7	6.7	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	3700	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C21-C35	U	2680	mg/kg	1.0	110	< 1.0	< 1.0	< 1.0	< 1.0	130	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	63	140	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	9100	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	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	< 1.0	< 1.0	< 1.0		< 1.0	< 1.0	< 1.0	< 1.0	1300	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	130	< 5.0	< 5.0	< 5.0	< 5.0	150	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	68	140	< 5.0		< 5.0	< 5.0	< 5.0	< 5.0	13000	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatics																																																					
Aromatic TPH >C5-C7	N	2680	mg/kg	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	< 1.0	< 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	< 1.0	< 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
Aromatic TPH >C7-C8	N	2680	mg/kg	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	< 1.0	< 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	< 1.0	< 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
Aromatic TPH >C8-C10	U	2680	mg/kg	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	< 1.0	< 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	< 1.0	< 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
Aromatic TPH >C10-C12	U	2680	mg/kg	1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	5.6	< 1.0	< 1.0	< 1.0

HOOVER factory - soil screening
Residential with plant uptake
2.5%

| | | |

HOOVER factory - soil screening

Residential with plant uptake

2.5%

Client: Quantum Geotechnic Ltd	22-28706	22-28260	22-28260	22-26687	22-26687	22-26687	22-26687	22-26687	22-26687	22-26687	22-26687	22-26687	22-26687	22-26687	22-26687	22-27208	22-27208	22-27208	22-27208	22-27208	22-24952	22-24952	22-24952	22-25022	22-25022	22-25794	22-25794	22-24952	22-24952	22-24952	22-24952	22-25022	22-25022	22-25794	22-24550	22-24550	22-24550	22-24550	22-24550	No. samples	No. of exceedances	TSV	Average (Mean)	Average / TSV	Maximum	Max/ TSV
Quotation No.: Q22-27297	1477516	1475278	1475279	1468016	1468017	1468018	1468023	1468034	1468035	1468037	1468039	1468041	1468045	1468049	1470665	1470666	1470667	1470668	1470669	1460224	1460226	1460227	1460711	1464118	1464119	1464119	1458556	1458557	1458559	1458561	1458563													
Order No.:	5	2	1	4	6	7	11	22	9	11	13	15	19	23	4	5	6	7	8	1	3	4	1	1	1	2	1	3	4	1	4	1	1	3	5	7	9							
	IBH104	IBH104	IBH104 (Acid Sump)	IBH105	IBH105	IBH105	IBH105	IBH105	IBH107	IBH107	IBH107	IBH107	IBH107	IBH107	IBH107	IBH107	IBH107	IBH107	IBH107	ES	ES	ES	BH104	BH104	BH107	BH107	ES	ES	ES	ES	RBH104	RBH104	RBH107	RBH112	RBH112	RBH112	RBH112	RBH112							
	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	BH101	BH101	BH101	SOIL	SOIL	SOIL	SOIL	BH113	RBH101	RBH101	RBH101	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL							
	4.00	0.50		1.2	4.2	4.8	13.2	7.2	6.2	8.7	11.7	14.7	20.7	26.7	1.2	2.7	4.2	4.8	6.15	SOIL	SOIL	SOIL	0.50	4.00	0.5	0.5	SOIL	SOIL	SOIL	SOIL	0.50	4.00	0.5	0.20	1.00	4.00	7.00	10.00							
				1.4	4.4	5.15	14.7	8.7	7.2	10.2	13.2	16.2	22.2	28.7	1.4	2.9	4.4	5	6.2	0.3	1.0	2.5					0.5	0.3	1.0	2.5	19-Jun-2022	19-Jun-2022		27-Jun-2022	27-Jun-2022	27-Jun-2022	27-Jun-2022	27-Jun-2022	27-Jun-2022							
	27-Jul-2022	12-Jul-2022	12-Jul-2022	09-Jul-2022	09-Jul-2022	09-Jul-2022	11-Jul-2022	09-Jul-2022	11-Jul-2022	11-Jul-2022	11-Jul-2022	11-Jul-2022	11-Jul-2022	11-Jul-2022	12-Jul-2022	12-Jul-2022	12-Jul-2022	12-Jul-2022	12-Jul-2022	29-Jun-2022	29-Jun-2022	29-Jun-2022	19-Jun-2022	19-Jun-2022	05-Jul-2022	05-Jul-2022	30-Jun-2022	29-Jun-2022	29-Jun-2022	29-Jun-2022													
	DURHAM	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB	NEW-ASB		DURHAM		DURHAM		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM		DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM	DURHAM							
Determinand																																											
ACM Type	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-							
Asbestos Identification	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected		No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	-	-	-	-			
Inorganics																																												
Moisture	16	14	9.8	5.8	7.9	15	12	7.0	8.9	21	17	10	10	16	4.6	8.7	6.4	23	19	11	15	18	14	22	13	13	12	11	15	18	14	22	13	13	14	22	4.3	22	145	0	-	12.1		35	
pH	8.3	8.4	8.9	9.5	8.5	8.9	9.0	8.9	7.7	7.4	9.5	8.2	9.0	9.1		9.1		9.4		8.6	8.3	8.6	7.8	8.7	8.4	8.4	5.3	8.6	8.3	8.6	7.8	8.7	8.4	8.6	8.8	8.6	6.5	6.2	136	129	7	8.3	1.19	10.1	1.44
Boron (Hot Water Soluble)	0.52	< 0.40	0.67	< 0.40	1.0	0.70	< 0.40	< 0.40	0.49	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40		< 0.40		0.48		< 0.40	0.40	< 0.40	< 0.40	< 0.40	3.3	3.3	0.90	< 0.40	0.40	< 0.40	< 0.40	< 0.40	3.3	0.45	0.44	0.60	0.64	< 0.40	136	0	-	2.8		170	
Sulphate (2:1 Water Soluble) as SO4	0.032	0.087	0.17	0.018	0.24	0.042	0.023	< 0.010	0.010	0.020	0.010	< 0.010	< 0.010	< 0.010		< 0.010		0.027		< 0.010	0.030	< 0.010	0.018	0.089	0.21	0.21	0.078	< 0.010	0.030	< 0.010	0.018	0.089	0.21	0.039	0.049	0.056	0.035	0.039	136	0	-	0.1		7.6	
Total Sulphur	0.13	0.16	0.51	0.071	0.26	0.030	0.020	0.030	0.037	0.019	0.032	0.051	0.017	0.070		0.15		0.19		0.39	0.29	0.56	0.15	0.11	0.26	0.26	0.71	0.39	0.29	0.56	0.15	0.11	0.26	0.48	0.41	0.83	0.030	0.096	136	0	-	0.3		3.9	
Cyanide (Total)	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50		< 0.50		< 0.50	< 0.50	< 0.50	2.3	2.2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	2.3	2.2	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	136	0	20	0.6	0.03	2.3	0.12
Sulphide (Easily Liberatable)	11	2.9	2.7	1.9	33	2.8	1.5	6.7	0.60	1.3	1.5	2.0	3.7	1.3		1.7		4.8		12	39	27	180	15	7.5	7.5	14	12	39	27	180	15	7.5	47	69	1.9	2.0	47	136	0	-	34.8		650	
Metals																																												
Aluminium (Total)	4800	7900	4200	6200	11000	3600	4800	4600	3800	3500	4800	3500	2700	2200		7000		5300		4300	7300	8700	13000	4000	6900	6900	7400	4300	7300	8700	13000	4000	6900	3800	4000	1900	7700	5600	136	0	-	7091.9		26000	
Iron (Total)	21000	17000	17000	20000	38000	14000	51000	28000	27000	18000	29000	21000	18000	19000		16000		19000		27000	29000	25000	23000	14000	20000	20000	15000	27000	29000	25000	23000	14000	20000	10000	10000	3800	12000	12000	136	0	-	20180.1		62000	
Arsenic	12	8.0	15	2.8	11	9.6	9.6	3.5	6.4	6.6	5.0	4.7	5.2	3.2		13		20		11	16	26	13	7.2	22	22	49	11	16	26	13	7.2	22	16	11	5.2	3.3	4.2	136	10	37.0	14.4	0.39	96	2.59
Barium	790	210	520	160	480	46	58	38	99	70	51	44	60	35		710		120		200	290	310	150	89	290	290	160	200	290	310	150	89	290	230	180	83	180	61	136	1	1300	258.0	0.20	3100	2.38
Beryllium	1.0	0.7	0.7	< 0.5	0.8	< 0.5	< 0.5	< 0.5	0.7	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5		0.6		0.5		< 0.5	0.6	0.7	0.6	< 0.5	0.8	0.8	1.3	< 0.5	0.6	0.7	0.6	< 0.5	0.8	0.7	0.6	< 0.5	1.0	0.8	136	4	1.7	0.7	0.43	2.7	1.59
Cadmium	< 0.10	0.42	< 0.10	< 0.10	< 0.10	< 0.10	0.18	< 0.10	0.15	0.19	0.13	< 0.10	< 0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.20	0.20	0.28	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.20	0.33	0.25	< 0.10	0.17	0.12	136	0	22.00	0.2	0.01	5.3	0.24
Chromium	17	12	15	3.0	23	6.1	13	20	26	25	7.8	5.9	5.2	4.1		11		16		14	11	13	25	5.9	19	19	12	14	11	13	25	5.9	19	9.5	10	2.3	14	8.8	136	0	910	14.0	0.02	62	0.07
Manganese	160	310	200	40	210	510	880	920	690	550	520	360	350	200		110		550		240	210	200	430	360	330	330	230	240	210	200	430	360	330	400	320	48	270	1400	136	0	-	438.7		4500	
Copper	44	22	40	7.7	20	6.3	13	6.5	14	13	10	9.1	8.5	11		24		23		33	36	37	30	14	130	130	59	33	36	37	30	14	130	62	29	14	31	11	136	0	2400	49.0	0.02	660	0.28
Mercury	< 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		0.07		0.08	0.11	0.40	< 0.05	< 0.05	0.11	0.11	0.60	0.08	0.11	0.40	< 0.05	< 0.05	0.11	0.20	0.09	< 0.05	< 0.05	< 0.05	136	0	40	0.1	0.00	2	0.05
Nickel	48	29	62	3.5	75	8.6	26	14	21	18	19	12	11	13		20		21		22	20	21	32	12	34	34	14	22	20	21	32	12	34	22	17	7.6	31	10	136	1	130	24.3	0.19	190	1.46
Lead	6.2	25	6.5	1.1	3.4	7.1	13	6.8	9.5	16	11	9.3	8.8	16		5.8		30		25	26	39	22	14	45	45	48	25	26	39	22	14	45	130	65	6.2	21	15	136	0	200	29.9	0.15	180	0.90
Selenium	0.90	0.72	0.75	0.27	0.48	0.29	0.54	0.28	0.66	0.51	< 0.25	0.67	< 0.25	< 0.25		0.39		0.71		0.67	1.3	2.5	0.44	0.46	0.88	0.88	2.5	0.67	1.3	2.5	0.44	0.46	0.88	1.0	0.76	0.85	0.50	0.94	136	0	250	0.9	0.00	4.7	0.02
Vanadium	36	21	32	11	72	8.3	14	8.3	12	8.9	9.5	7.6	6.2	5.2		21		20		24	24	24	36	8.7	40	40	25	24	24	24	36	8.7	40	18	16	5.0	9.1	13	136	0	410	21.6	0.05	75	0.18
Zinc	20	88	380	4.4	11	21	56	37	43	37	37	29	25	31		3.1		38		31	31	33	41	26	64	64	30	31	31	33	41	26	64	150	82	6.0	72	39	136	0	3700	83.6	0.02	3500	0.95
Chromium (Hexavalent)	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		< 0.50		< 0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	136	0	21	0.5	0.02	0.5	0.02
Organic Matter	2.4	5.9	1.4	< 0.40	8.8	2.1	0.84	0.55	2.1	< 0.40	0.57	3.1	3.8	6.2		< 0.40		21		31	48	33	7.9	11	14	14	84	31	48	33	7.9	11	14	67	33	100	1.2	3.3	136	0	-	17.9		100	
Aliphatics																																												
Aliphatic TPH >C5-C6	< 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	< 1.0	< 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	136	0	78	1.0	0.01	1	0.01
Aliphatic TPH >C6-C8	< 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	< 1.0	< 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	136	0	230	1.0	0.00	1	0.00
Aliphatic TPH >C8-C10	< 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	< 1.0	< 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	136	0	65	1.0	0.02	7	0.11
Aliphatic TPH >C10-C12	< 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	< 1.0	< 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	136	0	330	1.9	0.01	68	0.21
Aliphatic TPH >C12-C16	< 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	< 1.0	< 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	136	0	2400	3.0	0.00	95	0.04
Aliphatic TPH >C16-C21	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	49	40	< 1.0	< 1.0	< 1.0	136	0	92000	31.2	0.00	3700	0.18
Aliphatic TPH >C21-C35	< 1.0	< 1.0	180	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	55	49	< 1.0	< 1.0	< 1.0	136	0	92000	86.2	0.00	9100	0.43
Aliphatic TPH >C35-C44	< 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	< 1.0	< 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	136	0	21	1.5	0.07	74	3.52
Total Aliphatic Hydrocarbons	< 5.0	< 5.0	180	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		< 5.0		< 5.0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	100	89	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	100	89	< 5.0	< 5.0	< 5.0	136	0	-	123.1		13000	
Aromatics																																												
Aromatic TPH >C5-C7	< 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	< 1.0	< 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	136	0	140	1.0	0.01	1	0.01
Aromatic TPH >C7-C8	< 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	< 1.0	< 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	136	0	290	1.0	0.00	1	0.00
Aromatic TPH >C8-C10	< 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	< 1.0	< 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	136	0	83	1.0	0.01	1	0.01
Aromatic TPH >C10-C12	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	6.7	< 1.0	< 1.0	< 1.0	< 1.0	136	0	180	1.1	0.01	6.7	0.04
Aromatic TPH >C12-C16	< 1.0	< 1.0	7.5	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	110	< 1.0	< 1.0	< 1.0	< 1.0	136	0	330	2.5	0.01	110	0.33
Aromatic TPH >C16-C21	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	490	< 1.0	< 1.0	< 1.0	< 1.0	136	0	540	9.9	0.02	690	1.28
Aromatic TPH >C21-C35	< 1.0	< 1.0	180	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	2400	1600	< 1.0	< 1.0	< 1.0	136	2	1500	89.6	0.06	5700	3.80
Aromatic TPH >C35-C44	< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	130	< 1.0	< 1.0	< 1.0	< 1.0	136	0	1500	12.5	0.01	1300	0.87
Total Aromatic Hydrocarbons	< 5.0	< 5.0	190	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		< 5.0		< 5.0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	2400	2300	< 5.0	< 5.0	< 5.0	136	0	-	115.3		7800	
Total Petroleum Hydrocarbons	< 10	< 10	360	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10		< 10		< 10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	2500	2400	< 10	< 10	< 10	136	0	-	239.6		21000	
PAHs																																												
Naphthalene	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	3.3	4.0	< 0.10	< 0.10	< 0.10	136	0	5.6	0.2	0.04	5.5	0.98
Acenaphthylene	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.40	1.6	< 0.10	< 0.10	< 0.10	136	0	420	0.1	0.00	1.6	0.00
Acenaphthene	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	5.7	23	< 0.10	< 0.10	< 0.10	136	0	510	0.3	0.00	23	0.05
Fluorene	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10		< 0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	6.5	25	< 0.10	< 0.10	< 0.10	136	0	400	0.3	0.00	25	0.06
Phenanthrene	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.17	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10		< 0.10		1.2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1.2	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	32	130	< 0.10	< 0.10	< 0.10	136	0	220	1.6	0.01	130	0.59
Anthracene	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.12	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		< 0.10		< 0.10		0.83	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.83	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	6.3	32	< 0.10	< 0.10	< 0.10	136	0	5400	0.4	0.00	32	0.01
Fluoranthene	< 0.10	< 0.10	< 0.10	0.25	0.28	0.83	0.29	0.17

APPENDIX B

LEACHATE SCREENING TABLES

HOOVER factory - leachate screening

Project: Q0838 Hoover Candy Site						22-24952	22-24952	22-24952	22-25576	22-25762	22-25794	22-26342	22-26687	22-26915	22-27023	22-27110	22-27200	22-27203	22-27208	22-27224	22-27110	22-27116	22-28047	22-28260	22-28260	22-24550	22-24952	22-24952	22-24952	22-25576	22-25794	22-27108	22-28202
Client: Quantum Geotechnic Ltd				Chemtest Job No.:		1460231	1460226	1460231	1463196	1464002	1464119	1466565	1468017	1469195	1469770	1470168	1470568	1470583	1470669	1470720	1470168	1470204	1474219	1475278	1475279	1458562	1460231	1460226	1460231	1463196	1464119	1470140	1474920
Quotation No.: Q22-27297				Chemtest Sample ID.:		3	3	3		ES			6				4		8	5	1	3	1	2	1	8	3	3	3	2	1	8	ES1
Order No.:				Client Sample Ref.:		ES	ES	ES	2	4	1	2	IBH105	2	4	1	WS121	CP103	IBH107	WS134	WS136	IBH102	WS123	IBH104	IBH104 (Acid Sump)	RBH112	ES	ES	ES	WS108	RBH107	TP110	WS117
				Sample Location:		BH113	BH101	BH113	WS108	WS119	BH107	WS133	SOIL	CP102	CP104	WS136	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	RBH113	RBH101	RBH113	SOIL	SOIL	SOIL	SOIL
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	4.2	SOIL	SOIL	SOIL	3.30		6.15	5.2		4.2				8.50	SOIL	SOIL	SOIL	0.50	0.5	4.0	0.50
				Top Depth (m):		1.0	1.0	1.0	0.50	2.50	0.5	1.0	4.4	0.5	2.50	0.2	3.40	4.00	6.2	5.5	0.2	5.7	0.30	0.50			1.0	1.0	1.0				
				Date Sampled:		30-Jun-2022	29-Jun-2022	30-Jun-2022	04-Jul-2022	05-Jul-2022	05-Jul-2022	11-Jul-2022	09-Jul-2022	06-Jul-2022	11-Jul-2022	14-Jul-2022	15-Jul-2022	08-Jul-2022	12-Jul-2022	12-Jul-2022	14-Jul-2022	12-Jul-2022	13-Jul-2022	12-Jul-2022	12-Jul-2022	27-Jun-2022	30-Jun-2022	29-Jun-2022	30-Jun-2022	04-Jul-2022	05-Jul-2022	13-Jul-2022	19-Jul-2022
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**																												
pH	U	1010	10:1		N/A	8.2	8.2	8.2	8.7	8.8	8.7	7.6	8.1	7.8	7.8	8.2	7.8	8.4	8.0	9.0	8.2	8.0	8.4	8.3	8.2	8.7	8.2	8.2	8.2	8.7	8.7	7.9	8.0
Metals																																	
Arsenic (Dissolved)	U	1455	10:1	µg/l	0.20	0.41	1.6	0.41	9.7	0.32	17	< 0.20	2.5	3.1	1.1	12	5.4	4.4	1.5	12	12	< 0.20	0.28	18	6.8	0.45	0.41	1.6	0.41	9.7	17	3.1	22
Boron (Dissolved)	U	1455	10:1	µg/l	10.0	62	54	62	33	35	67	59	30	< 10	< 10	17	17	17	70	41	17	< 10	< 10	13	17	42	62	54	62	33	67	12	81
Cadmium (Dissolved)	U	1455	10:1	µg/l	0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.55	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.53	1.4	< 0.50	< 0.50	< 0.50	0.79	1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.96
Copper (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	8.2	< 0.50	2.5	0.78	1.4	< 0.50	5.6	2.8	4.2	< 0.50	< 0.50	0.56	3.4	0.83	< 0.50	< 0.50	< 0.50	1.3	0.97	< 0.50	< 0.50	8.2	< 0.50	2.5	1.4	18	20
Mercury (Dissolved)	U	1455	10:1	µg/l	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	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.50	< 0.50	< 0.50	< 0.50	0.74	0.51	< 0.50	10	< 0.50	1.4	< 0.50	< 0.50	< 0.50	< 0.50	2.7	1.4	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.3	1.1
Lead (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.8	1.5	< 0.50	< 0.50	< 0.50	3.3	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	0.81	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.70	< 0.50	1.3	2.3	< 0.50	< 0.50	< 0.50	2.2	1.6	< 0.50	< 0.50	0.81	< 0.50	< 0.50	< 0.50	< 0.50	2.4
Vanadium (Dissolved)	U	1455	10:1	µg/l	0.50	< 0.50	< 0.50	< 0.50	3.9	0.76	11	0.98	2.8	1.6	1.4	5.0	2.2	13	2.2	25	5.0	< 0.50	< 0.50	14	20	< 0.50	< 0.50	< 0.50	< 0.50	3.9	11	0.75	8.9
Zinc (Dissolved)	U	1455	10:1	µg/l	2.5	< 2.5	3.7	< 2.5	< 2.5	< 2.5	< 2.5	2.8	< 2.5	< 2.5	< 2.5	< 2.5	22	4.2	9.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	< 2.5	3.7	< 2.5	< 2.5	< 2.5	7.7	2.6
Chromium (Hexavalent)	U	1490	10:1	µg/l	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Aliphatics																																	
Aliphatic TPH >C5-C6	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	10:1	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatics																																	
Aromatic TPH >C5-C7	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	10:1	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	10:1	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
PAHs																																	
Naphthalene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	10:1	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAH's	U	1800	10:1	µg/l	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	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	1920	10:1	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	0.20	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

No. samples	No. of exceedances	TSV	Average (Mean)	Average / TSV	Maximum	Max/ TSV
29	8	8.5	8.26	0.97	9	1.06
29	0	25.8	5.84	0.22	22	0.85
29	0	750	38.00	0.05	81	0.11
29	0	0.05	0.11	-	<0.11	-
29	0	4.7	0.58	0.12	1.4	0.30
29	17	0.516	3.15	5.92	20	38.76
29	0	0.026	0.05	-	<0.05	-
29	2	2.06	1.04	0.50	10	4.85
29	3	0.619	0.68	1.09	3.3	5.33
29	0	10	0.79	0.08	2.4	0.24
29	2	20	4.92	0.24	25	1.25
29	3	5.62	3.79	0.67	22	3.91
29	0	0.6	20.00	<20	<20	-
29	0	10	0.10	0.01	0.1	0.01
29	0	10	0.10	0.01	0.1	0.01
29	0	10	0.10	0.01	0.1	0.01
29	0	10	0.10	0.01	0.1	0.01
29	0	10	0.10	0.01	0.1	0.01
29	0	10	0.10	0.01	0.1	0.01
29	0	10	0.10	0.01	0.1	0.01
29	0	-	-	-	0.1	-
29	0	-	5.00	-	5	-
29	0	10	0.10	0.01	0.1	0.01
29	0	0.75	0.10	0.13	0.1	0.13
29	0	10	0.10	0.01	0.1	0.01
29	0	10	0.10	0.01	0.1	0.01
29	0	10	0.10	0.01	0.1	0.01
29	0	90	0.10	0.00	0.1	0.00
29	0	90	0.10	0.00	0.1	0.00
29	0	-	0.10	-	0.1	-
29	0	-	5.00	-	5	-
29	0	-	10.00	-	10	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	0.10	-	0.1	-
29	0	-	2.00	-	2	-
29	0	-	0.04	-	0.2	-

Key

6.7

Exceedance of Screening Value

Average or Maximum concentration below screening value

Average or Maximum concentration above screening value

Client: Quantum Geotechnic Ltd	test Job No.:				22-29752	22-29752	22-29743	22-29748	22-29741	22-29741	22-29755	22-29743	22-29755	22-29755	22-30726	22-30726	22-30726	22-29741	22-29741	22-29743	22-29743	22-29748	22-29748	22-29748	22-29748	22-29752	22-29752					
Quotation No.: Q22-27297	Sample ID.:				1481993	1481994	1481923	1481943	1481914	1481915	1482009	1481924	1482010	1482011	1486426	1486427	1486428	1481916	1481917	1481921	1481922	1481939	1481940	1481941	1481942	1481995	1481996					
Order No.:	Sample Ref.:				1	1	1	1	1	2	1	1	1	2	EW1	EW1	EW1	1	2	1	1	1	1	1	1	1	1					
Sample Location:					RBH101	RBH102	RBH103	RBH105	RBH106	RBH106(B)	RBH108	RBH108	RBH109	RBH109(B)	RBH110	RBH111	RBH112	RBH113	RBH113(B)	RWS-5	RWS-N	IBH103	IBH105	IBH106	IBH107	CP101	CP102					
Sample Type:					WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER					
Top Depth (m):					5.13	5.33	6.25	4.16	5.86	5.56	5.40	5.41	8.54	8.66	14.12	8.94	18.70	7.86	7.56		4.78	6.80	6.86	6.89	5.53	5.44						
Date Sampled:					03-Aug-2022	03-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	03-Aug-2022	04-Aug-2022	03-Aug-2022	03-Aug-2022	09-Aug-2022	09-Aug-2022	09-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	03-Aug-2022	03-Aug-2022					
SVOCs																															
Methyl Tert-Butyl Ether	N	1760	µg/l	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	< 1.0	< 1.0		19	0	1.0	0.0	
N-Nitrosodimethylamine	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Phenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2-Chlorophenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
1,3-Dichlorobenzene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
1,4-Dichlorobenzene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
1,2-Dichlorobenzene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Hexachloroethane	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
4-Methylphenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Nitrobenzene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Isophorone	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2-Nitrophenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2,4-Dimethylphenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2,4-Dichlorophenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Naphthalene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
4-Chloroaniline	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Hexachlorobutadiene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2-Methylnaphthalene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Hexachlorocyclopentadiene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2,4,6-Trichlorophenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2,4,5-Trichlorophenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2-Chloronaphthalene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2-Nitroaniline	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Acenaphthylene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Dimethylphthalate	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2,6-Dinitrotoluene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Acenaphthene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
3-Nitroaniline	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Dibenzofuran	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
4-Chlorophenylphenylether	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2,4-Dinitrotoluene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Fluorene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Diethyl Phthalate	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
4-Nitroaniline	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Azobenzene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Hexachlorobenzene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Pentachlorophenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Phenanthrene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Anthracene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Carbazole	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Di-N-Butyl Phthalate	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Fluoranthene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Pyrene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Butylbenzyl Phthalate	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Benzo[a]anthracene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Chrysene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Di-N-Octyl Phthalate	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Benzo(b)fluoranthene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Benzo(k)fluoranthene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Benzo(a)pyrene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
Benzo(g,h,i)perylene	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
4-Nitrophenol	N	1790	µg/l	0.50			< 0.50		< 0.50											< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50				8	0	0.5	0.0	
PAHs																															
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Benzo(b)fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Benzo(k)fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Benzo(a)pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Benzo(g,h,i)perylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10		23	0	0.1	0.0	
Total Of 16 PAH's	U	1800	µg/l	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	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		23	0	2.0	0.0	
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030		23	0	0.0	0.0	

Key

6.7	Exceedance of Screening Value
	Average or Maximum concentration below screening value
	Average or Maximum concentration above screening value

Exceedance of Screening Value
Average or Maximum concentration below screening value
Average or Maximum concentration above screening value

APPENDIX C

GROUNDWATER SCREENING TABLES

HOOVER Factory - Groundwater Round 1 Screening

Client: Quantum Geotechnic Ltd	test Job No.:				22-29752	22-29752	22-29743	22-29748	22-29741	22-29741	22-29755	22-29743	22-29755	22-29755	30726	30726	30726	22-29741	22-29741	22-29743	22-29743	22-29748	22-29748	22-29748	22-29748	22-29752	22-29752					
Quotation No.: Q22-27297	Sample ID.:				1481993	1481994	1481923	1481943	1481914	1481915	1482009	1481924	1482010	1482011	1486426	1486427	1486428	1481916	1481917	1481921	1481922	1481939	1481940	1481941	1481942	1481995	1481996					
Order No.:	mple Ref.:				1	1	1	1	1	2	1	1	1	2	EW1	EW1	EW1	1	2	1	1	1	1	1	1	1	1					
Sample Location:					RBH101	RBH102	RBH103	RBH105	RBH106	RBH106(B)	RBH108	RBH108	RBH109	RBH109(B)	RBH110	RBH111	RBH112	RBH113	RBH113(B)	RWS-S	RWS-N	IBH103	IBH105	IBH106	IBH107	CP101	CP102					
Sample Type:					WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER					
Top Depth (m):					5.13	5.33	6.25	4.16	5.86	5.56	5.40	5.41	8.54	8.66	14.12	8.94	18.70	7.86	7.56			4.78	6.80	6.86	6.89	5.53	5.44					
Date Sampled:					03-Aug-2022	03-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	03-Aug-2022	04-Aug-2022	03-Aug-2022	03-Aug-2022	09-Aug-2022	09-Aug-2022	09-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	04-Aug-2022	03-Aug-2022	03-Aug-2022					
Determinand	**Accred.**	**SOP**	**Units**	**LOD**																								**No. samples**	**No. of exceedances**	**TSV**	**Average (Mean)**	**Average / TSV**	**Maximum**	**Max/ TSV**
pH	U	1010		N/A	7.7	7.4	8.2	8.1	8.5	8.6	7.2	8.0	7.4	7.4	7.9	7.7	8.1	8.3	8.1	8.3	8.3	8.0	8.2	8.2	8.4	7.4	7.4	23	1	8.5	7.9	0.9	8.6	1.01
Inorganics																																	
Sulphur	N	1220	mg/l	1.0	73	100	18	230	7.3	30	100	87	120	110	140	100	9.3	37	40	5.7	5.7	53	33	31	37	37	28	23	0	-	62.3		230.0	-
Biochemical Oxygen Demand	N	1090	mg O2/l	4.0																< 4.0	< 4.0							2	0	-	4.0		0.0	-
Chemical Oxygen Demand	U	1100	mg O2/l	10																< 10	< 10							2	0	-	10.0		0.0	-
Calcium (Dissolved)	U	1455	mg/l	2.00																33	33							2	0	-	33.0		33.0	-
Total Hardness as CaCO3	U	1270	mg/l	15																110	100							2	0	-	105.0		110.0	-
Sulphate	U	1220	mg/l	1.0	220	300	55	690	22	89	300	260	350	340	430	300	28	110	120	17	17	160	98	94	110	110	85	23	0	188000	187.2	0.0	690.0	0.00
Cyanide (Total)	U	1300	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.21	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	23	0	1	0.1	0.1	0.2	0.21
Sulphide	U	1325	mg/l	0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	23	0	0.25	0.1	0.2	0.0	0.00
Metals																																	
Arsenic (Dissolved)	U	1455	µg/l	0.20	2.2	0.26	0.29	< 0.20	1.4	0.78	< 0.20	< 0.20	21	2.2	0.23	< 0.20	1.3	< 0.20	< 0.20	0.88	0.76	< 0.20	< 0.20	< 0.20	2.1	< 0.20	< 0.20	23	0	25.8	1.5	0.1	21.0	0.81
Boron (Dissolved)	U	1455	µg/l	10.0	240	160	43	130	< 10	65	140	100	170	150	69	88	87	55	53	10	< 10	110	61	64	70	130	110	23	0	750	92.4	0.1	240.0	0.32
Barium (Dissolved)	U	1455	µg/l	5.00	140	79	77	48	38	80	78	47	110	81	110	73	210	140	160	41	44	44	76	52	27	81	92	23	6	100	83.8	0.8	210.0	2.10
Beryllium (Dissolved)	U	1455	µg/l	1.00	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	26	< 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	23	1	4	2.3	0.1	26.0	6.50
Cadmium (Dissolved)	U	1455	µg/l	0.11	0.76	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	27	0.38	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	23	3	0.05	1.3	24.6	27.0	500.00
Chromium (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	23	1.0	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	5.4	< 0.50	< 0.50	< 0.50	23	2	4.7	1.7	0.4	23.0	4.60
Copper (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	20	< 0.50	< 0.50	< 0.50	1.2	< 0.50	< 0.50	0.60	1.6	< 0.50	< 0.50	< 0.50	8.2	< 0.50	< 0.50	23	2	2.12	1.8	0.8	20.0	2.47
Iron (Dissolved)	N	1455	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	9.3	< 5.0	< 5.0	32	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	38	< 5.0	< 5.0	58	< 5.0	< 5.0	23	0	200	10.1	0.1	58.0	0.29
Mercury (Dissolved)	U	1455	µg/l	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	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	23	0	0.026	<0.05		0.0	-
Nickel (Dissolved)	U	1455	µg/l	0.50	4.4	0.96	< 0.50	< 0.50	< 0.50	17	< 0.50	1.0	30	3.3	2.4	1.8	3.5	< 0.50	< 0.50	< 0.50	< 0.50	4.9	< 0.50	< 0.50	4	1.9	2.1	23	9	2.06	3.6	1.7	30.0	14.56
Lead (Dissolved)	U	1455	µg/l	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	23	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	23	1	2.54	1.5	0.8	23.0	9.00
Selenium (Dissolved)	U	1455	µg/l	0.50	2.1	1.9	0.70	< 0.50	0.84	2.1	1.9	1.3	16	6.2	0.96	2.1	1.4	1.9	1.4	< 0.50	< 0.50	2.2	0.93	0.71	< 0.50	1.8	1.4	23	1	10.0	2.2	0.7	16.0	1.60
Vanadium (Dissolved)	U	1455	µg/l	0.50	1.1	< 0.50	< 0.50	< 0.50	0.65	0.64	< 0.50	< 0.50	25	0.82	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4.7	< 0.50	< 0.50	23	1	20.00	1.8	0.1	25.0	1.25
Zinc (Dissolved)	U	1455	µg/l	2.5	18	< 2.5	< 2.5	< 2.5	< 2.5	6.5	< 2.5	3.5	28	< 2.5	4.5	< 2.5	11	< 2.5	< 2.5	19	14	< 2.5	< 2.5	< 2.5	11	< 2.5	< 2.5	23	7	5.62	6.5	1.3	28.0	4.48
Chromium (Hexavalent)	U	1490	µg/l	20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	23	0	0.6	<20		<20	-
Organics																																	
Dissolved Organic Carbon	U	1610	mg/l	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	42	35	46	< 2.0	< 2.0	2.9	2.9	< 2.0	< 2.0	< 2.0	2.4	< 2.0	< 2.0	23	0	-	7.2		46.0	-
Total Organic Carbon	U	1610	mg/l	2.0	2.5	< 2.0	< 2.0	79	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	57	< 2.0	48	< 2.0	< 2.0	2.8	2.8	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	23	0	-	9.8		79.0	-
Aliphatics																																	
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	10	0.1	0.0	0.0	0.00
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	10	0.1	0.0	0.0	0.00
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	10	0.1	0.0	0.0	0.00
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	10	0.1	0.0	0.0	0.00
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	10	0.1	0.0	0.0	0.00
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	10	0.1	0.0	0.0	0.00
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	10	0.1	0.0	0.0	0.00
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	-	0.1		0.0	-
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	23	0	-	5.0		0.0	-
Aromatics																																	
Aromatic TPH >C5-C7	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	10	0.1	0.0	0.0	0.00
Aromatic TPH >C7-C8	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	0.75	0.1	0.1	0.0	0.00
Aromatic TPH >C8-C10	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	10	0.1	0.0	0.0	0.00
Aromatic TPH >C10-C12	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	10	0.1	0.0	0.0	0.00
Aromatic TPH >C12-C16	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	10	0.1	0.0	0.0	0.00
Aromatic TPH >C16-C21	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	90	0.1	0.0	0.0	0.00
Aromatic TPH >C21-C35	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0	90	0.1	0.0	0.0	0.00
Aromatic TPH >C35-C44	N	1675	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	23	0		0.1		0.0	-
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	23	0		5.0		0.0	-
Total Petroleum Hydrocarbons	N	1675	µg/l	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	23	0		10.0		0.0	-
VOCs																																	
Dichlorodifluoromethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
Chloromethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
Vinyl Chloride	N	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
Bromomethane	U	1760	µg/l	5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	19	0		5.0		0.0	-
Chloroethane	U	1760	µg/l	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	< 2.0	< 2.0	< 2.0	< 2.0	19	0		2.0		0.0	-
Trichlorofluoromethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
1,1-Dichloroethene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
Trans 1,2-Dichloroethene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
1,1-Dichloroethene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
cis 1,2-Dichloroethene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
Bromochloromethane	U	1760	µg/l	5	< 5	< 5	< 5		< 5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	19	0		5.0		0.0	-
Trichloromethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
1,1,1-Trichloroethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
Tetrachloromethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
1,1-Dichloropropene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
Benzene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
1,2-Dichloroethane	U	1760	µg/l	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	< 2.0	< 2.0	< 2.0	< 2.0	19	0		2.0		0.0	-
Trichloroethene	N	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
4-Isopropyltoluene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
1,4-Dichlorobenzene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
N-Butylbenzene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
1,2-Dichlorobenzene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
1,2-Dibromo-3-Chloropropane	U	1760	µg/l	50	< 50	< 50	< 50		< 50		< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	19	0		50.0		0.0	-
1,2,4-Trichlorobenzene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
Hexachlorobutadiene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	19	0		1.0		0.0	-
1,2,3-Trichlorobenzene	U	1760	µg/l	2.0	< 2.0	< 2.0	< 2.0		< 2.0		< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	<

Client: Quantum Geotechnic Ltd					Chemtest Job No.:	22-32699	22-32699	22-32670	22-32699	22-32700	22-32699	22-32670	22-32700	22-32700	22-32700	22-32699	22-32700	22-32699	22-32700	22-32700	22-32700	22-32699	22-32699	22-32670	22-32670	22-32670	22-32670	22-32670	22-32670	22-32670
Quotation No.: Q22-27297					Chemtest Sample ID.:	1495035	1495031	1494895	1495029	1495044	1495036	1494894	1495043	1495040	1495041	1495032	1495042	1495034	1495038	1495039	1495037	1495030	1495033	1494898	1494899	1494897	1494900	1494896	1494901	1494902
					Sample Location:	RBH101	RBH102	RBH103	RBH104	RBH104B	RBH105	RBH106	RBH108	RBH109	RBH109B	RBH110	RBH111	RBH112	RBH113	RBH113B	RBH114	CP101	CP102	BH104	BH105	BH106	BH106 (B)	BH107	RIVER NORTH	RIVER SOUTH
					Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
					Top Depth (m):	5.17	5.38	6.27	5.85	5.99	4.22	5.69	5.46	8.54	8.72	14.16	8.93	16.41	7.90	7.87	1.33	5.55	5.46	6.5	6.89	6.9	6.98	6.94		
					Date Sampled:	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022
SVOCs																														
N-Nitrosodimethylamine	N	1790	µg/l	0.50			< 0.50																							
Phenol	N	1790	µg/l	0.50			< 0.50																							
2-Chlorophenol	N	1790	µg/l	0.50			< 0.50																							
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50			< 0.50																							
1,3-Dichlorobenzene	N	1790	µg/l	0.50			< 0.50																							
1,4-Dichlorobenzene	N	1790	µg/l	0.50			< 0.50																							
1,2-Dichlorobenzene	N	1790	µg/l	0.50			< 0.50																							
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50			< 0.50																							
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50			< 0.50																							
Hexachloroethane	N	1790	µg/l	0.50			< 0.50																							
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50			< 0.50																							
4-Methylphenol	N	1790	µg/l	0.50			< 0.50																							
Nitrobenzene	N	1790	µg/l	0.50			< 0.50																							
Isophorone	N	1790	µg/l	0.50			< 0.50																							
2-Nitrophenol	N	1790	µg/l	0.50			< 0.50																							
2,4-Dimethylphenol	N	1790	µg/l	0.50			< 0.50																							
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50			< 0.50																							
2,4-Dichlorophenol	N	1790	µg/l	0.50			< 0.50																							
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50			< 0.50																							
Naphthalene	N	1790	µg/l	0.50			< 0.50																							
4-Chloroaniline	N	1790	µg/l	0.50			< 0.50																							
Hexachlorobutadiene	N	1790	µg/l	0.50			< 0.50																							
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50			< 0.50																							
2-Methylnaphthalene	N	1790	µg/l	0.50			< 0.50																							
Hexachlorocyclopentadiene	N	1790	µg/l	0.50			< 0.50																							
2,4,6-Trichlorophenol	N	1790	µg/l	0.50			< 0.50																							
2,4,5-Trichlorophenol	N	1790	µg/l	0.50			< 0.50																							
2-Chloronaphthalene	N	1790	µg/l	0.50			< 0.50																							
2-Nitroaniline	N	1790	µg/l	0.50			< 0.50																							
Acenaphthylene	N	1790	µg/l	0.50			< 0.50																							
Dimethylphthalate	N	1790	µg/l	0.50			< 0.50																							
2,6-Dinitrotoluene	N	1790	µg/l	0.50			< 0.50																							
Acenaphthene	N	1790	µg/l	0.50			< 0.50																							
3-Nitroaniline	N	1790	µg/l	0.50			< 0.50																							
Dibenzofuran	N	1790	µg/l	0.50			< 0.50																							
4-Chlorophenylphenylether	N	1790	µg/l	0.50			< 0.50																							
2,4-Dinitrotoluene	N	1790	µg/l	0.50			< 0.50																							
Fluorene	N	1790	µg/l	0.50			< 0.50																							
Diethyl Phthalate	N	1790	µg/l	0.50			< 0.50																							
4-Nitroaniline	N	1790	µg/l	0.50			< 0.50																							
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50			< 0.50																							
Azobenzene	N	1790	µg/l	0.50			< 0.50																							
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50			< 0.50																							
Hexachlorobenzene	N	1790	µg/l	0.50			< 0.50																							
Pentachlorophenol	N	1790	µg/l	0.50			< 0.50																							
Phenanthrene	N	1790	µg/l	0.50			< 0.50																							
Anthracene	N	1790	µg/l	0.50			< 0.50																							
Carbazole	N	1790	µg/l	0.50			< 0.50																							
Di-N-Butyl Phthalate	N	1790	µg/l	0.50			< 0.50																							
Fluoranthene	N	1790	µg/l	0.50			< 0.50																							
Pyrene	N	1790	µg/l	0.50			< 0.50																							
Butylbenzyl Phthalate	N	1790	µg/l	0.50			< 0.50																							
Benzo[a]anthracene	N	1790	µg/l	0.50			< 0.50																							
Chrysene	N	1790	µg/l	0.50			< 0.50																							
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50			< 0.50																							
Di-N-Octyl Phthalate	N	1790	µg/l	0.50			< 0.50																							
Benzofluoranthene	N	1790	µg/l	0.50			< 0.50																							
Benzo[k]fluoranthene	N	1790	µg/l	0.50			< 0.50																							
Benzo[a]pyrene	N	1790	µg/l	0.50			< 0.50																							
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50			< 0.50																							
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50			< 0.50																							
Benzo[g,h,i]perylene	N	1790	µg/l	0.50			< 0.50																							
4-Nitrophenol	N	1790	µg/l	0.50			< 0.50																							
PAHs																														
Naphthalene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzofluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 16 PAHs	U	1800	µg/l	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	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Total Phenols	U	1920	mg/l	0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030	< 0.030

SVOCs																																
N-Nitrosodimethylamine	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Phenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2-Chlorophenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Bis-(2-Chloroethyl)Ether	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
1,3-Dichlorobenzene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
1,4-Dichlorobenzene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
1,2-Dichlorobenzene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2-Methylphenol (o-Cresol)	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Bis(2-Chloroisopropyl)Ether	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Hexachloroethane	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
N-Nitrosodi-n-propylamine	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
4-Methylphenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Nitrobenzene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Isophorone	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2-Nitrophenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2,4-Dimethylphenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Bis(2-Chloroethoxy)Methane	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2,4-Dichlorophenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
1,2,4-Trichlorobenzene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Naphthalene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
4-Chloroaniline	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Hexachlorobutadiene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
4-Chloro-3-Methylphenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2-Methylnaphthalene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Hexachlorocyclopentadiene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2,4,6-Trichlorophenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2,4,5-Trichlorophenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2-Chloronaphthalene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2-Nitroaniline	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Acenaphthylene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Dimethylphthalate	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2,6-Dinitrotoluene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Acenaphthene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
3-Nitroaniline	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Dibenzofuran	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
4-Chlorophenylphenylether	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2,4-Dinitrotoluene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Fluorene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Diethyl Phthalate	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
4-Nitroaniline	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
2-Methyl-4,6-Dinitrophenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Azobenzene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
4-Bromophenylphenyl Ether	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Hexachlorobenzene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Pentachlorophenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Phenanthrene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Anthracene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Carbazole	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Di-N-Butyl Phthalate	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Fluoranthene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Pyrene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Butylbenzyl Phthalate	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Benzo[a]anthracene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Chrysene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Bis(2-Ethylhexyl)Phthalate	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Di-N-Octyl Phthalate	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Benzofluoranthene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Benzo[k]fluoranthene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Benzo[a]pyrene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Indeno(1,2,3-c,d)Pyrene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Dibenz(a,h)Anthracene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
Benzo[g,h,i]perylene	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
4-Nitrophenol	N	1790	µg/l	0.50	1	0	-	0.50	-	0.50	-
PAHs											
Naphthalene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Acenaphthylene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Acenaphthene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Fluorene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Phenanthrene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Anthracene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Fluoranthene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Pyrene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Benzo[a]anthracene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Chrysene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Benzofluoranthene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Benzo[k]fluoranthene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Benzo[a]pyrene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Indeno(1,2,3-c,d)Pyrene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Dibenz(a,h)Anthracene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Benzo[g,h,i]perylene	U	1800	µg/l	0.10	25	0	-	0.10	-	0.10	-
Total Of 16 PAHs	U	1800	µg/l	2.0	25	0	-	2.00	-	2.00	-
Total Phenols	U	1920	mg/l	0.030	25	0	-	0.03	-	0.03	-

Key

6.7	Exceedance of Screening Value
	Average or Maximum concentration below screening value
	Average or Maximum concentration above screening value

HOOVER Factory - Groundwater Round 2 Screening

Client: Quantum Geotechnic Ltd					Chemtest Job No.:	22-32699	22-32699	22-32670	22-32699	22-32700	22-32699	22-32670	22-32700	22-32700	22-32700	22-32699	22-32700	22-32699	22-32700	22-32700	22-32700	22-32699	22-32699	22-32670	22-32670	22-32670	22-32670	22-32670	22-32670	22-32670
Quotation No.: Q22-27297					Chemtest Sample ID.:	1495035	1495031	1494895	1495029	1495044	1495036	1494894	1495043	1495040	1495041	1495032	1495042	1495034	1495038	1495039	1495037	1495030	1495033	1494898	1494899	1494897	1494900	1494896	1494901	1494902
					Sample Location:	RBH101	RBH102	RBH103	RBH104	RBH104B	RBH105	RBH106	RBH108	RBH109	RBH109B	RBH110	RBH111	RBH112	RBH113	RBH113B	RBH114	CP101	CP102	IBH104	IBH105	IBH106	IBH106 (B)	IBH107	RIVER NORTH	RIVER SOUTH
					Sample Type:	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
					Top Depth (m):	5.17	5.38	6.27	5.85	5.99	4.22	5.69	5.46	8.54	8.72	14.16	8.93	16.41	7.90	7.87	1.33	5.55	5.46	6.5	6.89	6.9	6.98	6.94		
					Date Sampled:	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022	25-Aug-2022
Determinand	**Accred.**	**SOP**	**Units**	**LOD**																										
pH	U	1010		N/A		7.4	7.5	7.7	7.5	7.5	7.2	7.8	7.4	7.4	7.6	7.3	7.5	7.5	7.5	7.4	7.4	7.5	7.5	7.6	7.6	7.6	7.5	7.6	8.4	8.4
Inorganics																														
Ammoniacal Nitrogen	U	1220	mg/l	0.050		0.31	< 0.050	< 0.050	< 0.050	< 0.050	0.11	0.078	0.076	0.43	0.42	0.54	< 0.050	0.33	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050		
Nitrite as NO2	U	1220	mg/l	0.020																									< 0.020	< 0.020
Nitrate as NO3	U	1220	mg/l	0.50																									1.7	1.5
Phosphorus (Dissolved)	N	1220	mg/l	0.020																									0.022	0.037
Sulphur	N	1220	mg/l	1.0		40	97	19	60	47	190	17	87	110	110	170	100	11	40	40	70	37	27	31	37	33	33	37	8.3	9.3
Sulphate	U	1220	mg/l	1.0		120	290	58	180	140	570	50	260	320	320	500	300	34	120	120	210	110	80	92	110	100	99	110	25	28
Cyanide (Total)	U	1300	mg/l	0.050		0.080	0.060	< 0.050	< 0.050	< 0.050	0.080	< 0.050	< 0.050	< 0.050	< 0.050	0.070	< 0.050	0.060	< 0.050	< 0.050	< 0.050	< 0.050	0.090	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Sulphide	U	1325	mg/l	0.050		< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Metals																														
Aluminium (Dissolved)	N	1455	µg/l	5.0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	8.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0		
Arsenic (Dissolved)	U	1455	µg/l	0.20		0.62	< 0.20	0.39	< 0.20	0.37	0.56	1.2	0.35	0.90	0.91	0.58	0.54	1.4	0.28	0.59	0.46	0.25	0.31	0.27	0.38	0.31	0.76	0.92	2.6	2.5
Boron (Dissolved)	U	1455	µg/l	10.0		84	100	60	88	86	130	130	110	96	93	81	100	99	56	56	70	85	76	68	74	160	75	160	74	38
Barium (Dissolved)	U	1455	µg/l	5.00		110	54	74	54	57	100	110	37	36	46	110	61	220	150	140	130	87	73	89	86	120	49	81	73	64
Beryllium (Dissolved)	U	1455	µg/l	1.00		< 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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Cadmium (Dissolved)	U	1455	µg/l	0.11		< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11	< 0.11
Chromium (Dissolved)	U	1455	µg/l	0.50		< 0.50	< 0.50	< 0.50	< 0.50	1.7	< 0.50	0.64	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.64	< 0.50	4.1	2.8	< 0.50	< 0.50
Copper (Dissolved)	U	1455	µg/l	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.64	1.1	0.55	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	0.96	0.76
Iron (Dissolved)	N	1455	µg/l	5.0		< 5.0	< 5.0	< 5.0	< 5.0	12	< 5.0	< 5.0	< 5.0	58	29	13	1455	< 5.0	< 5.0	21	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	5.4	< 5.0
Mercury (Dissolved)	U	1455	µg/l	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	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Manganese (Dissolved)	U	1455	µg/l	0.50		660	10	0.78	4.4	2.1	34	10	2.0	91	250	500	3.8	18	17	4.2	80	73	1.3	19	25	4.9	2.1	180		
Nickel (Dissolved)	U	1455	µg/l	0.50		2.0	0.70	1.2	0.83	1.0	3.8	7.1	1.7	2.2	4.0	4.2	1.2	3.9	1.9	0.55	6.5	3.0	3.5	7.4	1.2	0.87	1.9	3.5	1.4	1.2
Lead (Dissolved)	U	1455	µg/l	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Selenium (Dissolved)	U	1455	µg/l	0.50		0.70	1.1	1.0	1.3	2.1	1.4	0.80	2.9	2.0	1.9	1.8	2.7	1.6	1.6	3.7	1.8	1.1	1.8	1.3	1.5	1.2	1.5	0.89	1.1	0.99
Vanadium (Dissolved)	U	1455	µg/l	0.50		< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	1.1	< 0.50	< 0.50
Zinc (Dissolved)	U	1455	µg/l	2.5		6.7	3.5	< 2.5	2.6	< 2.5	3.4	26	20	< 2.5	< 2.5	15	< 2.5	14	6.9	< 2.5	< 2.5	< 2.5	4.6	39	12	< 2.5	3.6	6.8	6.6	3.3
Chromium (Hexavalent)	U	1490	µg/l	20		< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20	< 20
Organics																														
Dissolved Organic Carbon	U	1610	mg/l	2.0		77	81	48	69	62	96	35	62	68	59	86	75	59	61	50	69	56	59	64	64	63	65	64	26	23
Total Organic Carbon	U	1610	mg/l	2.0		78	88	50	74	68	99	35	59	72	72	86	67	57	65	52	79	62	59	65	68	67	69	64	24	24
Aliphatics																														
Aliphatic TPH >C5-C6	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C6-C8	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C8-C10	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C10-C12	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C12-C16	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C16-C21	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C21-C35	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aliphatic TPH >C35-C44	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aliphatic Hydrocarbons	N	1675	µg/l	5.0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatics																														
Aromatic TPH >C5-C7	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C7-C8	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C8-C10	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C10-C12	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C12-C16	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C16-C21	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C21-C35	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Aromatic TPH >C35-C44	N	1675	µg/l	0.10		< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Aromatic Hydrocarbons	N	1675	µg/l	5.0		< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Petroleum Hydrocarbons	N	1675	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
VOCs																														
Dichlorodifluoromethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Chloromethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	N	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	U	1760	µg/l	5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chloroethane	U	1760	µg/l	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	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichlorofluoromethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans 1,2-Dichloroethene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
cis 1,2-Dichloroethene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Bromochloromethane	U	1760	µg/l	5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Trichloromethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	U	1760	µg/l	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	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Trichloroethene	N	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	U	1760	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Bromodichloromethane	U	1760	µg/l	5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
cis-1,3-Dichloropropene	N	1760	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Toluene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-Dichloropropene	N	1760	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,1,2-Trichloroethane	U	1760	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Tetrachloroethene	U	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	U	1760	µg/l	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	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
Dibromochloromethane	U	1760	µg/l	10		< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
1,2-Dibromoethane	U	1760	µg/l	5		< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5	< 5
Chlorobenzene	N	1760	µg/l	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	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	U	1760	µg/l	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

REDSTART

St David's House
Pascal Close
St Mellons
Cardiff
CF3 0LW

www.redstartwales.com