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Phase I & II Geoenvironmental Site Assessment

GHX0011 Site Infrastructure

Garth Wymott 2

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PICK EVERARD

Phase I & II Geoenvironmental Site Assessment
Land adjacent to HMP Garth, HMP Wymott

Reference:14-451-R1-2
Date: August 2021

PHASE I & II GEOENVIRONMENTAL SITE ASSESSMENT

Land adjacent to HMP Garth
HMP Wymott
Leyland

Prepared for:

PICK EVERARD

Report Ref: 14-451-R1-2
Date Issued: August 2021

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QUALITY ASSURANCE

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EXECUTIVE SUMMARY

Site Address	Land adjacent to HMP Garth, HMP Wymott, Leyland	
Grid Reference	E 350560, N 420800	
Site Area	43.53 Ha.	
Proposed Development	E3P understands that Pick Everard are working on behalf of the Ministry of Justice who are considering the future redevelopment of the site for a new prison facility.	
Current Site Use	The subject site is an irregular shaped parcel of land located at HM Wymott Prison in Ulnes Walton, Leyland. The south east sector is within HM Wymott Prison, with the remainder of the site located to the north. The land to the north of the prison forms part of a small farm holding that occupies the land with a number of agricultural buildings in the centre. The land surrounding the farm is separated into various paddocks for livestock including; pigs, sheep and horses. A series of sporadic semi-mature and mature trees are present across site. A dense woodland area is present in the north west. A boiler house is present in the west and a sewage pumping station is present to the west of Pump House Lane. A farm building which is a former military store is located in the far east of the site. An additional smaller pond is located in the northwest corner of the site. Within the prison boundary, to the east of the cell blocks, the site comprises exercise land, military style obstacle course and a shower/changing room block. Due to the coronavirus outbreak the fields had been left semi abandoned with the grass and obstacle course being overgrown. In the south east of the site a temporary coronavirus ward has been erected to allow prisoners to be segregated in the case of an outbreak within the prison. Access to the south east sector is gained through HM Wymott Prison. Access to the northern sector is from Pump House Lane and Willow Road.	
Site History	Historical mapping suggests that the site was predominantly agricultural land with a number of small ponds until the 1970's when site a number of tracks and structures (possible storage shelters) are present. A sewage pumping station is recorded in the east of the site, pre 2020 to the present day.	
Environmental Setting	**Drift Geology**	Glacial Till – CLAY, SAND, GRAVEL across the site. Head – CLAY, SILT, SAND, GRAVEL - West
	Bedrock Geology	Singleton Mudstone Member - MUDSTONE
	Faults	There are no faults in the vicinity of the site.
	Hydrogeology	Secondary undifferentiated strata and Secondary A aquifer (drift) overlying Secondary B aquifer (solid). No groundwater abstractions have been identified within a 1 km radius.
	Hydrology	Two ponds and a drainage network are present on site.
	Flood Risk	The west of the site is located in a Flood Zone 3 with a high probability of flooding; therefore a Flood Risk Assessment will be required.

Natural Landform and Geomorphology	The subject site is underlain by glacial till deposits which were laid down by the deposition of melting ice shelf in the most recent glaciation. Head deposits are also present in the west of the site which are formed by the slow flow of waterlogged soil and unsaturated superficial deposits associated with meltwater from thawing ice lenses. The underlying rock formations are associated with the Singleton Mudstone Member. A stream network and pond are present in the west of the site. The south east sector appears to have been levelled to create the sports pitches.
Utility Locations	Utility connections are available throughout Pump House Lane and Ridley Lane. A foul sewer runs north to south across the south east sector. An 11kV electricity cable runs to the north of the prison.
Landfill Sites and Ground Gases	There are no landfill sites within 250 m. The Envirocheck report lists potentially infilled ground relating to former water features on site. Historical mapping confirms the presence of infilled ponds on site.
Radon	Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level) – No further action
Coal Mining/Land Stability	The site is not located in a Coal Mining Reporting Area or Development High Risk Area, therefore no further assessment is required.
Brine Workings	The site is not located in the Cheshire Brine Compensation District.
Hazardous Installations	No hazardous installations that could potentially prejudice the proposed construction of highly sensitive residential (prison) dwellings have been identified within influencing distance of the subject site.

GROUND INVESTIGATION

Ground Investigation Works	E3P has completed an intrusive ground investigation comprising: • 25 x window sample boreholes, • Construction of environmental monitoring installations.
Ground Conditions	**Made Ground – 0.0 m bgl to >3.45 m bgl** Made Ground deposits were encountered within the majority of exploratory hole locations to depths of between 0.20 m and in excess of 3.45 m bgl (WS101) although, in general, Made Ground was encountered to a depth of less than 1.50 m bgl. Made Ground deposits generally comprise a reworked topsoil of dark brown silty clayey fine to medium sand with sandstone, ceramic and brick. Beneath the reworked topsoil, Made Ground comprises dark brown gravelly fine to coarse sand and soft to firm gravelly clay with mudstone, brick and concrete. A hydrocarbon odour was noted in WS106 between 0.80 m to 1.00 m bgl. A relict topsoil layer was identified between 0.40 m and 0.60 m bgl and organic matter was also noted in WS106 between 0.80 m to 1.50 m bgl. A strong organic odour was noted in the reworked clay in WS118 between 0.60 m and 1.50 m bgl. WS101 adjacent to the existing boiler house refused on a possible obstruction at 3.45 m bgl.

Ground Conditions	**TOPSOIL – 0.00 m bgl to 0.32 m bgl** Natural topsoil was encountered in localised areas as dark brown slightly clayey fine to medium SAND with rootlets in the northern sector and as soft to firm dark brown to black CLAY in the south east sector. Topsoil depths ranged from between 0.23 m to 0.32 m bgl.
	DRIFT – 0.10 m bgl to >5.45 m bgl Drift deposits were encountered in all exploratory locations, with the exception of WS101 where the full depth of Made Ground could not be proven. The drift deposits were encountered to depths in excess of 5.45 m bgl. The drift deposits are fairly consistent, generally comprising firm medium strength to very stiff very high strength greyish brown gravelly CLAY with mudstone. Localised lenses of granular drift deposits were encountered, generally comprising medium dense greyish brown clayey silty gravelly fine to medium SAND with mudstone. Loose GRAVEL was identified in WS103 between 1.00 m to 2.00 m bgl.
	SOLID The solid bedrock geology was not encountered during the ground investigation. BGS boreholes in the vicinity of the site suggest that the drift deposits are present to depths in excess of 15.00 m bgl.
	GROUNDWATER – Groundwater was encountered as seepages between 1.00 and 3.50 m bgl during the site investigation with monitoring recording groundwater levels between 0.40 and 3.38 m bgl.

CONTAMINATED LAND ASSESSMENT

Human Health	The Tier I Human Health Assessment has identified elevated concentrations of non-volatile PAH compounds and hydrocarbon fractions C12-C35 (aromatic). The risk to chronic human health associated with the elevated concentrations of non-volatile PAH and TPH compounds can be mitigated through the installation of a suitable cover system in all areas of landscaping and public open space where Made Ground remains to remove any potential for direct exposure to impacted soils. The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy. With regards to the elevated TPH C12-C16, these compounds present a potential volatilisation to indoor air risk. These elevated concentrations have only been identified within one location (WS106) and are therefore considered to be a localised hotspot. Therefore, during a process of cut/fill enabling works, a hotspot removal should be undertaken where these soils may be chemically validated to assess chemical suitability for retention on site in an area of no future sensitivity. Chemical analysis of the natural drift deposits has identified these soils to be acceptable for use as subsoil within the proposed areas of landscaping; however, further chemical validation samples will be required to confirm this.

Human Health	Areas of natural topsoil are present in the north of the site. Six samples have been tested to date which suggest that the topsoil is suitable for re-use. Further chemical validation samples will be required to confirm this.
Controlled Waters	The Tier 1 assessment has identified exceedances of the EQS levels for cadmium, chromium (III), copper, lead, nickel, selenium and zinc. The exceedances of heavy metals are likely to be associated with the Made Ground identified in the southern and eastern sectors. The site is underlain by cohesive drift deposits to depths in excess of 5.45 m which will inhibit lateral migration to on-site surface waters features and vertical migration to the underlying Secondary A and B aquifers. Therefore, impacted perched groundwater is not likely to migrate towards the controlled water receptors. In addition, the sensitivity of the aquifers is reduced, given the absence of any potable groundwater abstractions within 1.0 km. Where leachate analysis has been undertaken, this can overstate the risk and is not wholly representative of the site characterisation. The m-BAT and Pb screening tools have confirmed, the on-site surface water features are not at risk from the heavy metal contaminants identified within Table 8.4. Therefore, although heavy metals exceed EQS thresholds, they do not pose a risk to controlled waters as they are not bioavailable. It should also be noted the site is currently uncapped and the proposed development will largely encapsulate the site, thus limiting the potential for infiltration and therefore leaching potential. Given the general low soluble nature of the identified contaminants of concern, in addition to the presence of low permeability clay soils, it is considered there is unlikely to be any degree of unacceptable risk to the controlled water receptors and the wider environ.
Ground Gas	Preliminary ground gas monitoring suggests that the site should be classified as CS2 due to elevated concentrations of carbon dioxide (up to 8.6 % v/v) and new prison structures will likely require specialist protection measures.
Potable Water Infrastructure	This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation.

GEOTECHNICAL ASSESSMENT

Underground Obstructions	Significant obstructions will be present beneath the existing structures. A possible obstruction was noted in WS101 at 3.45 m bgl. During a phase of cut-and-fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.
Allowable Bearing Pressure	The underlying natural clay drift deposits have been assessed as being firm low strength to very stiff very high strength with a net allowable bearing pressure (ABP) in the order of 41-135 kN/m^2 at circa 1 m bgl increasing to 83–447 kN/m^2 at circa 2 m bgl. Localised areas of granular drift deposits were assessed as being loose to medium dense, having a net ABP of between 81-121 kN/m^2 between 1.0 -4.0 m bgl.

Foundation Options	Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying firm to very stiff glacial clays and localised areas of medium-dense sands. Where proposed levels remain similar, it is likely that proposed structures could be constructed using strip or trench fill foundations bearing on the underlying firm to very stiff clays or medium dense sands, subject to the required bearing stratum being present at a shallow depth and the absence of tree influence. Where the suitable founding stratum is greater than 2.50 m bgl and in areas of deep Made Ground an engineered foundation solution will be required. Where structures are located within the vicinity of the infilled ponds, ground improvement may be required. There is the potential for peat or organic soils to be present in the location of the existing ponds. Dependent on development levels, structures in these areas may require a driven pile foundation. Foundation depths should take account of the presence of existing and proposed trees, with foundations deepened locally to mitigate the potential for volumetric instability attributed to fluctuations in moisture content, in accordance with the requirements of NHBC standards.
Building Floor Slabs	Ground-bearing floor slabs will be viable but will require detailed design to accommodate variability of the formation and account for differential settlement. The slab would need to be constructed utilising a sub-base with the thickness designed by a structural engineer to ensure that settlement tolerances are taken into consideration.
Heave Precautions	The Clay soils are classified as Low to Medium Volume Change Potential and where present at a shallow depth within the conjectured zone of potential tree influence, heave precautions will be required within the construction of a shallow foundation and to the underside of floor residential floor slabs.
Soakaway Drainage	The Made Ground and underlying soils are cohesive in nature and impacted by low-level inorganic hydrocarbon compounds which would preclude the use of infiltration drainage systems.
Sulphate Assessment	Concrete classification will be DS1 AC1s.
CBR Design %	Granular soils can be re-engineered to ensure 5% within the subgrade during favourable climatic conditions. Natural clay soils will provide a CBR in the order of 3–5% during drier climatic periods. However, if water is allowed to shed onto the formation, the CBR will reduce to < 2%, which will require specialist engineering of the subgrade.
Cut/Fill	Development levels unknown at this time; however, an element of cut-and-fill works will be required to prepare the development platform.
Civil Engineering Excavations	Shallow bedrock has not been encountered. Made Ground present beneath the site is likely to be loosely compacted and possibly prone to collapse. Perched groundwater may also require localised pumping in excavations.
Waste Characterisation	Any material that is to be disposed off-site should undergo assessment using Technical Guidance WM3: *Waste Classification – Guidance on the classification and assessment of waste*.

RECOMMENDATIONS

Based on the findings of the geoenvironmental site assessment, the following additional works are recommended to be completed in due course:

- Further investigation of inaccessible areas.
- Plot-specific foundation schedule (upon receipt of the final development levels).
- Remediation and enabling works strategy.
- Construction Phase Surface Water Management Plan.

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DRAWING LIST

14-451-R1-001 - Site Location Plan
14-451-R1-002 - Proposed Development Plan
14-451-R1-003 - Historical Features Plan
14-451-R1-004 - Site Features Plan
14-451-R1-005 - Exploratory Hole Location Plan
14-451-R1-006 - Depth of Made Ground Plan
14-451-R1-007 - Depth of Topsoil Plan
14-451-R1-008 - Depth to Founding Strata Plan
14-451-R1-009 - Concept Foundation Zoning Plan
14-451-R1-010 - Conceptual Site Model
14-451-R1-018 - Contamination Issues Plan

1. INTRODUCTION

1.1. BACKGROUND

E3P has been commissioned by Pick Everard to undertake a detailed Phase I and II Geoenvironmental Site Assessment for a parcel of land adjacent to HMP Garth, HMP Wymott, Leyland.

This report is required to determine potential contaminated land liabilities, remediation requirements and geotechnical engineering works that will be required as part of the proposed development for a proposed new prison facility.

1.2. PROPOSED DEVELOPMENT

E3P understands that Pick Everard are working on behalf of the Ministry of Justice for hybrid planning application seeking: Outline planning permission (with all matters reserved except for access, parking and landscaping) for a new prison (up to 74,531.71 sqm GEA) (Class C2A) within a secure perimeter fence following demolition of existing buildings and structures and together with associated engineering works; Outline planning permission for a replacement boiler house (with all matters reserved except for access); and Full planning permission for a replacement bowling green and club house (Class F2(c)).

A snapshot of the proposed development layout is indicated in Figure 1.1.

FIGURE 1.1 SNAPSHOT OF PROPOSED DEVELOPMENT

1.3. OBJECTIVES

The objectives of the geoenvironmental assessment are as follows:

- Undertake a preliminary stage of sampling and analysis to provide an overview of environmental issues identified.
- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors.
- Assess the geotechnical information and provide preliminary recommendations in relation to foundations, pavement construction and floor slabs.
- Provide recommendations regarding future works required.

1.4. SCOPE OF WORKS

The scope of work includes the following elements:

- Detailed desk study;
- Design of suitable intrusive ground investigation;
- Window sample probeholes with, and construction of, environmental monitoring installations;
- In-situ geotechnical testing;
- Chemical and geotechnical laboratory analysis;
- Groundwater monitoring and sampling;
- Ground gas monitoring;
- Contamination risk assessment and conceptual site model;
- Geotechnical assessment and interpretation; and
- Factual and interpretive reporting.

1.5. LIMITATIONS

The limitations of this report are presented in Appendix I.

1.6. CONFIDENTIALITY

E3P has prepared this report solely for the use of the client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from E3P; a charge may be levied against such approval.

2. SITE SETTING

2.1. SITE DETAILS

Site Address	Land adjacent to HMP Garth, HMP Wymott, Leyland
National Grid Reference	E 350560, N 420800
Site Area	43.53 Ha.

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location map is presented in Appendix III as Drawing 14-451-001.

2.2. CURRENT SITE USE

E3P has undertaken a site walkover of the entire site and a description of the key findings is summarised in Table 2.1.

TABLE 2.1 SITE DESCRIPTION

Occupancy/Use	The subject site is an irregular shaped parcel of land located at HM Wymott Prison in Ulnes Walton, Leyland. The south east sector is within HM Wymott Prison, with the remainder of the site located to the north. The land to the north of the prison forms part of a small farm holding that occupies the land with a number of agricultural buildings in the centre. The land surrounding the farm is separated into various paddocks for livestock including; pigs, sheep and horses. A series of sporadic semi-mature and mature trees are present across site. A dense woodland area is present in the north west. A boiler house is present in the west and a sewage pumping station is present to the west of Pump House Lane. A farm building which is a former military store is located in the far east of the site. A small pond is located in the north west corner of the site. Within the prison boundary, to the east of the cell blocks, the site comprises a exercise land, military style obstacle course and a shower/changing room block. Due to the coronavirus outbreak the fields had been left semi abandoned with the grass and obstacle course being overgrown. In the south east of the site a temporary coronavirus ward has been erected to allow prisoners to be segregated in the case of an outbreak within the prison.	
Surface Cover (%)	**Buildings**	10%
	Hardstand	10%
	Soft Cover	80%
Structures	Agricultural buildings are located in the centre of the site. The existing boiler house is present in the west. A sewage pumping station is located to the west of Pump House Lane. A building used as a separate ward for coronavirus in present in the south east, along with changing rooms. A farm building/former military store is located in the far east of the site.	
Access	Access to the south east sector is through HM Wymott Prison. Access to the northern sector is from Pump House Lane and Willow Road.	
Slope	There is little variance in topography.	

Retaining Structures	No retaining structures are apparent.
Vegetation/Ecology	Vegetation is present across the site with areas of overgrown grasses, although the majority of the grass is short due to livestock grazing. A series of sporadic semi-mature and mature trees are present across site. A dense woodland area is present in the north west. A tree survey has been undertaken to support the planning application with findings recorded within Arboricultural Impact Assessment and Method Statement (Ref: 08623-0000-TYL-GHX0000-XX-RP-X-0002, Dated 27th July 2021).
Hazardous Material Storage	No above-ground storage tanks (ASTs) or underground storage tanks (USTs) were observed at the site during the preliminary site walkover. Infrastructure associated with the sewage pumping works is present in the centre of the site. Due to the previous nature of the site, it is unlikely that hazardous materials storage will have occurred on the site.
Asbestos-Containing Material (ACM)	No evidence of ACM was noted during the site walkover. A pre-demolition asbestos survey will be required within all existing buildings within the site boundary.
Polychlorinated Biphenyls (PCBs)	There is no equipment identified that may contain PCBs within the site boundary.
Waste Storage	Potentially hazardous waste streams are unlikely to be generated at the site and none were observed during the preliminary site inspection.
Drainage	Utility connections are available throughout Pump House Lane and Ridley Lane. A foul sewer runs north to south across the south east sector.

2.3. SURROUNDING AREA

The surrounding area land uses are summarised in Table 2.2.

TABLE 2.2 SURROUNDING LAND USES

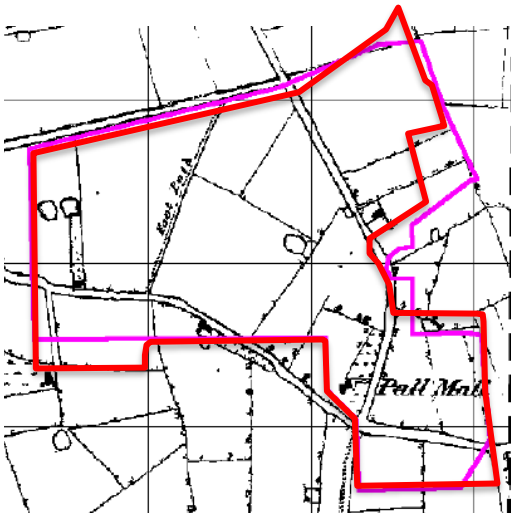
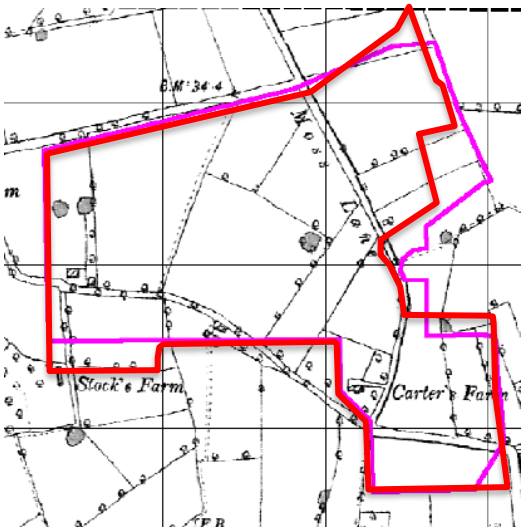
DIRECTION	LAND USE
North	Agricultural land
East	Residential units and agricultural land.
South	HM Prison
West	HM Prison

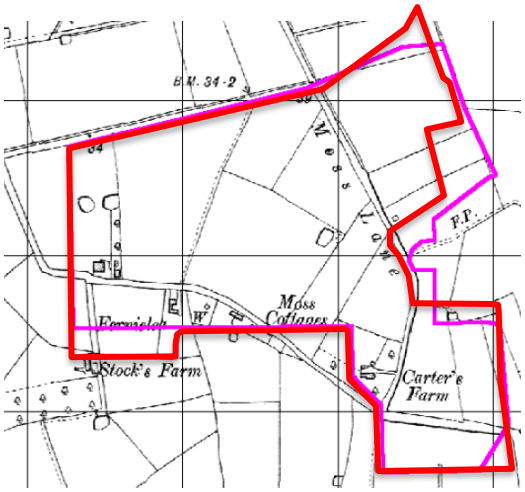
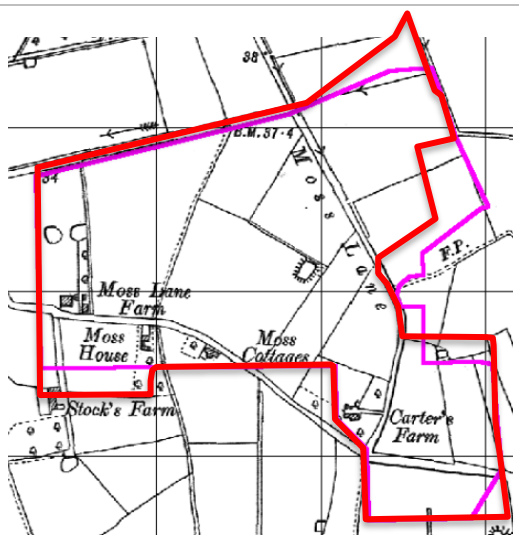
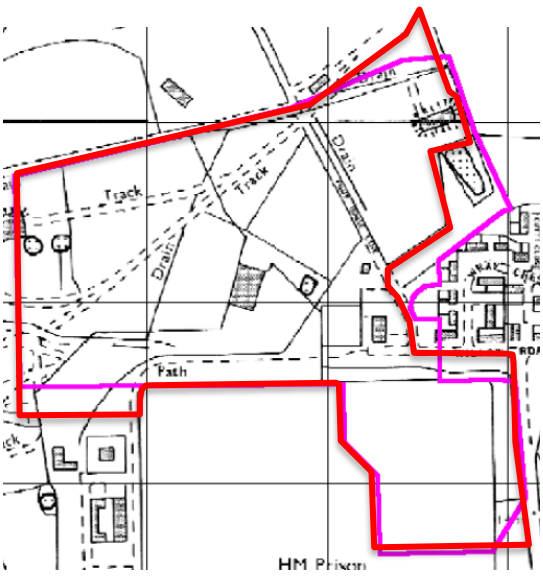
3. SITE HISTORY

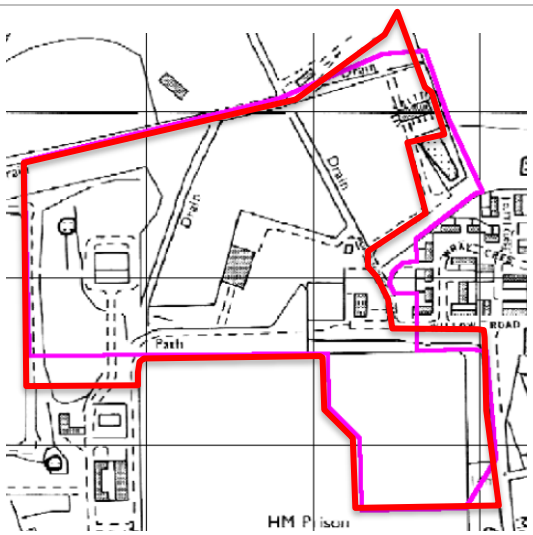
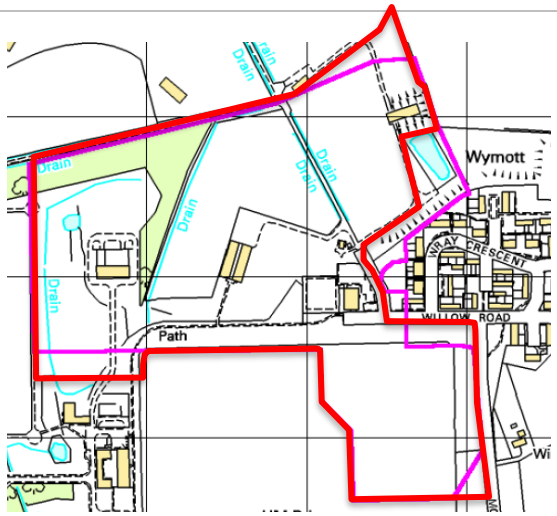
3.1. ON-SITE HISTORICAL DEVELOPMENT

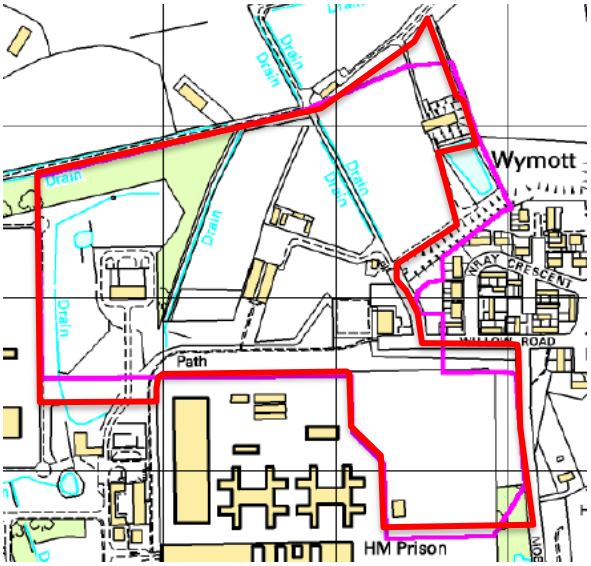
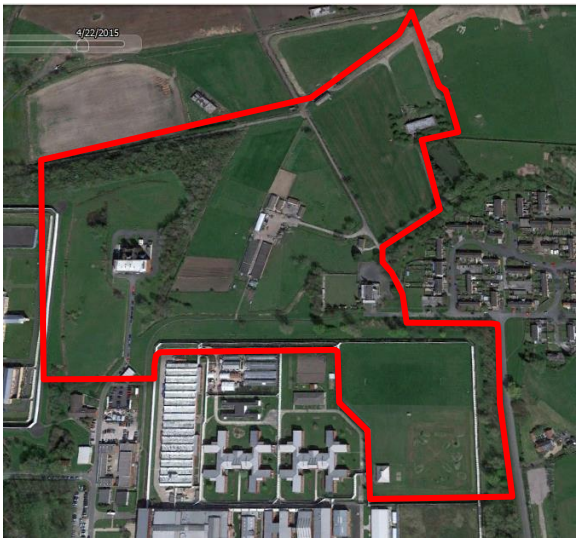
A review of historical mapping and historical aerial imagery pertinent to the site is summarised in Table 3.1. In addition, historical site features are presented on Drawing No 14-451-003 in Appendix III.

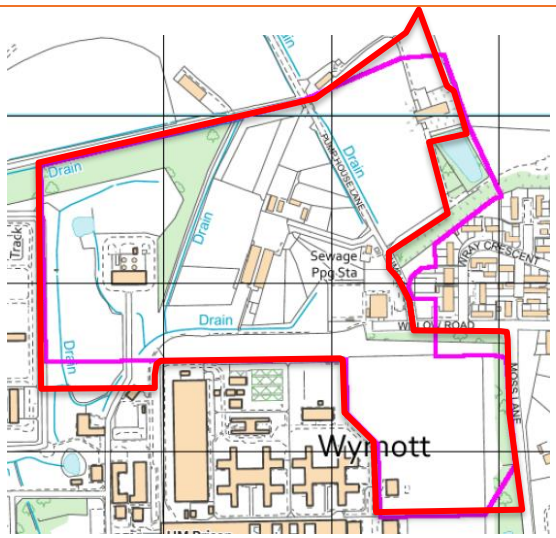
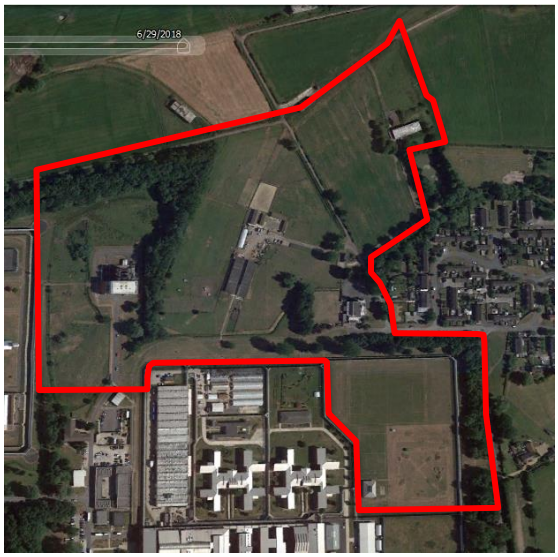
TABLE 3.1 HISTORICAL DEVELOPMENT

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1847-1849 **1:10,560**	The site is agricultural land with a number of different field parcels. Ponds are recorded in the west and centre of the site. Roads run through the south and centre of the site.	
1894 **1:10,560**	A farm is recorded in the south of the site. There are no other significant changes.	

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1912-1913 1:10,560	A well and Moss Cottages are recorded in the south west of the site.	
1929-1931 1:10,560	Moss Lane Farm and Moss House are recorded in the south west. A field boundary has been removed in the east.	
1983-1984 1:10,560	A rectangular building is recorded in the far east of the site. Two large rectangular buildings are also present in the central sector, in the east and one is present at the western boundary. When viewed within the wider area, it appears that these are possibly MOD storage facilities. This is confirmed by the UXO Desk study (report ref: PRA-20-1311 October 2020) which states:	

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1983-1984 **1:10,560** *Continued…*	*During WWII, the Site remained open fields, however one explosives storage house (ESH) was built on Site with associated rail tracks (representing a small portion of the wider dispersed depot site). Additional tracks leading to other ESHs crossed the Site also.* A number of paths, tracks and drains are marked across the site. Carter's Farm, Moss Lane Farm, Moss House and Moss Cottages are no longer present. The road through the south of the site is no longer present.	See previous page
1990-1995 **1:10,000**	The pond in the centre of the site and one of the ponds in the west have been infilled. A square building is present in the west. The tracks are no longer present.	
2001 **1:10,000**	Additional drains are present in the west of the site.	

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
2006 **1:10,000**	Additional structures are present in the centre of the site and a small structure is present in the south east (current changing rooms).	
2015 **Google Earth Imagery**	There are no significant changes.	

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
2020 **1:10,000**	A building in the east of the site is recorded as a Sewage Pumping Station. A number of field boundaries have been added to the west of the Sewage Pumping Station.	
2020 **Google Earth Imagery**	The aerial imagery shows the existing ponds and buildings.	

3.2. OFF-SITE HISTORICAL DEVELOPMENT

A review of potentially contaminative uses identified on historical Ordnance Survey maps within a 250 m radius of the site is summarised in Table 3.2.

TABLE 3.2 SURROUNDING HISTORICAL DEVELOPMENT

SURROUNDING FEATURE	DISTANCE	DATES	DIRECTION
Ponds Then: no longer marked	10 m – 250 m	Pre 1847–Present	North, East, South, West
Electricity Substation Then: no longer marked	110 m	Pre 1970 – Pre 1983 Pre 1983–Present	South East
Tanks Then: no longer marked	150 m – 250 m	Pre 1970 – Pre 1983 Pre 1983–Present	South
Works Then: no longer recorded	200 m	Pre 1983–Present	South East

3.3. PLANNING HISTORY

E3P has undertaken a review of online planning records held by Chorley Council and no environmentally pertinent information has been obtained for the site.

3.4. ANECDOTAL INFORMATION

No anecdotal information was obtained following a web-based search.

4. ENVIRONMENTAL SETTING

4.1. GEOLOGY AND HYDROGEOLOGY

The British Geological Survey (BGS) map for the site, (1:50,000 Solid and Drift editions) and online records indicate the site is underlain by the geological sequence presented in Table 4.1.

TABLE 4.1 SUMMARY OF UNDERLYING GEOLOGY

GEOLOGICAL UNIT	CLASSIFICATION	DESCRIPTION	AQUIFER CLASSIFICATION
Drift	Glacial Till	SAND, CLAY and GRAVEL	Secondary undifferentiated
	Head (West)	CLAY, SILT, SAND, GRAVEL	Secondary A aquifer
Solid	Singleton Mudstone Member	MUDSTONE	Secondary B aquifer

TABLE 4.2 SUMMARY OF BGS BOREHOLE RECORDS

LOCATION	DEPTH	TOPSOIL	DRIFT	SOLID
150 m W	15.0 m	0.4 m	CLAY and SAND >15.0 m	Not encountered

There are no faults in the vicinity of the site.

The Envirocheck report indicates that the site is not located within a groundwater source protection zone. Furthermore, there are no groundwater abstractions within 1 km of the site.

Based on the local topography and the location of surface watercourses, it is considered likely that shallow groundwater, if present, will flow in a southerly direction, towards the River Lostock.

4.2. NATURAL LANDFORM AND GEOMORPHOLOGY

Based on the initial geological assessment, a review of available topographic data and pertinent mapping, E3P has undertaken a preliminary geomorphological assessment of the landform and its possible mechanism for formation.

The subject site is underlain by glacial till deposits which were laid down by the deposition of a melting ice shelf in the most recent glaciation. Head deposits are also present in the west of the site which are formed by the slow flow of waterlogged soil and unsaturated superficial deposits associated with meltwater from thawing ice lenses. The underlying rock formations are associated with the Singleton Mudstone Member.

A stream network and pond are present in the west of the site.

The south east sector appears to have been levelled to create the exercise land.

4.3. GEOTECHNICAL DATA

Geotechnical data presented within a commercially available environmental database is summarised in Table 4.3.

TABLE 4.3 SUMMARY OF GEOTECHNICAL DATA

HAZARD	DESIGNATION
Shrink-Swell Clay	Very low risk
Landslides	Very low risk
Ground Dissolution	No hazard
Compressible Ground	No hazard
Collapsible Deposits	Very low risk
Running Sand	Very low risk

4.4. COAL MINING

The site is not located in a Coal Mining Reporting Area or Development High Risk Area, therefore no further assessment is required.

4.1. RADON RISK POTENTIAL

The Envirocheck report indicates the site is situated in an area where less than 1% of homes are above the "Action Level" and that the BGS reports that full radon protective measures are not necessary in the construction of new dwellings or extensions.

4.2. PRELIMINARY GEOTECHNICAL ASSESSMENT

Based on the desk-study information, the following geotechnical assessment has been made:

- Existing buildings will require demolition, with all relict foundations grubbing out, prior to the construction of the proposed development.
- Made Ground is likely to be present in localised areas associated with former buildings and infilled ponds.
- Historically infilled ponds are present within the site boundary, which are potential sources of alluvial deposits, silts and possible organic peat deposits in addition to potential depths of Made Ground. Investigation will be required in order to assess these and undertake in-situ geotechnical testing to determine the likely foundation solution for plots in these areas.

4.3. HYDROLOGY

Surface water features within 250 m of the subject site are summarised in Table 4.4.

TABLE 4.4 SURFACE WATER FEATURES

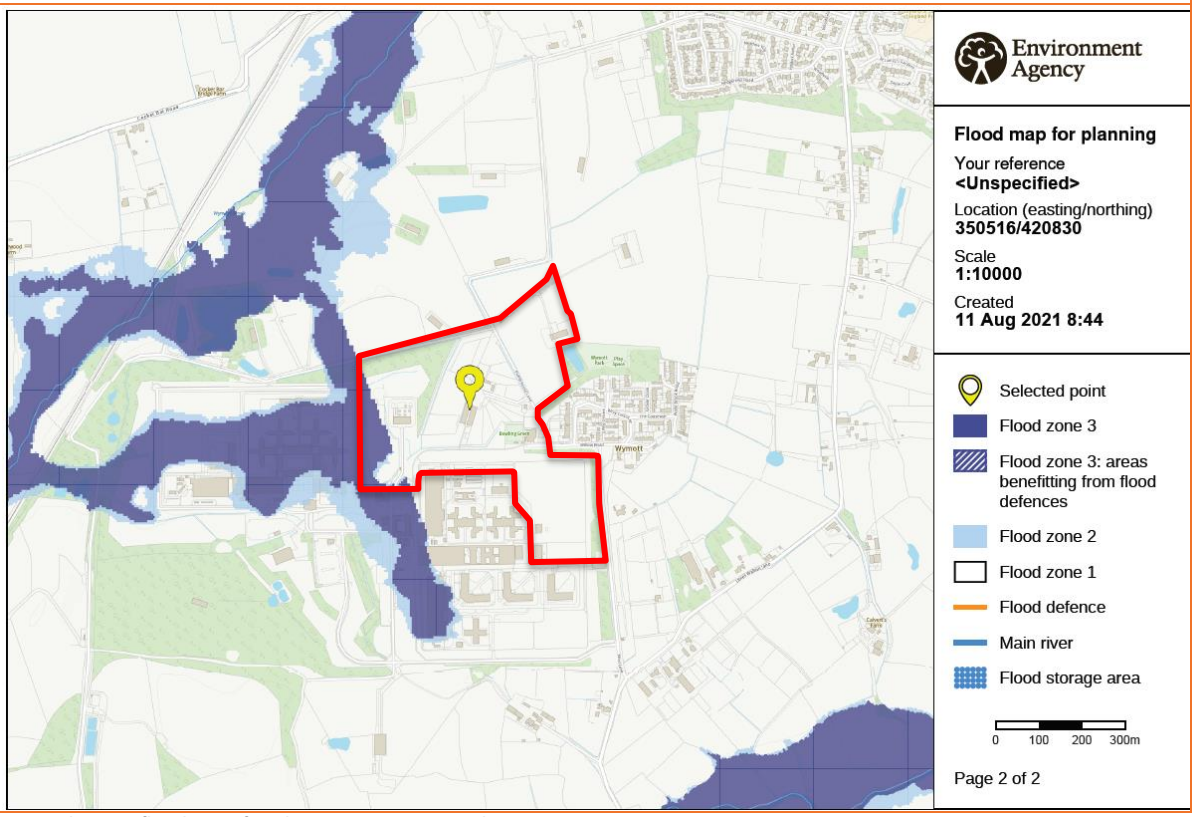
SURFACE WATER FEATURE	QUALITY	DISTANCE (m)	DIRECTION
Wymott Brook	C – Fairly Good	607 m	West
River Lostock	C – Fairly Good	670 m	South

Two ponds and a drainage network are present on site.

The site is predominantly located within a currently defined "Flood Risk Zone 1"; defined as land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (< 0.1%). The west of the site is located in a Flood Zone 3 with a high probability of flooding, therefore a Flood Risk Assessment will be required. The Environment Agency (EA) Flood Risk Map for the site is presented as Figure 4.1.

A Flood Risk Assessment (Ref: 608623-0000-HYD-GHX0000-XX-RP-D-0001, Dated 5th August 2021) has been undertake for the site. A detailed assessment of fluvial flood risk based on updated flood risk modelling provided by the EA has identified all of the subject site is now within a Flood Risk Zone 1.

FIGURE 4.1 EA FLOOD RISK MAP



Source - https://flood-map-for-planning.service.gov.uk/

4.4. INDUSTRIAL LAND USES

There are no active entries within the trade directory for industrial land uses within 250 m. The closest active entry is Ideal Tyre Specialists located 676 m north east.

4.5. SENSITIVE LAND USES

The closest residential properties are located adjacent to eastern boundaries of the site. HM Wymott Prison is located adjacent to the south and HMP Garth is located to the west. Agricultural land is present on site and to the north and east.

4.6. SITE SENSITIVITY ASSESSMENT

The site is assessed to be located within a "Low to Moderate" sensitivity setting as discussed within Table 4.5.

TABLE 4.5 SITE SENSITIVITY ASSESSMENT

SENSITIVITY PROFILE	DISCUSSION	RATING
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not located in a source protection zone.	**LOW**
Distance to the Closest Groundwater Abstraction Point	>1.0 km	**LOW**
Aquifer Classification in Superficial Drift Deposits	Secondary Undifferentiated aquifer Secondary A aquifer – there are no potable abstractions within 1.0 km.	**LOW**
Aquifer Classification in Bedrock	Secondary B aquifer	**LOW**
Is the Site Underlain by Low-Permeability Drift to Depths in Excess of 10 m?	The underlying superficial deposits are likely to comprise low-permeability clay soils to depths in excess of 5 m which may reduce the potential for mobile phase contaminants to migrate towards the bedrock aquifer or the surface water features.	**LOW**
Is the Site Located Within 50 m of a Surface Watercourse?	Two ponds and a drainage network are present on site.	**MODERATE**
Sensitive Land Uses	The closest residential properties are located adjacent to eastern boundaries of the site. HM Wymott Prison is located adjacent to the south and HMP Garth is located to the west. Agricultural land is present on site and to the north and east. The site lies in an area of adopted green belt and nitrate vulnerable zone.	**HIGH**
OVERALL SITE ENVIRONMENTAL SENSITIVITY		**LOW/MODERATE**

5. CONSULTATIONS

5.1. CONTAMINATED LAND OFFICER

E3P contacted the environmental health department at Lancashire Chorley Council who have been unable to respond within the reporting timescales. Upon receipt of the search information, E3P will issue any pertinent information and/or use the information to inform the development of any intrusive investigation proposals.

5.2. LANDFILL SITES AND WASTE TREATMENT SITES

There are no landfill sites within 250 m. The Envirocheck report lists potentially infilled ground relating to former water features on site. Historical mapping confirms the presence of infilled ponds on site.

5.3. REGULATORY DATABASE

The information summarised in Table 5.1 has been obtained from a commercially available environmental database. The summary table only includes records from within 250 m of the subject site and not otherwise detailed in the report.

TABLE 5.1 SUMMARY OF ENVIRONMENTAL DATA

RECORD	ENTRIES WITHIN 250 m	DETAILS
Contaminated Land Register Entries and Notices	0	None Identified
Authorised Industrial Processes (IPC/IPPC/LAPPC)	0	None Identified
Fuel Stations Entries	0	None Identified
Licensed Radioactive Substances	0	None Identified
Enforcements, Prohibitions or Prosecutions	0	None Identified
Discharge Consents	0	None Identified
Pollution Incidents	0	None Identified
Consents Issued Under the Planning (Hazardous Substances) Act 1990	0	None Identified
Control of Major Accident Hazard (COMAH) Sites	0	None Identified

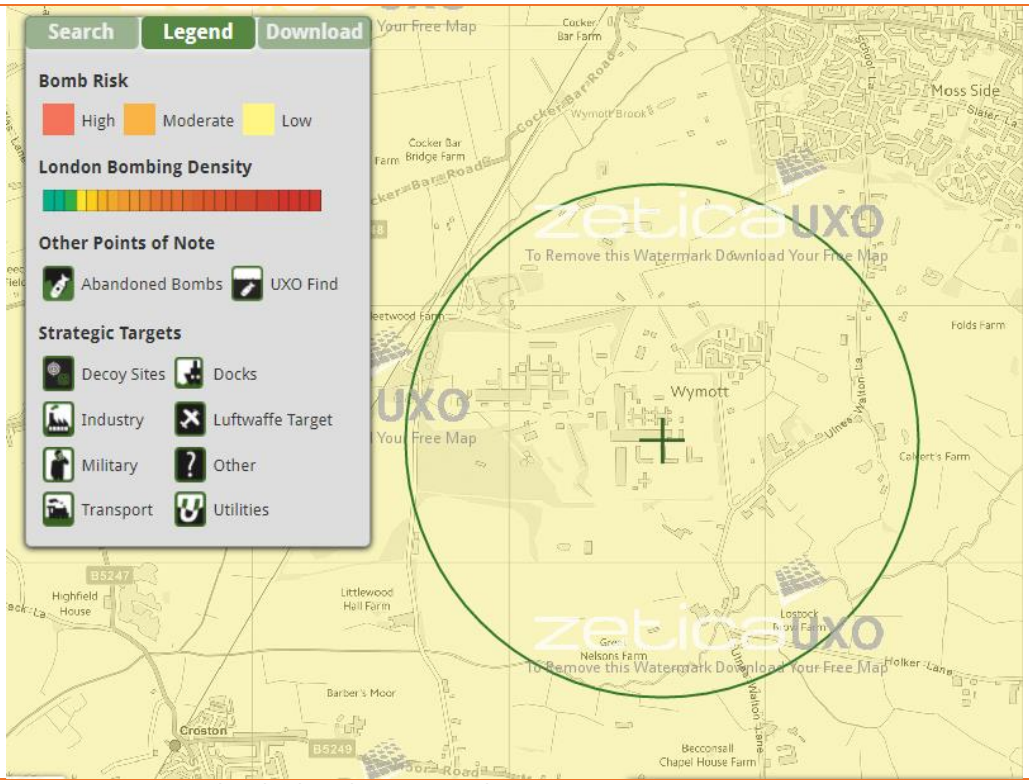
5.1. UNEXPLODED ORDNANCE

The regional unexploded bomb risk map from Zetica (2014) indicates that the site is in an area at low risk from possible unexploded ordnance (UXO) resulting from the Second World War. The Zeticia UXO Risk Map is presented as Figure 5.1.

The Brimstone UXO Desk Study (report ref: PRA-20-1311 October 2020) states:

During WWII, the Site remained open fields, however one explosives storage house (ESH) was built on Site with associated rail tracks (representing a small portion of the wider dispersed depot site). Additional tracks leading to other ESHs crossed the Site also. The report recommends the completion of a Stage 2 Detailed Risk Assessment prior to commencing development.

FIGURE 5.1 ZETICA UXO RISK MAP



Source - https://zeticauxo.com/downloads-and-resources/risk-maps/

6. INITIAL CONCEPTUAL SITE MODEL

In accordance with EA LCRM (2019) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), E3P has developed an initial conceptual site model (CSM) to identify potential contamination sources, migration pathways and receptors within the study area. This is summarised within Table 6.1.

ON-SITE SOURCES OF CONTAMINATION

The following potential on-site sources of contamination have been identified:

TABLE 6.1 ON-SITE SOURCES OF CONTAMINATION

ON-SITE FEATURE	DATES	POTENTIAL CONTAMINATION
Made Ground from former buildings/structures	Pre 1894-Present	Heavy metals and inorganic compounds, PAH's, hydrocarbon compounds, asbestos. Hazardous Ground Gas
Infilled Ponds, Field Boundaries	Pre 1847-Pre 1990	Heavy metals and inorganic compounds, PAH's, hydrocarbon compounds, asbestos. Hazardous Ground Gas
Tracks	Pre 1983-Pre 1990	Heavy metals, PAH's, hydrocarbon compounds, asbestos.
Sewage Pumping Station	Pre 2020-Present	Organic compounds, pathogens.
Boiler House	Pre 1990-Present	Heavy Metals and inorganic compounds, PAH's
MOD storage	Pre 1983 – Pre 2001	Heavy metals, chlorinated and non-chlorinated solvents, PAH's, hydrocarbon compounds, asbestos.

OFF-SITE SOURCES OF CONTAMINATION

The following potential off-site sources of contamination have been identified:

TABLE 6.2 OFF-SITE SOURCES OF CONTAMINATION

SURROUNDING FEATURE	DISTANCE FROM SITE AND DIRECTION	POTENTIAL CONTAMINATION
Infilled Ponds	30 m – 250 m North, East, South, West	Hazardous Ground Gas

TABLE 6.3 INITIAL CONCEPTUAL SITE MODEL

SOURCE	PATHWAY	RECEPTOR
Human Health		
Heavy Metals, PAHs associated with Made Ground, Infilled Ponds and Field Boundaries, Boiler House, MOD Storage	Dermal Contact and Ingestion. Consumption of Homegrown Produce.	Construction Workers. Site End Users.
Discussion: Made Ground, derived from the demolition of buildings and infilling of ponds and field boundaries is likely to be present in localised areas of the site. Made Ground is likely to be impacted by heavy metals, hydrocarbons and polycyclic aromatic hydrocarbons (PAH). The existing boiler house and the former MOD storage are a potential source for heavy metals and PAHs. If present, heavy metals and non-volatile PAHs may pose a short-term risk to construction workers who may come into contact with impacted soils during earthworks. The site is likely to be covered by the proposed structures or hard-standing; however, future site users may come into contact with impacted soils within any gardens or landscaped areas.		
Volatile Hydrocarbon Compounds and PAH associated with Made Ground, Infilled Ponds and Field Boundaries, Sewage Pumping Station, MOD Storage	Volatilisation/Accumulation. Vapour Inhalation.	Construction Workers. Site End Users.
Discussion: Made Ground across the site resulting from demolition activities and infilling may be potential sources of hydrocarbon compounds and volatile PAHs, such as naphthalene. Historical site uses including the MOD storage may be a source of volatile contaminants such as PAH's, TPH's and other solvents and agents used on site. There is potential for spillages and leakages to have occurred overtime and the presence of railway tracks also increases the risk of diesel spillages. Hydrocarbon compounds, solvents and PAHs may pose a risk to construction workers if they come into contact with impacted soils during further earthworks, however appropriate PPE/ Respiratory Protective Equipment (RPE) will ensure they are at no unacceptable risk. Future end users may come into contact with impacted soils in garden and landscaped areas, though the main pathway of volatile compounds is considered to be vapour inhalation indoors. If identified, it is likely that additional remediation of impacted soils and/or perched groundwater will be required to mitigate the risk to future residential end users.		
Asbestos-Containing Materials (ACMs) within Made Ground	Fibre/Dust Inhalation.	Construction Workers. Site End Users. Third-Party Property.
Discussion: A pre-demolition asbestos survey will be required with any asbestos materials removed from the buildings prior to demolition. Asbestos may be present in the Made Ground associated with historic infilling and demolition activities. ACM poses a risk through fibre and dust inhalation and if present may pose a risk to construction workers during any future earthworks / demolition and to adjacent third party property should dust be generated during those works.		
Hazardous Ground Gases		
Methane and Carbon Dioxide Associated with Made Ground, Infilled ponds, Sewage Pumping Station	Inhalation. Accumulation.	Construction Workers. Site End Users.

SOURCE	PATHWAY	RECEPTOR
Discussion: Made Ground, possible localised sludges associated with the sewage pumping station and organic deposits in infilled ponds may be sources of hazardous ground gases such as carbon dioxide and methane which have associated asphyxiation and explosive risks. The infilled ponds within 250 m may also be a potential source of hazardous ground gas, however due to the distance from site this is considered to represent a very low risk.		
Controlled Waters		
Mobile Contaminants	Vertical/Lateral Migration.	Secondary A Aquifer. Secondary B Aquifer. On-Site Drainage Network and Pond
Discussion: Impacted Made Ground represents a potential source of mobile contamination. Potential granular drift deposits beneath the site may facilitate the migration of mobile contamination, if present, to the on-site pond and drainage network and underlying Secondary A aquifer and Secondary B aquifer. The risk of downward migration is reduced considering there are no potable groundwater abstractions within 1.0 km. Intrusive investigation with chemical analysis of soil and groundwater samples is recommended to assess the presence of mobile contaminants and facilitate further risk assessment.		
Buildings and Infrastructure		
pH and Sulphate	Corrosion of Concrete.	Foundations/Concrete.
Discussion: Presence of pH and sulphate within Made Ground deposits may result in corrosion of buried concrete within the proposed development. Assessment must be undertaken to confirm the levels of pH and sulphate within the underlying strata and in particular any Made Ground deposits so that a concrete classification can be determine.		
Ecology		
Mobile Contaminants	Lateral Migration.	On-Site Drainage Network and Pond
Discussion: Mature and semi-mature trees are located on site which may provide habitats for protected wildlife (nesting birds or roosting bats). A habit survey will be required to support a planning application. In the likely absence of any significant sources of mobile contaminants, the risk to ecology and aquatic ecosystems is considered to be low.		

7. GROUND INVESTIGATION

7.1. GENERAL OVERVIEW

A ground investigation has been designed based on the findings of the desk study, with exploratory holes advanced to target specific potential contaminant sources summarised in Table 6.1. The investigation has also been used to collect geotechnical information to assist in the design and construction of the proposed development.

Exploratory fieldwork was completed between 29th October 2020 and 4th November 2020. The works are summarised in Table 7.1 overleaf.

7.2. LIMITATIONS OF THE INVESTIGATION

Investigation could not be completed in the location of the existing buildings.

7.3. SCOPE OF INVESTIGATION

TABLE 7.1 SUMMARY OF FIELDWORK

POTENTIAL SOURCE/RATIONALE	LOCATION HOLE	TYPE	MAXIMUM DEPTH (m bgl)	MONITORING WELLS RESPONSE ZONE (m bgl)
Boiler House	WS101	Window Sample Probehole	3.45	N/A
General Ground Conditions – Agricultural Land	WS102		4.45	0.5–4.0
	WS103		5.45	N/A
	WS104		5.45	N/A
	WS105		4.45	N/A
	WS106		4.45	N/A
	WS107		4.45	N/A
	WS108		4.45	0.5–4.0
	WS109		4.45	0.5–4.0
	WS110		4.45	N/A
	WS111		4.45	N/A
	WS112		4.45	0.5–4.0
	WS113		4.45	N/A
	WS114		4.45	N/A
	WS115		3.45	N/A
	WS116		4.45	N/A
	WS117		3.45	N/A
General Ground Conditions – Exercise Land	WS118		4.45	N/A
	WS119		4.45	0.5–4.0
	WS120		4.45	N/A
	WS121		4.45	N/A
	WS122		4.45	N/A
	WS123		4.45	1.0–4.0
	WS124		4.45	N/A
	WS125		4.45	N/A

Window sample probeholes were advanced to undertake in-situ detailed geotechnical testing, obtain environmental samples and install groundwater and ground gas monitoring wells. The majority of window sample probeholes were only drilled to 4.45 m bgl due to time constraints.

The sampling locations are illustrated in Drawing 14-451-005 (Appendix III). The ground conditions encountered are indicated on the logs, which are provided in Appendix V.

Return visits were made to monitor installations for groundwater level and gas concentrations. In addition, selected wells were purged and samples of groundwater recovered for chemical analysis.

7.4. IN-SITU STANDARD PENETRATION TESTING (SPT)

In-situ geotechnical testing was conducted using the standard penetration test (SPT) and, where the ground is granular, a 60° cone (SPT(C)) was used instead of the sampling tube. The results are shown in the probehole logs in Appendix V and presented in Table 8.5 and discussed in Section 10.

7.5. LABORATORY ANALYSIS

Selected soil samples were submitted for a range of chemical analysis comprising:

- Metals.
- pH, total sulphate, water-soluble sulphate (2:1 extract).
- Sulphide.
- Cyanide.
- Phenols.
- Total and speciated polycyclic aromatic hydrocarbons (PAHs).
- Semi Volatile Organic Compounds (SVOC).
- Volatile Organic Compounds (VOC).
- Total Organic Carbon (TOC).
- Asbestos identification and quantification.
- Banded total petroleum hydrocarbon (TPH).

I2 Analytical undertook the analytical work and the testing results are included in Appendix VI and discussed in Section 9.

Selected samples were submitted to PSL Laboratory where the following geotechnical tests were undertaken:

- Atterberg limits determinations;
- Moisture content;
- Compaction tests;
- Particle size distribution;
- Consolidation tests; and
- Single-stage triaxial tests.

Laboratory analysis sheets are included in Appendix VIII and are summarised in Section 8.

8. GROUND AND GROUNDWATER CONDITIONS

8.1. SUMMARY OF GROUND CONDITIONS

The ground investigation generally confirms the published geology and identifies the strata set out in Table 8.1.

TABLE 8.1 SUMMARY OF STRATA

HOLE	DEPTH TO STRATUM (m bgl)							
	MADE GROUND TOPSOIL	MADE GROUND	TOPSOIL	FIRM CLAY	STIFF / VERY STIFF CLAY	SAND	GRAVEL	SILT
WS101	0.00–1.50	1.50–3.45	–	–	–	–	–	–
WS102	0.00–0.16	0.16–0.60	–	–	0.60–4.45	–	–	–
WS103	0.00–0.20	0.20–0.50	–	0.50–1.00 2.00–3.00	3.00–5.45	–	1.00–2.00	–
WS104	–	–	0.00–0.32	0.32–2.5	2.50–5.45	–	–	–
WS105	0.00–0.42	0.42–1.00	–	1.00–2.00	2.00–2.45 2.55–4.45	–	–	2.45–2.55
WS106	0.00–0.22 0.40–0.60	0.22–0.40 0.60–1.50	–	1.50–3.00	3.00–4.45	–	–	–
WS107	0.00–0.60	–	–	–	0.60–4.45	–		–
WS108	–	–	0.00–0.30	0.30–2.00	2.00–4.45	–	–	–
WS109	0.00–0.50	0.50–0.80	–	–	1.00–4.45	–	–	–
WS110	0.00–0.50	0.50–0.60	–	–	0.60–4.45	–	–	–
WS111	0.00–0.50	–	–	–	0.50–0.70 1.00–4.45	0.70–1.00	–	–
WS112	0.00–0.30	–	–	–	0.30–4.45	–	–	–
WS113	–	–	0.00–0.30	0.30–1.00	1.20–4.45	1.00–1.20	–	–
WS114	–	–	0.00–0.23	–	0.23–4.45	–	–	–
WS115	–	–	0.00–0.30	–	2.00–3.45	0.30–2.00	–	–
WS116	–	–	0.00–0.28	–	0.75–4.45	0.28–0.70	0.70–0.75	–
WS117	0.00–0.30	0.30–1.00	–	–	1.00–3.45	–		–
WS118	0.00–0.40	0.40–1.50	–	–	1.50–4.45	–	–	–
WS119	0.00–0.30	–	–	–	0.30–4.45	–	–	–
WS120	–	–	0.00–0.25	–	0.25–4.45	–	–	–
WS121	–	–	0.00–0.25	–	0.25–3.40	3.40–4.45	–	–
WS122	0.10–0.30	0.00–0.10	–	0.30–0.60	0.60–4.45	–		–
WS123	0.00–0.15	0.15–0.30	–	–	0.30–4.45	–	–	–
WS124	–	0.00–0.35	–	0.35–2.0	2.00–4.45	–	–	–
WS125	0.00–0.05	0.05–1.20	–	–	1.20–4.45	–	–	–

8.2. MADE GROUND

Made Ground deposits were encountered within the majority of exploratory hole locations to depths of between 0.20 m and in excess of 3.45 m bgl (WS101) although, in general, Made Ground was encountered to a depth of less than 1.50 m bgl.

Made Ground deposits generally comprise a reworked topsoil of dark brown silty clayey fine to medium sand with sandstone, ceramic and brick. Beneath the reworked topsoil, Made Ground comprises dark brown gravelly fine to coarse sand and soft to firm gravelly clay with mudstone, brick and concrete.

A hydrocarbon odour was noted in WS106 between 0.80 m to 1.00 m bgl. A relict topsoil layer was identified between 0.40 m and 0.60 m bgl and organic matter was also noted in WS106 between 0.80 m to 1.50 m bgl.

A strong organic odour was noted in the reworked clay in WS118 between 0.60 m and 1.50 m bgl.

WS101 adjacent to the existing boiler house refused on a possible obstruction at 3.45 m bgl.

A Depth of Made Ground Plan is presented as Drawing 14-451-006 in Appendix III.

8.3. TOPSOIL

Natural topsoil was encountered in localised areas as dark brown slightly clayey fine to medium SAND with rootlets in the northern sector and as soft to firm dark brown to black CLAY in the south east sector. Topsoil depths ranged from between 0.23 m to 0.32 m bgl.

8.4. DRIFT DEPOSITS

Drift deposits were encountered in all exploratory locations, with the exception of WS101 where the full depth of Made Ground could not be proven. The drift deposits were encountered to depths in excess of 5.45 m bgl.

The drift deposits are fairly consistent, generally comprising firm medium strength to very stiff very high strength greyish brown gravelly CLAY with mudstone.

Localised lenses of granular drift deposits were encountered, generally comprising medium dense greyish brown clayey silty gravelly fine to medium SAND with mudstone. Loose GRAVEL was identified in WS103 between 1.00 m to 2.00 m bgl.

8.5. SOLID GEOLOGY

The solid bedrock geology was not encountered during the ground investigation. BGS boreholes in the vicinity of the site suggest that the drift deposits are present to depths in excess of 15.00 m bgl.

8.6. GROUNDWATER

Groundwater strikes were encountered as seepages. The depth of the seepages are shown on the exploratory hole records in Appendix V and are summarised in Table 8.2.

TABLE 8.2 SUMMARY GROUNDWATER STRIKES

LOCATION	DEPTH TO STRIKE (m)	NOTES
WS101	2.00	Seepage
WS105	1.00	
WS106	1.50	
WS110	1.50	
WS117	1.00	
WS118	1.00	
WS119	3.00	
WS121	3.00	
WS122	3.00	
WS124	3.50	

8.7. VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

Visual and olfactory evidence of potential contamination has been identified during the site investigation and these are summarised in Table 8.3.

TABLE 8.3 SUMMARY VISUAL AND OLFACTORY EVIDENCE OF CONTAMINATION

LOCATION	DEPTH (m)	STRATUM	NOTES
WS106	1.0-1.5	Made Ground	Hydrocarbon odour
WS118	0.6-1.5	Made Ground	Strong organic odour

8.8. SOIL CONSISTENCY

Undrained shear strength values were measured using laboratory undrained triaxial tests. Results of the tests are presented in Table 8.4, which indicate the clay soils to vary between soft and very stiff. Strength test data is generally consistent with the field descriptions of the aforementioned soils.

Results of the standard penetration tests, including undrained shear strengths derived from SPTs are included in Table 8.5.

TABLE 8.4 SUMMARY OF UNDRAINED SHEAR STRENGTH TEST RESULTS

LOCATION	SAMPLE DEPTH (m)	LAB DESCRIPTION	UNDRAINED SHEAR STRENGTH (kN/m^2)	CONSISTENCY
WS103	2.5–3.0	Stiff, brown, slightly gravelly, sandy CLAY.	83	Stiff
WS106	2.5–3.0	Firm brown slightly gravelly sandy CLAY.	59	Firm
WS108	0.5–1.0	Firm brown slightly gravelly sandy CLAY.	62	Firm
WS111	1.5–2.0	Very stiff brown slightly gravelly sandy CLAY.	158	Very Stiff
WS112	1.5–2.0	Very stiff brown slightly gravelly sandy CLAY.	183	Very Stiff
WS115	1.5–2.0	Firm brown slightly gravelly sandy CLAY.	61	Firm
WS117	1.5–2.0	Firm brown slightly gravelly sandy CLAY.	68	Firm
WS118	1.5–2.0	Soft brown gravelly sandy CLAY.	21	Soft
WS120	2.5–3.0	Firm brown slightly gravelly sandy CLAY.	73	Firm
WS121	0.5–1.0	Stiff brown slightly gravelly sandy CLAY.	96	Stiff
WS123	2.5–3.0	Very stiff brown slightly gravelly sandy CLAY.	180	Very Stiff

TABLE 8.5 STANDARD/CONE PENETRATION TEST RESULTS

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS101	2.0	MADE GROUND: Gravelly clay	18	16.44	N/A	High strength	Very Stiff	82.22	169.04
WS101	3.0	MADE GROUND: Gravelly clay	50	43.48	N/A	Very high strength	Very Stiff	217.41	447.00
WS102	1.0	Gravelly CLAY	8	8.07	N/A	Medium strength	Stiff	40.33	82.91
WS102	2.0	Gravelly CLAY	15	13.70	N/A	Medium strength	Stiff	68.52	140.87
WS102	3.0	Gravelly CLAY	26	22.61	N/A	High strength	Very Stiff	113.05	232.44
WS102	4.0	Gravelly CLAY	50	42.24	N/A	Very high strength	Very Stiff	211.21	434.25
WS103	1.0	Clayey GRAVEL	8	8.07	Loose	N/A	N/A	N/A	80.65
WS103	2.0	CLAY	6	5.48	N/A	Low strength	Firm	27.41	56.35
WS103	3.0	Gravelly CLAY	14	12.18	N/A	Medium strength	Stiff	60.88	125.16
WS103	4.0	CLAY	24	20.28	N/A	High strength	Very Stiff	101.38	208.44
WS103	5.0	CLAY	24	19.91	N/A	High strength	Very Stiff	99.55	204.68
WS104	1.0	Gravelly CLAY	6	6.05	N/A	Low strength	Firm	30.24	62.18
WS104	2.0	Gravelly CLAY	8	7.31	N/A	Low strength	Firm	36.54	75.13

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS104	3.0	CLAY	12	10.44	N/A	Medium strength	Stiff	52.18	107.28
WS104	4.0	CLAY	19	16.05	N/A	High strength	Very Stiff	80.26	165.02
WS104	5.0	CLAY	26	21.57	N/A	High strength	Very Stiff	107.85	221.74
WS105	1.0	Gravelly CLAY	5	5.04	N/A	Low strength	Firm	25.20	51.82
WS105	2.0	CLAY	9	8.22	N/A	Medium strength	Stiff	41.11	84.52
WS105	3.0	CLAY	16	13.91	N/A	Medium strength	Stiff	69.57	143.04
WS105	4.0	CLAY	20	16.90	N/A	High strength	Very Stiff	84.49	173.70
WS106	1.0	MADE GROUND: Gravelly clay	3	3.02	N/A	Very low strength	Soft	15.12	31.09
WS106	2.0	Sandy CLAY	7	6.39	N/A	Low strength	Firm	31.97	65.74
WS106	3.0	Sandy CLAY	11	9.57	N/A	Medium strength	Stiff	47.83	98.34
WS106	4.0	Sandy CLAY	18	15.21	N/A	High strength	Very Stiff	76.04	156.33
WS107	1.0	CLAY	8	8.07	N/A	Medium strength	Stiff	40.33	82.91
WS107	2.0	CLAY	11	10.05	N/A	Medium strength	Stiff	50.24	103.30
WS107	3.0	CLAY	24	20.87	N/A	High strength	Very Stiff	104.36	214.56

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS107	4.0	CLAY	27	22.81	N/A	High strength	Very Stiff	114.05	234.50
WS108	1.0	Gravelly CLAY	7	7.06	N/A	Low strength	Firm	35.29	72.55
WS108	2.0	Gravelly CLAY	14	12.79	N/A	Medium strength	Stiff	63.95	131.48
WS108	3.0	Gravelly CLAY	29	25.22	N/A	High strength	Very Stiff	126.10	259.26
WS108	4.0	Gravelly CLAY	34	28.72	N/A	High strength	Very Stiff	143.62	295.29
WS109	1.0	CLAY	11	11.09	N/A	Medium strength	Stiff	55.45	114.00
WS109	2.0	Gravelly CLAY	16	14.62	N/A	Medium strength	Stiff	73.08	150.26
WS109	3.0	Gravelly CLAY	22	19.13	N/A	High strength	Very Stiff	95.66	196.68
WS109	4.0	Gravelly CLAY	19	16.05	N/A	High strength	Very Stiff	80.26	165.02
WS110	1.0	Gravelly CLAY	13	13.11	N/A	Medium strength	Stiff	65.53	134.73
WS110	2.0	Gravelly CLAY	13	11.88	N/A	Medium strength	Stiff	59.38	122.09
WS110	3.0	Gravelly CLAY	22	19.13	N/A	High strength	Very Stiff	95.66	196.68
WS110	4.0	Gravelly CLAY	21	17.74	N/A	High strength	Very Stiff	88.71	182.39
WS111	1.0	CLAY	12	12.10	N/A	Medium strength	Stiff	60.49	124.37

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS111	2.0	CLAY	13	11.88	N/A	Medium strength	Stiff	59.38	122.09
WS111	3.0	CLAY	25	21.74	N/A	High strength	Very Stiff	108.71	223.50
WS111	4.0	CLAY	25	21.12	N/A	High strength	Very Stiff	105.61	217.13
WS112	1.0	CLAY	8	8.07	N/A	Medium strength	Stiff	40.33	82.91
WS112	2.0	CLAY	12	10.96	N/A	Medium strength	Stiff	54.81	112.69
WS112	3.0	CLAY	17	14.78	N/A	Medium strength	Stiff	73.92	151.98
WS112	4.0	CLAY	20	16.90	N/A	High strength	Very Stiff	84.49	173.70
WS113	1.0	Gravelly CLAY	9	9.07	N/A	Medium strength	Stiff	45.37	93.27
WS113	2.0	Gravelly CLAY	8	7.31	N/A	Low strength	Firm	36.54	75.13
WS113	3.0	Gravelly CLAY	23	20.00	N/A	High strength	Very Stiff	100.01	205.62
WS113	4.0	Gravelly CLAY	22	18.59	N/A	High strength	Very Stiff	92.93	191.07
WS114	1.0	CLAY	9	9.07	N/A	Medium strength	Stiff	45.37	93.27
WS114	2.0	Gravelly CLAY	18	16.44	N/A	High strength	Very Stiff	82.22	169.04
WS114	3.0	CLAY	23	20.00	N/A	High strength	Very Stiff	100.01	205.62
WS114	4.0	CLAY	25	21.12	N/A	High strength	Very Stiff	105.61	217.13

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS115	1.0	Clayey SAND	12	12.10	Medium Dense	N/A	N/A	N/A	120.98
WS115	2.0	Gravelly CLAY.	24	21.92	N/A	High strength	Very Stiff	109.62	225.39
WS115	3.0	Gravelly CLAY.	50	43.48	N/A	Very high strength	Very Stiff	217.41	447.00
WS116	1.0	Gravelly CLAY.	8	8.07	N/A	Medium strength	Stiff	40.33	82.91
WS116	2.0	Gravelly CLAY.	15	13.70	N/A	Medium strength	Stiff	68.52	140.87
WS116	3.0	CLAY.	19	16.52	N/A	High strength	Very Stiff	82.62	169.86
WS116	4.0	CLAY.	26	21.97	N/A	High strength	Very Stiff	109.83	225.81
WS117	1.0	Gravelly CLAY.	9	9.07	N/A	Medium strength	Stiff	45.37	93.27
WS117	2.0	Gravelly CLAY.	26	23.75	N/A	High strength	Very Stiff	118.76	244.17
WS117	3.0	Gravelly CLAY.	50	43.48	N/A	Very high strength	Very Stiff	217.41	447.00
WS118	1.0	Gravelly CLAY	4	4.03	N/A	Low strength	Firm	20.16	41.46
WS118	2.0	Gravelly CLAY	10	9.14	N/A	Medium strength	Stiff	45.68	93.91
WS118	3.0	Gravelly CLAY	16	13.91	N/A	Medium strength	Stiff	69.57	143.04

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS118	4.0	Gravelly CLAY	22	18.59	N/A	High strength	Very Stiff	92.93	191.07
WS119	1.0	Gravelly CLAY	8	8.07	N/A	Medium strength	Stiff	40.33	82.91
WS119	2.0	Gravelly CLAY	10	9.14	N/A	Medium strength	Stiff	45.68	93.91
WS119	3.0	Gravelly CLAY	14	12.18	N/A	Medium strength	Stiff	60.88	125.16
WS119	4.0	Gravelly CLAY	20	16.90	N/A	High strength	Very Stiff	84.49	173.70
WS120	1.0	Gravelly CLAY	9	9.07	N/A	Medium strength	Stiff	45.37	93.27
WS120	2.0	Gravelly CLAY	14	12.79	N/A	Medium strength	Stiff	63.95	131.48
WS120	3.0	Gravelly CLAY	18	15.65	N/A	High strength	Very Stiff	78.27	160.92
WS120	4.0	Gravelly CLAY	18	15.21	N/A	High strength	Very Stiff	76.04	156.33
WS121	1.0	Gravelly CLAY	10	10.08	N/A	Medium strength	Stiff	50.41	103.64
WS121	2.0	Gravelly CLAY	15	13.70	N/A	Medium strength	Stiff	68.52	140.87
WS121	3.0	Gravelly CLAY	18	15.65	N/A	High strength	Very Stiff	78.27	160.92
WS121	4.0	SAND	13	10.98	Medium Dense	N/A	N/A	N/A	109.83

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS122	1.0	Gravelly CLAY	11	11.09	N/A	Medium strength	Stiff	55.45	114.00
WS122	2.0	Gravelly CLAY	12	10.96	N/A	Medium strength	Stiff	54.81	112.69
WS122	3.0	Gravelly CLAY	12	10.44	N/A	Medium strength	Stiff	52.18	107.28
WS122	4.0	Gravelly CLAY	19	16.05	N/A	High strength	Very Stiff	80.26	165.02
WS123	1.0	Gravelly CLAY	8	8.07	N/A	Medium strength	Stiff	40.33	82.91
WS123	2.0	Gravelly CLAY	12	10.96	N/A	Medium strength	Stiff	54.81	112.69
WS123	3.0	Gravelly CLAY	21	18.26	N/A	High strength	Very Stiff	91.31	187.74
WS123	4.0	Gravelly CLAY	18	15.21	N/A	High strength	Very Stiff	76.04	156.33
WS124	1.0	Gravelly CLAY	7	7.06	N/A	Low strength	Firm	35.29	72.55
WS124	2.0	Gravelly CLAY	11	10.05	N/A	Medium strength	Stiff	50.24	103.30
WS124	3.0	Gravelly CLAY	14	12.18	N/A	Medium strength	Stiff	60.88	125.16
WS124	4.0	Gravelly CLAY	22	18.59	N/A	High strength	Very Stiff	92.93	191.07
WS125	1.0	Gravelly CLAY	9	9.07	N/A	Medium strength	Stiff	45.37	93.27

BOREHOLES	DEPTH (m bgl)	MATERIAL FIELD DESCRIPTION	CPT/SPT "N" VALUE	CORRECTED "N" VALUE $(N_1)_{60}$	TERZAGHI & PECK RELATIVE DENSITY (SANDS)	EUROCODE SOIL STRENGTH	CONSISTENCY (BS 5930)	TERZAGHI & PECK APPROXIMATE UNDRAINED SHEAR STRENGTH (kN/m^2)	ALLOWABLE BEARING PRESSURE (kN/m^2)*
WS125	2.0	Gravelly CLAY	11	10.05	N/A	Medium strength	Stiff	50.24	103.30
WS125	3.0	Gravelly CLAY	23	20.00	N/A	High strength	Very Stiff	100.01	205.62
WS125	4.0	Gravelly CLAY	26	21.97	N/A	High strength	Very Stiff	109.83	225.81

NOTES
* The Allowable Bearing Pressure (ABP) should be considered indicative.
The interpretation of in situ mass undrained shear strength (cu) data from SPT Blow Count (N) results and the influence of the Plasticity Index (PI) was reported in Standard Penetration Test in Insensitive Clays and Soft Rocks. Stroud (1974). The standard penetration test and the engineering properties of glacial materials subsequently. Stroud and Butler (1975) and (1989).
Allowable bearing pressure on sands. Soil Mechanics in Engineering Practice Terzaghi, K. & Peck, R.B. 1996.

8.9. CONSOLIDATION

Nine undisturbed samples of Glacial Till were submitted for oedometer analysis. The results are provided in Table 8.6.

TABLE 8.6 OEDOMETER CONSOLIDATION RESULTS

LOCATION	DEPTH (m)	SAMPLE TYPE	MOISTURE CONTENT (%)	OEDOMETER CONSOLIDATION		
				PRESSURE RANGE (kPa)	Mv (m^2/MN)	Cv (m^2/year)
WS101	1.5-2.0	U100	37	0–35	1.472	1.194
				35–70	0.590	1.821
				70–140	0.393	2.507
				140–280	0.242	2.440
				280–35	0.103	4.713
WS106	2.5-3.0	U100	21	0–55	0.464	0.526
				55–110	0.285	0.508
				110–220	0.182	0.523
				220–440	0.107	0.736
				440–55	0.038	0.905
WS108	0.5-1.0	U100	20	0–15	0.394	18.798
				15–30	0.603	7.653
				30–60	0.387	8.379
				60–120	0.204	4.843
				120–15	0.084	9.026
WS111	1.5-2.0	U100	20	0–35	0.148	38.208
				35–70	0.200	13.904
				70–140	0.170	12.334
				140–280	0.115	7.270
				280–35	0.059	43.134
WS112	1.5-2.0	U100	20	0–35	0.264	39.497
				35–70	0.246	18.115
				70–140	0.175	8.549
				140–280	0.108	3.218
				280–35	0.056	3.886
WS115	1.5-2.0	U100	26	0–35	0.154	9.925
				35–70	0.209	3.291
				70–140	0.173	2.778
				140–280	0.120	2.688
				280–35	0.049	2.955

LOCATION	DEPTH (m)	SAMPLE TYPE	MOISTURE CONTENT (%)	OEDOMETER CONSOLIDATION		
				PRESSURE RANGE (kPa)	Mv (m2/MN)	Cv (m2/year)
WS117	1.5-2.0	U100	21	0–35	0.300	5.562
				35–70	0.359	6.906
				70–140	0.216	4.532
				140–280	0.135	4.145
				280–35	0.066	7.053
WS120	2.5-3.0	U100	20	0–55	0.116	22.116
				55–110	0.167	4.688
				110–220	0.128	4.192
				220–440	0.095	3.958
				440–55	0.036	3.078
WS123	2.5-3.0	U100	26	0–55	0.286	26.755
				55–110	0.238	18.592
				110–220	0.109	2.325
				220–440	0.067	1.801
				440–55	0.030	2.376

When considered at over-burden pressure with an additional load of 110 kPa the coefficient of volume compressibility (Mv) ranged from 0.084 m^2/MN up to 0.393 m^2/MN. The material is considered to be low to high compressibility.

8.10. PARTICLE SIZE DISTRIBUTION

Particle Size Distribution Tests have been undertaken on selected samples of granular material via wet sieve to obtain information on the soil fractions. The results are included in Table 8.7. The full results can be found in Appendix VIII.

TABLE 8.7 SUMMARY OF PARTICLE SIZE DISTRIBUTION TEST RESULTS

LOCATION	DEPTH (m)	SOIL FRACTION (%)			
		COBBLES	GRAVEL	SAND	SILT/CLAY
WS102	0.5-1.0 (Natural)	0	3	28	69
WS108	0.5-1.0 (Natural)	0	3	15	82
WS114	0.5-1.0 (Natural)	0	4	15	81
WS117	0.5-2.0 (Made Ground/Natural)	0	3	16	81
WS125	1.5-2.0 (Natural)	0	5	15	80

8.11. SOIL DENSITY/MOISTURE CONTENT RELATIONSHIP

Dry density / moisture content relationship analysis has been conducted on soils using via utilising proctor compaction tests utilising both a 2.5kg rammer. The results of the tests have been summarised in Table 8.8. The full test results can be found in Appendix VIII.

TABLE 8.8 SUMMARY DRY DENSITY AND MOISTURE CONTENT

LOCATION	LABORATORY DESCRIPTION	TOP DEPTH (m)	METHOD OF COMPACTION	INITIAL MOISTURE CONTENT (%)	OPTIMUM MOISTURE CONTENT (%)	MATERIAL RETAINED ON 37.5 mm SIEVE (%)	MAX DRY DENSITY (mg/m³)	MATERIAL RETAINED ON 20.0 mm TEST SIEVE (%)
WS102	Made Ground: brown slightly gravelly very sandy clay.	0.5	2.5kg	26	10	0	1.63	0
WS108	Firm brown slightly gravelly sandy CLAY.	0.5	2.5kg	21	18	0	1.74	0
WS114	Brown slightly gravelly sandy CLAY.	0.5	2.5kg	23	20	0	1.69	0
WS117	Firm brown slightly gravelly sandy CLAY.	1.5	2.5kg	20	17	0	1.80	0
WS125	Brown slightly gravelly sandy CLAY.	1.5	2.5kg	20	17	0	1.76	0

The proctor compaction tests have indicated that the materials on site are variable with the material being wet of the optimum. It should be noted that if this material is excavated for use in a cut/fill operation careful consideration should be taken in the stabilisation of this material.

Engineering of this type of material will need to be completed during dry weather periods only.

8.12. SOIL PLASTICITY

The Atterberg limits determinations, summarised in Table 8.9, show the clay to be of low to moderate plasticity.

TABLE 8.9 SUMMARY OF PLASTICITY INDEX TEST RESULTS

LOCATION	DEPTH (m)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PASSING 425 µm SIEVE (%)	MODIFIED PLASTICITY INDEX	NHBC VOLUME CHANGE POTENTIAL
WS101	1.00-1.45	33	25	50	25	93	23.25	Medium
WS101	2.00-2.45	23	21	42	21	94	19.74	Low
WS102	2.00-2.45	21	20	40	20	92	18.40	Low
WS103	1.00-1.45	38	21	45	24	97	23.28	Medium
WS103	2.00-2.45	24	22	47	25	94	23.50	Medium
WS105	2.00-2.45	22	19	37	18	94	16.92	Low
WS106	1.00-1.45	28	26	55	29	93	26.97	Medium
WS107	1.00-1.45	20	21	41	20	98	19.60	Low
WS108	2.00-2.45	18	20	40	20	91	18.20	Low
WS109	1.00-1.45	28	21	40	19	97	18.43	Low
WS110	1.00-1.45	20	20	42	22	97	21.34	Medium
WS111	1.00-1.45	23	21	43	22	92	20.24	Medium
WS112	2.00-2.45	18	19	38	19	90	17.10	Low
WS114	1.00-1.45	18	19	39	20	94	18.80	Low
WS115	2.00-2.45	21	23	48	25	95	23.75	Medium
WS116	1.00-1.45	17	19	40	21	94	19.74	Low
WS117	1.00-1.45	17	18	37	19	92	17.48	Low
WS118	1.00-1.45	48	31	66	35	83	29.05	Medium
WS118	2.00-2.45	22	18	37	19	98	18.62	Low
WS119	1.00-1.45	19	20	41	21	96	20.16	Medium

LOCATION	DEPTH (m)	NATURAL MOISTURE CONTENT (%)	PLASTIC LIMIT (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)	PASSING 425 µm SIEVE (%)	MODIFIED PLASTICITY INDEX	NHBC VOLUME CHANGE POTENTIAL
WS120	2.00-2.45	18	19	39	20	92	18.40	Low
WS121	1.00-1.45	18	21	43	22	91	20.02	Medium
WS121	2.00-2.45	19	20	40	20	94	18.80	Low
WS123	1.00-1.45	17	18	38	20	95	19.00	Low
WS124	2.00-2.45	19	20	41	21	97	20.37	Medium

The results of the Atterberg limits testing confirmed that the soils would be deemed to be "Low to Medium Volume Change Potential" in accordance with the classification system utilised by the LABC/NHBC industry guidance.

8.13. pH AND SULPHATE

Chemical analyses for pH and soluble sulphate content contained in Appendix VI (summarised in Table 8.10), shows that the soils at the site generally meet Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with BRE *Special Digest 1* (2005).

TABLE 8.10 SUMMARY OF pH AND SULPHATE DATA

LOCATION	DEPTH (m)	SO_4 IN 2:1 WATER/SOIL (g/l)	pH VALUE	CLASSIFICATION
WS101	2.3	0.036	7.7	DS-1, AC-1s
WS103	1.1	0.03	7.8	
WS106	1.2	0.054	6.8	
WS109	0.8	0.044	7.9	
WS111	0.2	0.025	7.7	
WS116	0.7	0.013	8.1	
WS120	0.2	0.014	6.7	
WS121	0.1	0.019	6.4	

9. TIER I QUALITATIVE CONTAMINATED LAND RISK ASSESSMENT

E3P has undertaken a Tier 1 qualitative risk assessment to determine if any potential contaminants within the underlying soils and groundwater pose an unacceptable level of risk to the identified receptors.

9.1. DEVIATING SAMPLES

Deviating samples were to be avoided during the ground investigation by using best practice sampling procedures including use of appropriate sampling containers and adhering to the laboratory holding times for each contaminant analysis undertaken. The following is noted regarding sample deviations:

Deviations are recorded for the four groundwater samples. The deviations relate to the exceeding the maximum holding time for pH analysis. The identified deviations are not considered to have impacted the overall risk assessment. All other results are not identified as deviating.

9.2. HUMAN HEALTH RISK ASSESSMENT

At Tier 1 stage, the long term (chronic) human health toxicity of the soil has been assessed by comparing the on-site concentrations of organic and inorganic compounds with reference values published in LQM/CIEH S4UL (S4UL3267) for a residential end use with plant uptake. These values have been used due to the potential for cultivation in any proposed areas of landscaping.

The results of this comparison have been summarised within Table 9.1.

TABLE 9.1 SUMMARY OF INORGANIC AND HYDROCARBON TOXICITY ASSESSMENT FOR A RESIDENTIAL END USE

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
Arsenic	mg/kg	37	20	24	N/A	1	No Further Action
Cadmium	mg/kg	17	20	0.8		1	
Chromium (VI)	mg/kg	6.1	20	<4.0		1	
Lead	mg/kg	200	20	110		1	
Mercury	mg/kg	1.2	20	0.4		3	
Nickel	mg/kg	180	20	54		1	
Selenium	mg/kg	250	20	<1.0		1	
Copper	mg/kg	2400	20	89		1	
Zinc	mg/kg	3700	20	190		1	
Cyanide – Total	mg/kg	791	20	<1.0		1	
Phenols – Total	mg/kg	210	9	<1.0		1	
Asbestos	Fibres	NFD	11	NAD		3	
Naphthalene	mg/kg	2.3	18	0.98		4	
Acenaphthylene	mg/kg	170	18	3.8		2	
Acenaphthene	mg/kg	210	18	0.36		1	
Fluorene	mg/kg	170	18	0.71		1	
Phenanthrene	mg/kg	95	18	5.3		2	
Anthracene	mg/kg	2400	18	3.1		2	
Fluoranthene	mg/kg	280	18	60		2	
Pyrene	mg/kg	620	18	77		2	
Benzo(a)Anthracene	mg/kg	7.2	18	45	WS111 0.2 m	2	**Further Action**
Chrysene	mg/kg	15	18	36	WS111 0.2 m	2	**Further Action**
Benzo(b)Fluoranthene	mg/kg	2.6	18	71 5.7 3.1	WS111 0.2 m WS123 0.2 m WS118 0.8 m	2	**Further Action**
Benzo(k)Fluoranthene	mg/kg	77	18	26	N/A	2	No Further Action
Benzo(a)Pyrene	mg/kg	2.2	18	70 5.5 2.8	WS111 0.2 m WS123 0.2 m WS118 0.8 m	2	**Further Action**
Indeno(123-cd)Pyrene	mg/kg	27	18	26	N/A	2	No Further Action
Dibenzo(a,h)Anthracene	mg/kg	0.24	18	7.0 0.61 0.37	WS111 0.2 m WS123 0.2 m WS118 0.8 m	2	**Further Action**
Benzo(ghi)Perylene	mg/kg	320	18	30	N/A	2	No Further Action
TPH C5-C6 (aliphatic)*	mg/kg	42	20	<1.0		4	
TPH C6-C8 (aliphatic)*	mg/kg	100	20	<0.1		4	
TPH C8-C10 (aliphatic)*	mg/kg	27	20	<0.1		4	

DETERMINANT	UNIT	GAC	N	MC	LOC. OF EX	PATH-WAY	ASSESSMENT
TPH C10-C12 (aromatic)*	mg/kg	74	20	70		4	
TPH C12-C16 (aromatic)*	mg/kg	140	20	2700	WS106 0.8 m	4	**Further Action**
TPH C16-C21 (aromatic)*	mg/kg	260	20	9400	WS106 0.8 m	1	**Further Action**
TPH C21-C35 (aromatic)*	mg/kg	1100	20	3400	WS106 0.8 m	1	**Further Action**

Notes
PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical / Lateral Migration; PL6 = Corrosion of concrete; PL7=Tainting of water supply; PL8 = Uptake by plants

Abbreviations: GAC = general assessment criteria, n = number of samples, MC = maximum concentration; Loc of Ex = location of exceedance; NFD = no fibres detected.

* The Tier 1 GAC for the hydrocarbon fraction is derived from the CIEH assessment for petroleum hydrocarbons Criteria Working Group (CWG) for both aliphatic and aromatic compounds. E3P has utilised the Tier 1 values for aliphatic compounds for the volatile and semi volatile fractions (C5-C12) and the Tier 1 values for aromatic compound for the non-volatile fractions (C12-C35). The comparison of a total (aliphatic/aromatic) compounds to an individual fraction is considered to be a conservative approach and satisfactory for the protection of human health.

Referring to Table 9.1, the results of this direct comparison indicates that the data exceeds the screening criteria for a residential end use for the following contaminants:

- Benzo(a)Anthracene;
- Chrysene;
- Benzo(b)Fluoranthene;
- Benzo(a)Pyrene;
- Dibenzo(a,h)Anthracene;
- Hydrocarbon Fractions C12-C35 (aromatic).

Asbestos has not been detected in any of the soil samples submitted for analysis.

No significant concentrations of SVOCs or VOCs were identified in the soils submitted for chemical analysis.

In relation to these exceedances, the following can be determined:

- The main exposure pathways based on the Tier I exceedances are:
  - Soil ingestion;
  - Vapour inhalation (indoor);
  - Dermal contact and ingestion; and
  - Consumption of homegrown vegetables;
- The exceedances for all determinands are associated with Made Ground deposits between 0.20 – 1.20 m bgl.

HUMAN HEALTH RISK ASSESSMENT AND MITIGATION

The risk to chronic human health associated with the elevated concentrations of non-volatile PAH and TPH compounds can be mitigated through the installation of a suitable cover system where Made Ground remains in all areas of landscaping to remove any potential for direct exposure to impacted soils.

The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy.

With regards to the elevated TPH C12-C16, these compounds present a potential volatilisation to indoor air risk. These elevated concentrations have only been identified within one location and are therefore considered to be a localised hotspot. Therefore, during a process of cut/fill enabling works, a hotspot removal should be undertaken where these soils may be chemically validated to assess chemical suitability for retention on site in an area of no future sensitivity.

Chemical analysis of the natural drift deposits has identified these soils to be acceptable for use as subsoil within the proposed areas of landscaping; however, further chemical validation samples will be required to confirm this.

Areas of natural topsoil are present in the north of the site. Six samples have been tested to date which suggest that the topsoil is suitable for re-use. Further chemical validation samples will be required during build phase to confirm this.

9.3. CONTROLLED WATERS RISK ASSESSMENT

E3P has undertaken a controlled waters risk assessment for the site based on the consideration of the conceptual site model and the sensitive receptors which are summarised in Table 9.2.

TABLE 9.2 CONTROLLED WATERS CONCEPTUAL MODEL AND SENSITIVITY PROFILE

DISCUSSION		SENSITIVITY RATING
Contaminant Source		
Made Ground Heavy metal and PAH contamination may be present as a result of the potential Made Ground infill material from historical features such as infilled ponds and field boundaries. Variable Made Ground is present and Made Ground with high-level (predominantly low-solubility) hydrocarbon impact is present at WS106. Cohesive drift deposits are present underlying the Made Ground to depths in excess of 5.45 m bgl.		**Moderate**
Pathway		
Vertical Migration Clay drift deposits are present across the site which will offer protection to the underlying superficial and bedrock aquifers. There are no potable groundwater abstractions within 1.0 km. **Lateral migration** Clay drift deposits are present across the site which will inhibit lateral migration to the on-site ponds and drainage network.		**Low** **Low**
Receptor		
Aquifer Classification in Superficial Drift Deposits	Secondary Undifferentiated aquifer Secondary A aquifer – there are no potable groundwater abstractions within 1.0 km.	**Low**
Aquifer Classification in Bedrock	Secondary B aquifer	**Low**
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not affected.	**Low**
Distance to the Closest Groundwater Abstraction Point	None identified within a 1 km radius.	**Low**
Is the Site Located Within 50 m of a Surface Watercourse?	Two ponds and a drainage network are present on site.	**Moderate**
The ICSM developed within the context of the site setting has viable pollutant pathway, which would be the lateral migration of potentially mobile phase-soluble contaminants towards the on-site ponds and drainage network. The sensitivity is reduced, given the presence of low permeability clay soils which will inhibit migration of any potentially mobile contaminants.		

To ensure a robust appraisal of the identified risk to controlled waters, E3P has identified the sources of potential contamination that represent a risk to controlled waters from the initial CSM, we have then assessed the availability of ground investigation data in the form of analysis of the solid phase (soil) and dissolved phase within the perched groundwater or aquifer. The results of this assessment are presented in Table 9.3.

TABLE 9.3 QUALITATIVE RISK TO CONTROLLED WATERS FROM SOIL ANALYTICAL RESULTS

CONTAMINANT	ASSESSMENT RATING	DISCUSSION
BTEX > 1 mg/kg	The soil data analysis has not identified any detectable concentrations of VOCs above 1mg/kg or TPH C5 to C6 that might otherwise be indicative of VOC impact.	None
Total VOC > 1 mg/kg		
Total SVOC > 1 mg/kg	SVOC analysis recorded concentrations below the laboratory LOD.	None
C5-C10 > 5 mg/kg	All concentrations are below the laboratory LOD.	None
C10-C12 > 10 mg/kg	Concentrations of C10-C12 have been recorded above 10 mg/kg and the maximum concentration was recorded in WS106 at 0.80 m bgl with a concentration 70 mg/kg.	Further discussion
C12-C16 > 50 mg/kg	Concentrations of C12-C16 have been recorded throughout the site and the maximum concentration was recorded within WS106 at 0.80 m bgl with a concentration 2700 mg/kg. This will be excavated as a localised hotspot.	Further discussion
Phenols > 2 mg/kg	All concentrations are below the laboratory LOD.	None
Naphthalene > 2 mg/kg	Concentrations of naphthalene are below 2 mg/kg.	None
Total PAH > 10 mg/kg	Total concentrations of low-solubility PAH compounds greater than 10 mg/kg have been detected in WS111 at 0.20 m bgl.	Further discussion
PCB > 1 mg/kg	No potential sources of PCB have been identified	None
Heavy metals > 500 mg/kg	Concentrations of heavy metals are all below 500 mg/kg.	None

The Tier I assessment has included a comparison of leachate analysis from samples of the Made Ground and groundwater samples to environmental quality standards (EQS).

These are presented in Table 9.4.

TABLE 9.4 COMPARISON OF GROUNDWATER AND LEACHATE ANALYSIS WITH TIER 1 SCREENING LEVELS

DETERMINAND	UNIT	EQS [1, 2, 3] AA	DWS [3,4,5]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
Arsenic	µg/l	50	10	4	1.3	N/A	5	12	N/A	No Further Action
Cadmium	µg/l	0.08-0.25	5	4	0.05	N/A	5	0.1	WS106	**Further Action**
Chromium (VI)	µg/l	3.4	–	4	-	N/A	5	<5.0	N/A	No Further Action
Chromium (III)	µg/l	4.7	50	4	6.7 5.9 4.8	WS119 WS109 WS112	5	1.6	N/A	**Further Action**
Copper	µg/l	1	2000	4	7.4 6.6 4.6 4.1	WS119 WS123 WS109 WS112	5	25 18 12 7.4 4.0	WS125 WS115 WS106 WS103 WS120	**Further Action**
Total Cyanide	µg/l	1	50	4	<1.0	N/A	5	<1.0	N/A	No Further Action
Lead	µg/l	1.2	10	4	0.2	N/A	5	8.1 4.8 4.6 3.2 3.1	WS106 WS120 WS115 WS103 WS125	**Further Action**
Mercury	µg/l	–	1.0	4	0.05	N/A	5	<0.5	N/A	No Further Action
Nickel	µg/l	4	20	4	8.8 5.6	WS109 WS123	5	3.5	N/A	**Further Action**
Selenium	µg/l	–	10	4	32	WS119	5	<4.0	N/A	**Further Action**
Zinc	µg/l	10.9	–	4	9.2	N/A	5	27 18 17	WS106 WS103 WS115	**Further Action**

DETERMINAND	UNIT	EQS [1, 2, 3] AA	DWS [3,4,5]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
pH	6–9			4	7.0-7.5	N/A	5	7.5-8.0	N/A	No Further Action
Naphthalene	µg/l	2	10*	4	<0.01		5	<0.01		
Anthracene	µg/l	0.1	10*	4	<0.01		5	<0.01		
Benzo[b]fluoranthene	µg/l	0.00017*	10*	4	<0.01		5	<0.01		
Benzo[k]fluoranthene	µg/l	0.00017*	10*	4	<0.01		5	<0.01		
Benzo(a)pyrene	µg/l	0.00017*	10*	4	<0.01		5	<0.01		
Indeno(123-cd)pyrene	µg/l	0.00017*	10*	4	<0.01		5	<0.01		
Fluoranthene	µg/l	0.0063	10*	4	<0.01		5	<0.01		
Benzo(ghi)perylene	µg/l	1.7–4	10*	4	<0.01		5	<0.01		
TPH C5-C6 (benzene)	µg/l	10	1	4	<1.0		5	<1.0		
TPH C6-C8 (toluene)	µg/l	74	700	4	<1.0	N/A	5	<1.0	N/A	No Further Action
TPH C8-C10 (ethyl benzene)	µg/l	20	300	4	<1.0		5	<1.0		
TPH C10-C12 (xylene)	µg/l	30	500	4	<10		5	<10		
TPH C10-C12 (xylene)	µg/l	30	500	4	<10		5	<10		
TPH C12-C16	µg/l	2	90[5]	4	<10		5	<10		
TPH C16-C35	µg/l	50#	90[5]	4	<10		5	<10		
TPH C5-C6	µg/l	–	15000	4	<1.0		5	<10		
TPH C6-C8	µg/l	–	15000	4	<1.0		5	<10		
TPH C8-C10	µg/l	–	300	4	<1.0		5	<10		
TPH C10-C12	µg/l	–	300	4	<10		5	<10		

DETERMINAND	UNIT	EQS [1, 2, 3] AA	DWS [3,4,5]	NO. OF GW SAMPLES	MAX CONC. IN GROUNDWATER	LOCATION OF EXCEEDANCE	NO. OF LEACHATE SAMPLES	MAX CONC. IN LEACHATE	LOCATION OF EXCEEDANCE	ASSESSMENT
TPH C12-C16	µg/l	–	300	4	<10	N/A	5	<10	N/A	No Further Action
TPH C16-C21	µg/l	–	300**	4	<10		5	<10	N/A	
TPH C21-C35	µg/l	–	300**	4	<10		5	<10	N/A	
Tetrachloroethylene	µg/l	0.4	10	4	<1.0		0	-	-	
Trichloroethylene	µg/l	10	10	4	<1.0		0	-	-	
Trichlorobenzene	µg/l	0.4	–	4	<1.0		0	-	-	
Trichloromethane	µg/l	2.5	–	4	<1.0		0	-	-	
Dichloromethane	µg/l	20	200	4	<1.0		0	-	-	
Carbon Tetrachloride	µg/l	12	3	4	<1.0		0	-	-	
Vinyl Chloride	µg/l	–	0.3	4	<1.0		0	-	-	

Notes

Solubility <0.01µg/l
AA – Annual Average
MAC- Maximum Admissible Concentration
* Polyaromatic hydrocarbons (PAH) - Benzo(a)pyrene (BaP), Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)-perylene and Indeno(1,2,3-cd)-pyrene. Benzo(a)pyrene can be considered as a marker for the other PAHs, hence only benzo(a)pyrene needs to be monitored for comparison with the biota EQS or the corresponding AA-EQS in water
** There are no WHO Guideline Values for aliphatic fractions C16-C21 and C21-C35, therefore the guideline value for aliphatic fractions inclusive of C8-C16 (300µg/l) has been applied.
1. The Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations (2015)
2. Directive establishing a framework for Community action in the field of water policy (Water Framework Directive)
3. Council Directive on pollution caused by certain dangerous substances discharged into the aquatic environment of the Community (Dangerous Substances Directive) - List II substances
4. Council Directive on the quality of water intended for human consumption (Drinking Water Directive)
5. WHO Guidelines for Drinking Water Quality. Third edition (2004)

9.3.1. CONTROLLED WATER RISK ASSESSMENT AND MITIGATION

This comparison indicates that the data exceeds the EQS values for the following inorganic compounds:

- Cadmium;
- Chromium (III);
- Copper;
- Lead;
- Nickel;
- Selenium;
- Zinc

Where leachate analysis has been undertaken, this can overstate the risk and is not wholly representative of the site characterisation.

9.3.2. M-BAT ASSESSMENT

Due to exceedances in both soils and leachate samples for copper, nickel and zinc, an m-BAT assessment has been completed to assess the bioavailability of the metals with respect to surface water receptors (on-site ponds and drainage network). The chemical values from the groundwater analysis have been input into the assessment.

Where the Risk Characterisation Ratio (RCR) is greater than 1, this indicates the bioavailable concentration is above the EQS and the receptor is therefore at risk.

The m-BAT assessment has confirmed that the concentrations for copper, zinc and nickel have an RCR of less than 1, therefore they are not considered bioavailable.

In light of the above assessment, E3P do not consider the site to pose an unacceptable level of risk to surface waters for copper, zinc and nickel. It should also be noted the site is currently uncapped and the proposed development will largely encapsulate the site, thus limiting the potential for infiltration and therefore leaching potential.

However, further analysis of the surface water should be undertaken as groundworks progress, to ensure no future mobilisation of contaminants is caused.

9.3.3. FINAL PB SCREENING TOOL

Lead is not included in the M-BAT tool as it is not a full bioavailable EQS, however, a separate assessment using the Pb screening tool has been completed for lead. The assessment confirms that there are no exceedances of the RCR.

In light of the above assessment, E3P do not consider the site to pose an unacceptable level of risk to surface waters for lead.

9.3.4. DISCUSSION OF CONTROLLED WATERS RISK ASSESSMENT

Historical mapping suggests that the site was predominantly agricultural land with a number of small ponds until the 1970's when site a number of tracks and structures (MOD storage sheds) are present. A Sewage Pumping Station is recorded in the centre of the site, pre 2020 to the present day.

The exceedances of heavy metals are likely to be associated with the Made Ground identified in the southern and eastern sectors.

The site is underlain by cohesive drift deposits to depths in excess of 5.45 m which will inhibit lateral migration to on-site surface waters features and vertical migration to the underlying Secondary A and B aquifers. Therefore, impacted perched groundwater is not likely to migrate towards the controlled water receptors. In addition, the sensitivity of the aquifers is reduced, given the absence of any potable groundwater abstractions within 1.0 km.

Where leachate analysis has been undertaken, this can overstate the risk and is not wholly representative of the site characterisation.

The m-BAT and Pb screening tools have confirmed, the on-site surface water features are not at risk from the heavy metal contaminants identified within Table 8.4. Therefore, although heavy metals exceed EQS thresholds, they do not pose a risk to controlled waters as they are not bioavailable.

It should also be noted the site is currently uncapped and the proposed development will largely encapsulate the site, thus limiting the potential for infiltration and therefore leaching potential.

Given the general low soluble nature of the identified contaminants of concern, in addition to the presence of low permeability clay soils, it is considered there is unlikely to be any degree of unacceptable risk to the controlled water receptors and the wider environ.

9.4. GROUND GAS

The potential impact on the development from ground gases has been assessed with reference to standards and guidelines published in CIRIA Report 665 – *Assessing risks posed by hazardous ground gases to buildings* (2007). However, it is recommended that the full ground gas assessment and recommended protection measures are agreed with the local authority prior to their adoption on site. Furthermore, all protection measures adopted should be validated by a suitably qualified engineer.

9.1. INVESTIGATION RATIONALE

The ICSM has identified that the underlying Made Ground and infilled ponds may represent a potential source of ground gas generation. Based on the identification of these sources, E3P has determined that the site represents a low ground gas source generation potential.

Within the context of the proposed residential (prison) end use and ground gas generation potential, the gas assessment requires that six visits are required over three months, with at least two sets of readings at low or falling atmospheric pressure as set out within CIRIA 665 Tables 5.5a and 5.5b.

The spacing requirements for monitoring wells are detailed within CIRIA 665 Table 4.2, which indicates that for low gas hazard sites (Made Ground with limited degradable material, organic clay of limited thickness) and a high sensitivity development, nominal well spacing should be between 25 m and 50 m.

TABLE 9.5 GROUND GAS MONITORING LOCATION RATIONALE

LOCATION	GROUND GAS SOURCE	DEPTH OF MONITORING WELL (m)
WS102	Natural Drift Deposits	0.5–4.0
WS108	Natural Drift Deposits	0.5–4.0
WS109	Natural Drift Deposits	0.5–4.0
WS112	Natural Drift Deposits	0.5–4.0
WS119	Natural Drift Deposits	0.5–4.0
WS123	Natural Drift Deposits	1.0–4.0

9.2. MONITORING METHODOLOGY

Concentrations of methane (CH_4), carbon dioxide (CO_2) and oxygen (O_2) were measured using a calibrated infra-red gas analyser (GFM435) with gas flow rates were measured using an integrated flow meter.

Gas measurements were recorded for a minimum of 60 seconds at each location, at which point the maximum concentration of CH_4 and CO_2, together with the lowest concentration of O_2 were recorded. The results of the ground gas monitoring are presented in Table 8.9.

CIRIA C665 and NHBC Report No 10627-R01 provide assessments for carbon dioxide and methane based upon gas screening values (GSVs) utilising flow rates and concentrations. The site-based GSVs for steady state methane and carbon dioxide are based upon the following equation:

$$GSV = \frac{concentration\ (by\ vol)}{100} \times flowrate\ (1\ /\ hr)$$

The GSVs within CIRA C665 are based upon all buildings other than standard residential houses. The thresholds for GSVs based upon CIRIA guidance are provided within Table 9.5.

TABLE 9.6 RESIDENTIAL THRESHOLDS FOR GAS SCREENING VALUES (GSV) IN ACCORDANCE WITH CIRIA C665 – COMMERCIAL END USE

CIRIA – NO SUBFLOOR VOID	
CLASSIFICATION	**GSV (METHANE AND CARBON DIOXIDE)**
CS1	< 0.07
CS2	< 0.70
CS3	< 3.5
CS4	< 15
CS5	< 70
CS6	> 70

9.2.1. SUMMARY OF MONITORING RESULTS

Table 9.7 presents of the ground gas and groundwater monitoring results to date.

TABLE 9.7 SUMMARY OF GROUND GAS MONITORING RESULTS

WELL	DATE	CH_4 INITIAL (%V/V)	CH_4 STEADY (%V/V)	CH_4 GSV (l/hr)	CO_2 INITIAL (%V/V)	CO_2 STEADY (%V/V)	CO_2 GSV (l/hr)	O_2 (%V/V)	ATMOS (mb)	ATMOS. DYNAMIC	FLOW (l/hr)	RESPONSE ZONE (m bgl)	DEPTH TO BASE (m bgl)	DEPTH TO WATER (m bgl)
WS102	13/11/20	No Access										0.5-4.0	-	-
	01/12/20	0.1	0.1	**0.0001**	**6.7**	**6.7**	0.0067	8.7	1028	Rising	0.1		3.60	0.65
WS108	13/11/20	0.1	0.1	0.0001	**6.9**	**6.9**	0.0069	10.6	1006	Rising	0.1	0.5-4.0	3.75	3.38
	01/12/20	0.1	0.1	0.0001	0.6	0.6	0.0006	19.1	1029	Rising	0.1		3.75	2.82
WS109	13/11/20	0.1	0.1	0.0001	**7.7**	**7.7**	0.0077	11.7	1004	Rising	0.1	0.5-4.0	3.55	0.41
	01/12/20	0.1	0.1	0.0001	**8.6**	**8.6**	0.0086	9.5	1030	Rising	0.1		3.55	0.42
WS112	13/11/20	0.1	0.1	0.0001	**5.7**	**5.7**	0.0057	12.1	1006	Rising	0.1	0.5-4.0	4.70	0.40
	01/12/20	0.1	0.1	0.0001	**5.8**	**5.8**	0.0058	12.3	1029	Rising	0.1		4.70	0.42
WS119	13/11/20	No Access										0.5-4.0	-	-
	01/12/20	No Access											-	-
WS123	13/11/20	No Access										1.0-4.0	-	-
	01/12/20	No Access											-	-

9.2.2. SOURCES OF GROUND GAS

The Phase I report and subsequent ground investigation has identified the following potential sources of ground gas:

- Made Ground deposits;
- Infilled ponds and field boundaries.

9.2.3. GROUNDWATER

Monitoring wells WS109 and WS112 were flooded during the first two monitoring visits and cannot therefore be included within the gas assessment.

Within the remaining wells, groundwater levels were observed between 0.65 and 3.38 m bgl.

9.2.4. GAS FLOW

During the monitoring a positive flow was noted in WS102, WS108, WS109 and WS112. The measure of positive flow is considered to be the result of groundwater fluctuations and flooding of the well causing compression – as opposed to gas generation – as the highest flows are recorded during periods of high groundwater levels.

Negative flows are indicative of back pressure from wind being greater than the active flow from the wells. Negative flows have not been recorded during the initial monitoring visits.

9.2.5. GAS CONCENTRATIONS

No methane concentrations above the limit of detection were recorded in the monitoring wells.

Carbon dioxide concentrations were recorded within all the monitoring wells at concentrations ranging from 0.6% v/v to 8.6% v/v. The maximum carbon dioxide levels were also associated with low oxygen concentrations.

9.2.6. GAS ASSESSMENT

In accordance with the methodology outlined with the CIRIA publication C665, E3P have utilised the results of the ground gas monitoring surveys to calculate a tentative gas screening value (GSV). The GSVs for the monitoring positions are summarised in Table 9.8.

TABLE 9.8 GAS RISK PROFILE AND LOCATION

LOCATION	MAX CH_4 (% v/v)	GSV (l/hr)	MAX CO_2 (% v/v)	GSV (l/hr)	CLASSIFICATION
WS102	0.1	0.001	6.7	0.0067	CS2
WS108	0.1	0.0001	6.9	0.0069	CS2
WS109	0.1	0.0001	8.6	0.0086	CS2
WS112	0.1	0.0001	5.8	0.0058	CS2

The GSV has been compared to the criteria outlined with CIRIA C665 to determine the level of risk to the proposed development and to ensure the appropriate remedial options are incorporated into any future building design in this area.

Preliminary ground gas monitoring suggests that the site should be classified as CS2 and new prison structures will likely require specialist protection measures as detailed below.

9.3. RESIDENTIAL BUILDING GAS RISK MITIGATION

British Standard BS8485 (2015)+A1(2019) provides two types of residential property that require assessment. These building types are:

- **Type A Building** – Private ownership with no building management controls on alterations to the internal structure, the use of rooms, the ventilation of rooms or the structural fabric of the building. Some small rooms are present. Probably conventional building construction (rather than civil engineering). Examples include private housing and some retail premises.

- **Type B Building** – Private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small- to medium-sized rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels.

Based on the ground gas risk assessment and the proposed Type B Building, it is envisaged that a point score of 3.5 will be required for affected properties, as summarised in Table 9.9.

TABLE 9.9 BS 8485 (2015) POINTS REQUIRED FOR TYPE A AND TYPE B BUILDINGS

CHARACTERISTIC SITUATION	NHBC TRAFFIC LIGHT SYSTEM	MINIMUM GAS PROTECTION SCORE (POINTS)	
		HIGH SENSITIVITY	
		TYPE A BUILDING	TYPE B BUILDING
1	Green	0	0
2	Amber 1	3.5	3.5
3	Amber 2	4.5	4
4	Red	6.5	5.5
5	N/A	N/A	6.5
6	N/A	N/A	N/A

Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, for example, high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system such as in institutional and/or fully serviced contractual situations.

The requisite 3.5 points must be achieved by installation of a suitable combination of measures detailed in Table 9.10.

TABLE 9.10 SUMMARY OF GROUND GAS MITIGATION MEASURES – BS8485 (2015)+A1(2019)

GAS PROTECTION SCORES FOR THE STRUCTURAL BARRIER	SCORE[A]
Floor and Substructure Design	
Precast Suspended Segmental Subfloor (Beam and Block)	0
Cast In-Situ Ground-Bearing Floor Slab (With Only Nominal Mesh Reinforcement)	0.5
Cast In-Situ Monolithic Reinforced Ground-Bearing Raft or Reinforced Cast In-Situ Suspended Floor Slab With Minimal Penetrations	1 or 1.5[B]
Basement Floor and Walls Conforming to BS 8102:2009, Grade 2 Waterproofing[C]	2
Basement Floor and Walls Conforming to BS 8102:2009, Grade 3 Waterproofing[C]	2.5

A) The scores are conditional on breaches of floor slabs, etc. being effectively sealed.
B) To achieve a score of 1.5 the raft or suspended slab should be well reinforced to control cracking and have minimal penetrations cast in (see **A.2.2.2**).
C) The score is conditional on the waterproofing not being based on the use of a geosynthetic clay liner waterproofing product (see **C.3,** Note 4).

PROTECTION ELEMENT SYSTEM		SCORE	COMMENTS
Gas protection scores for ventilation protection measures			
(a) Pressure Relief Pathway – Usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building.		0.5	Whenever possible a pressure relief pathway (as a minimum) should be installed in all gas protection measures systems. If the layer has a low permeability and/or is not terminated in a venting trench (or similar), then the score is 0.
(b) Passive Subfloor Dispersal Layer – Media used to provide the dispersal layer are: • Clear void; • Polystyrene void former blanket; • Geocomposite void former blanket; • No-fines gravel layer with gas drains; and • No-fines gravel layer.	Very good performance	2.5	The ventilation effectiveness of different media depends on a number of different factors including the transmissivity of the medium, the width of the building, the side ventilation spacing and type and the thickness of the layer. The selected score should be assigned taking into account the recommendations in Annex B of BS 8485 (2015). Passive ventilation should be designed to meet at least "good performance".
	Good performance	1.5	
(c) Active Dispersal Layer – Usually comprising fans with active abstraction (suction) from a subfloor dilution layer with roof-level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers.		1.5 to 2.5	This system relies on continued serviceability of the pumps, therefore alarm and response systems should be in place. There should be robust management systems in place to ensure the continued maintenance of the system, including pumps and vents. Active ventilation should always be designed to meet at least "good performance".

PROTECTION ELEMENT SYSTEM	SCORE	COMMENTS
(d) Active Positive Pressurisation – Provided by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket.	1.5 to 2.5	This system relies on continued operation of the pumps, therefore alarm and response systems should be in place. The score assigned should be based on the efficient "coverage" of the building footprint and the redundancy of the system. Active ventilation should always be designed to meet at least "good performance".
(e) Ventilated Car Park – Floor slab of occupied part of the building under consideration is underlain by a basement or undercroft car park.	4	Assumes that the car park is vented to deal with car exhaust fumes, designed to Buildings Regulations 2000, Approved Document F [9].

PROTECTION ELEMENT SYSTEM	SCORE	COMMENTS
Gas Protection Score for the Gas-Resistant Membrane		
Gas-resistant membrane meeting all of the following criteria: • Sufficiently impervious to the gases with a methane gas transmission rate < 40.0 ml/day/m^2/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method); • Sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; • Sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab); • Sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre-reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools); • Capable, after installation, of providing a complete barrier to the entry of the relevant gas; and • Verified in accordance with CIRIA C735.	2	The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation and integrity of joints. For example, a minimum 0.4 mm thickness (equivalent to 370 g/m^2 for polyethylene) reinforced membrane (virgin polymer) meets the performance criteria opposite. If a membrane is installed that does not meet all the criteria opposite, then the score is 0.
This table should be read in conjunction with the notes presented in BS 8485 (2015)+A1 (2019)		

9.4. POTABLE WATER SUPPLY

This section provides a summary of the site investigation data with reference to the selection of potable water supply pipework. The assessment is made with reference to the UK Water Industry Research (UKWIR) publication "*Guidance on the selection of Water Supply Pipes to be used in Brownfield Sites*"

TABLE 9.11 PIPELINE SELECTION PE THRESHOLD CONCENTRATIONS

Contaminant Group	PE-threshold (mg/kg)	Concentrations at Current pipeline depth (mg/kg)
Total VOC	0.5	<0.001
Total BTEX And MTBE	0.1	<0.1
Total SVOCs (Excluding PAH and those substances marked with an *)	2	<0.3
EC5-EC10 Aliphatic and Aromatic Hydrocarbons	2	<1.0
EC10-EC16- Aliphatic and Aromatic Hydrocarbons	10	2700
EC16-EC40 Aliphatic and Aromatic Hydrocarbons	500	9400
Phenols (From SVOC Analysis)*	2	<0.2
Cresols and Chlorinated Phenols (From SVOC Analysis)	2	<0.3
Ethers*	0.5	NA
Nitrobenzene*	0.5	NA
Ketones*	0.5	NA
Aldehydes*	0.5	NA
Amines	Fail	NA
Other Consideration		
Are there any exceedances of the PE threshold outside of the pipeline depth?	Yes – WS106 0.80 m bgl.	
Is free product present in soil and groundwater?	None	
Could hydrocarbon impact at greater depth than current pipeline depth be mobilised by rising groundwater levels?	Yes – shallow groundwater has been identified. The hydrocarbon impact at WS106 will be excavated as a localised hotspot.	
Will soils impacted with above determinands likely be utilised elsewhere on site?	Currently unknown – the soils may be re-used in POS.	
Will soils be imported to site as part of any future earth works	Currently unknown. The importation of materials may affect the WIR Risk Assessment which should be updated after completion.	

Notes - Pipe line depth normally between 0.75m–1.35m

Based on the assessment of current site conditions it is likely that barrier pipe will be required at the proposed development.

9.5. CONCEPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table 9.12 has been prepared for the site.

TABLE 9.12 CONCEPTUAL MODEL

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL1 PL2	Non-volatile PAH (Made Ground)	Dermal contact. Dermal contact and ingestion.	Future site users. Off-site receptors.	Likely	High	LOW
Discussion: Non-volatile PAH identified throughout Made Ground between depths of 0.20 m and 1.20 m bgl. **Recommendation:** Cover system to landscaped areas where Made Ground remains will prevent exposure to future site users. Construction works completed with PPE and provision of welfare.						
PL4	Volatile Contaminants such as hydrocarbons, (Made Ground)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off-site receptors.	Likely	Moderate	LOW
Assessment: Significantly elevated TPH C12-C35 has been identified in the Made Ground in WS106 at 0.80 m bgl. A hydrocarbon odour was also noted in this location. **Recommendation:** The soils should be excavated as a localised hotspot, with chemical analysis to determine if the soils can be retained on site in an area of low sensitivity.						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL4	Methane, carbon dioxide (potentially infilled features on and within 250 m of the site)	Inhalation of gas. Migration through permeable strata and preferential pathways. Explosion in confined spaces.	Future site users. Buildings. Off-site land users.	Low likelihood	Moderate	LOW
Assessment: The identified Made Ground and hydrocarbon impact are sources of hazardous ground gas. **Recommendation:** The monitoring to date suggests that new prison structures will require ground gas mitigation measures in accordance with CS2 due to elevated concentrations of carbon dioxide (up to 8.6 % v/v).						
PL5	Mobile contaminants such as metals, (Made Ground)	Surface runoff. Migration through permeable strata and preferential pathways. Perched waters migration.	Groundwater (Secondary A aquifer – Drift, Secondary B aquifer - Bedrock). Surface water (Ponds, drainage network).	Low Likelihood	Low	LOW
Assessment: The Tier 1 assessment has identified exceedances of the EQS for cadmium, chromium (III), copper, lead, nickel, selenium and zinc. The exceedances of heavy metals are likely to be associated with the Made Ground identified in the southern and eastern sectors. The site is underlain by cohesive drift deposits to depths in excess of 5.45 m which will inhibit lateral migration to on-site surface waters features and vertical migration to the underlying Secondary A and B aquifers. Therefore, impacted perched groundwater is not likely to migrate towards the controlled water receptors. In addition, the sensitivity of the aquifers is reduced, given the absence of any potable groundwater abstractions within 1.0 km. The m-BAT and Pb screening tools have confirmed, the on-site surface water features are not at risk from the heavy metal contaminants identified within Table 8.4. Therefore, although heavy metals exceed EQS thresholds, they do not pose a risk to controlled waters as they are not bioavailable.						

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
It should also be noted the site is currently uncapped and the proposed development will largely encapsulate the site, thus limiting the potential for infiltration and therefore leaching potential. **Recommendation:** Given the general low soluble nature of the identified contaminants of concern, in addition to the presence of low permeability clay soils, it is considered there is unlikely to be any degree of unacceptable risk to the controlled water receptors and the wider environ. However, further analysis of the surface water should be undertaken as groundworks progress, to ensure no future mobilisation of contaminants is caused.						
PL6	Organic contaminants such as hydrocarbons, (Made Ground)	Ingestion of tainted water supply.	Future site users. Water pipes.	Likely	Moderate	**LOW**
Assessment: Likely probability as elevated TPH has been encountered at pipeline depth at WS106. **Recommendation:** Following a process of remediation works and the removal of the identified hotspot, PE pipe may be suitable for the proposed development. A pipeline risk assessment should be completed following a process of remediation and enabling works.						
PL7	Phytotoxic contaminants (Made Ground)	Direct Contact (plant uptake).	Flora.	Likely	Low	**LOW**
Assessment: Likely probability as contamination considered possible, which may be taken up by flora in soft landscaping/gardens. **Recommendation:** Provision of a clean cover system in areas of Made Ground.						

Main exposure pathways:
PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical / Lateral Migration; PL6 = Corrosion of concrete; PL7=Tainting of water supply; PL8 = Uptake by plants;

10. GEOTECHNICAL ASSESSMENT

10.1. PROPOSED DEVELOPMENT

E3P understands that Pick Everard are working on behalf of the Ministry of Justice for hybrid planning application seeking: Outline planning permission (with all matters reserved except for access, parking and landscaping) for a new prison (up to 74,531.71 sqm GEA) (Class C2A) within a secure perimeter fence following demolition of existing buildings and structures and together with associated engineering works; Outline planning permission for a replacement boiler house (with all matters reserved except for access); and Full planning permission for a replacement bowling green and club house (Class F2(c)).

10.2. SUMMARY OF GROUND CONDITIONS

Made Ground

Made Ground deposits were encountered within the majority of exploratory hole locations to depths of between 0.20 m and in excess of 3.45 m bgl (WS101) although, in general, Made Ground was encountered to a depth of less than 1.50 m bgl.

Made Ground deposits generally comprise a reworked topsoil of dark brown silty clayey fine to medium sand with sandstone, ceramic and brick. Beneath the reworked topsoil, Made Ground comprises dark brown gravelly fine to coarse sand and soft to firm gravelly clay with mudstone, brick and concrete.

A hydrocarbon odour was noted in WS106 between 0.80 m to 1.00 m bgl. A relict topsoil layer was identified between 0.40 m and 0.60 m bgl and organic matter was also noted in WS106 between 0.80 m to 1.50 m bgl.

A strong organic odour was noted in the reworked clay in WS118 between 0.60 m and 1.50 m bgl.

WS101 adjacent to the existing boiler house refused on a possible obstruction at 3.45 m bgl.

A Depth of Made Ground Plan is presented as Drawing 14-451-006 in Appendix III.

Topsoil

Natural topsoil was encountered in localised areas as dark brown slightly clayey fine to medium SAND with rootlets in the northern sector and as soft to firm dark brown to black CLAY in the south east sector. Topsoil depths ranged from between 0.23 m to 0.32 m bgl.

Drift

Drift deposits were encountered in all exploratory locations, with the exception of WS101 where the full depth of Made Ground could not be proven. The drift deposits were encountered to depths in excess of 5.45 m bgl.

The drift deposits are fairly consistent, generally comprising firm low strength to very stiff very high strength greyish brown gravelly CLAY with mudstone.

The drift deposits are fairly consistent, generally comprising firm medium strength to very stiff very high strength greyish brown gravelly CLAY with mudstone.

Localised lenses of granular drift deposits were encountered, generally comprising medium dense greyish brown clayey silty gravelly fine to medium SAND with mudstone. Loose GRAVEL was identified in WS103 between 1.00 m to 2.00 m bgl.

Solid Geology

The solid bedrock geology was not encountered during the ground investigation. BGS boreholes in the vicinity of the site suggest that the drift deposits are present to depths in excess of 15.00 m bgl.

Groundwater

Groundwater was encountered as seepages between 1.00 and 3.50 m bgl during the site investigation with monitoring recording groundwater levels between 0.40 and 3.38 m bgl

10.3. SITE PREPARATION

The site should be cleared and any vegetation below areas of proposed development stripped in accordance with Series 200 of the *Manual of Contract Documents for Highway Works (MCHW)*. This should include the following:

- Roots present below the footprint of proposed structures and infrastructure should be grubbed out and the resulting void infilled with suitable compacted engineered fill.
- Demolition of all existing buildings and removal of all hardstanding.
- Redundant services should be sealed off and grubbed out and replaced with suitable compacted engineered fill.

10.4. FOUNDATION CONDITIONS AND ASSESSMENT OF POTENTIAL BEARING CAPACITIES

In due consideration of the identified ground conditions, in-situ and laboratory geotechnical testing, E3P has undertaken an assessment of the net safe allowable bearing pressure (ABP) within the underlying natural stratum to assist in the detailed design of foundations and infrastructure and determine the target founding stratum. The results of this assessment are summarised in Table 10.1.

TABLE 10.1 SUMMARY OF ABP

GRANULAR SOILS			
Description	**Depth (Range m bgl)**	**Relative Density**	**Allowable Bearing Pressure (kN/m^2)**
Silty SAND (WS115)	1.00	Medium Dense	121
SAND (WS121)	4.00	Medium Dense	110
GRAVEL (WS103)	1.00	Loose	81
COHESIVE SOILS			

Description	Depth (range m bgl)	Undrained Shear Strength (Cu) (kN/m^2)	Allowable Bearing Pressure (kN/m^2)
Firm Gravelly CLAY	1.00–2.00	20–37	41–75
Stiff to Very Stiff Gravelly CLAY	1.00–5.45	40–217	83–447

Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying firm to very stiff glacial clays and localised areas of medium-dense sands.

Significant obstructions will be present beneath the existing structures. A possible obstruction was noted in WS101 at 3.45 m bgl.

During a phase of cut-and-fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.

Where proposed levels remain similar, it is likely that structures could be constructed using strip or trench fill foundations bearing on the underlying firm to very stiff clays or medium dense sands, subject to the required bearing stratum being present at a shallow depth and the absence of tree influence.

Where the suitable founding stratum is greater than 2.50 m bgl and in areas of deep Made Ground an engineered foundation solution will be required. Where structures are located within the vicinity of the infilled ponds, ground improvement may be required.

There is the potential for peat or organic soils to be present in the location of the existing ponds. Dependent on development levels, structures in these areas may require a driven pile foundation.

Foundation depths should take account of the presence of existing and proposed trees, with foundations deepened locally to mitigate the potential for volumetric instability attributed to fluctuations in moisture content, in accordance with the requirements of NHBC standards.

It is recommended that at working drawing stage a foundation schedule is prepared for the development, taking account of the physical change of natural clay soils and the current/proposed locations of trees.

To determine if VSC is viable at the subject site, E3P has completed a Ground Improvement Design Risk Matrix that is summarised in Table 10.2.

TABLE 10.2 GROUND IMPROVEMENT DESIGN RISK MATRIX

RISK ITEM	COMMENT	PASS/FAIL
Soft clays with an undrained shear strength less than 30 kN/m^2	CLAY soils are generally firm to very stiff with Cu > 30 kN. Isolated areas of softer clay soils were encountered with Cu < 30 kN/m^2; however, it is considered that these will either be piled or soft material excavated to remove the organic deposits.	**PASS**
Ground with peat layers close to foundation level or the base of the stone column, or where intermediate layers of peat are thicker than 200 mm, either as a single layer or the sum of the thicknesses of individual layers throughout the length of the stone column	None identified, however there is the potential for organic soils to be present in the location of former and existing ponds. A relict topsoil layer was identified between 0.40 m and 0.60 m bgl and organic matter was also noted in WS106 between 0.80 m to 1.50 m bgl.	**Further in investigation required in the location of former/existing ponds.**
Voided filled ground, e.g. old water tanks, pottery, glass bottles, concrete rubble or brick fill of unsuitable grading	Made Ground will require removal and processing to render the site suitable for VSC. The existing buildings substructure will also require excavation and processing into a graded aggregate suitable for vibro treatment.	**PASS – on completion of enabling works**
Loose or non-engineered fill not previously subject to rising or fluctuating water levels saturation	None identified.	**PASS**
Filled ground still settling or expected to settle under its own weight or due to the effects of surcharging/upfilling where there is a high organic content or where decay is continuing	None identified	**PASS**
Fill, containing degradable material where organic material forms more than 15% of fill by volume	None identified.	**PASS**
Clays with a plasticity index greater than 40%	None identified.	**PASS**
Highly sensitive soils liable to collapse or remoulding	None identified.	**PASS**
Cohesive soils with trees in influencing distance	Plots where tree influence has been modelled and will either be subject to a piled or mass trench-fill solution.	**PASS**
Overall Risk Rating and Suitability for Vibratory Ground Improvement		**PASS**

A summary of anticipated foundations is presented in Table 10.3.

TABLE 10.3 ANTICIPATED FOUNDATIONS

LOCATION	ANTICIPATED FOUNDING STRATA DEPTH (m bgl)	GROUND WATER (m bgl)	TARGET STRATUM	TREES	FOUNDATION TYPE	TYPE OF CONCRETE
WS101	>3.45	2.00	Stiff CLAY	N	Pile/Vibro	DS-1 AC-1s
WS102	1.45	N/A	Stiff CLAY	Y	Mass Trench	DS-1 AC-1s
WS103	3.45	N/A	Stiff CLAY	Y	Pile/Vibro	DS-1 AC-1s
WS104	2.45	N/A	Firm CLAY	Y	Mass Trench	DS-1 AC-1s
WS105	2.45	1.00	Stiff CLAY	Y	Mass Trench	DS-1 AC-1s
WS106	1.95	1.50	Firm CLAY	Y	Mass Trench	DS-1 AC-1s
WS107	1.05	N/A	Stiff CLAY	N	Strip	DS-1 AC-1s
WS108	0.90	N/A	Firm CLAY	N	Strip	DS-1 AC-1s
WS109	1.45	N/A	Stiff CLAY	Y	Mass Trench	DS-1 AC-1s
WS110	1.05	1.50	Stiff CLAY	Y	Mass Trench	DS-1 AC-1s
WS111	1.45	N/A	Stiff CLAY	Y	Mass Trench	DS-1 AC-1s
WS112	0.90	N/A	Stiff CLAY	Y	Mass Trench	DS-1 AC-1s
WS113	1.45	N/A	Stiff CLAY	N	Strip	DS-1 AC-1s
WS114	0.90	N/A	Stiff CLAY	Y	Mass Trench	DS-1 AC-1s
WS115	0.90	N/A	MD SAND	Y	Strip	DS-1 AC-1s
WS116	1.25	N/A	Stiff CLAY	N	Strip	DS-1 AC-1s
WS117	1.45	1.00	Stiff CLAY	N	Strip	DS-1 AC-1s
WS118	1.95	1.00	Stiff CLAY	N	Mass Trench	DS-1 AC-1s
WS119	0.90	3.00	Stiff CLAY	N	Strip	DS-1 AC-1s
WS120	0.90	N/A	Stiff CLAY	N	Strip	DS-1 AC-1s
WS121	0.90	3.00	Stiff CLAY	Y	Mass Trench	DS-1 AC-1s
WS122	1.05	N/A	Stiff CLAY	Y	Mass Trench	DS-1 AC-1s
WS123	1.45	N/A	Stiff CLAY	Y	Mass Trench	DS-1 AC-1s
WS124	1.45	3.50	Firm CLAY	N	Strip	DS-1 AC-1s
WS125	1.65	N/A	Stiff CLAY	N	Mass Trench	DS-1 AC-1s

It is recommended that, at working drawing stage, a foundation schedule is prepared for the development taking account of the physical change of natural clay soils and the current/proposed locations of trees.

10.5. GROUND FLOOR SLABS

Following enabling works, the site will likely have a variable thickness of Made Ground, that may extend to significant depth in places. Given the structures that are proposed, it is considered that ground-bearing floor slabs will require settlement analysis and detailed design in order to accommodate variability of the formation and account for differential settlement.

Given the depth of Made Ground and its loose/variable nature, it will be necessary to undertake some form of Ground Improvement work to ensure the total and differential settlement is within tolerable limits for the Uniformly Distributed Load of the floor slab and any external reinforced concrete yards / hardstanding.

It is considered that Ground Improvement by either High Energy Impact Compaction or Vibro Stone Columns would provide a viable engineering solution to ensure the required ABP for a ground bearing floor slab.

As an alternative to the above, a more traditional solution which comprises the excavation of the upper stratum of Made Ground prior to re-engineering and compaction as a structural upfill be considered. Limitations with this approach would be attributed to the inherent variability of the material and issues arising from fluctuations in moisture content, which are exaggerated during periods of seasonal variance with increased precipitation and reduced evaporation.

Where a ground-bearing floor slab is to be constructed within the conjectured zone of tree influence, the clay will need to be removed to ensure that any desiccated soil cannot swell and induce heave to the structure. Alternatively, it may be possible to design the structure to resist the influence of clay heave using exaggerated sub-base and additional reinforcement within the slab to be designed by the structural engineer.

Where it is necessary to undertake cut-and-fill works utilising site-derived cohesive soils, careful consideration must be given to seasonal climatic conditions, which will have a significant impact of moisture conditions and the ability to compact clay soils in the wetter winter months. It may be necessary to undertake an element of stabilisation works through the addition of lime to ensure the soils can be engineered to the required performance standards.

It would be possible to utilise soil stabilisation techniques that incorporate the addition of lime and OPC to construct a stiffened soil horizon with a CBR > 15% to constitute a sub-base replacement layer that could then be capped with Type 1 MOT. The use of soil stabilisation could be extended within the conjectured zone of tree influence to modify the structure of clay soils and negate the potential for volumetric instability.

10.6. HEAVE PRECAUTIONS

The site has been proven to be underlain by clay soils which are susceptible to volumetric instability due to fluctuations in moisture content, particularly within influencing distance of trees as per the NHBC / LABC conjectured zones of influence.

As the clay is deemed to be Medium Volume Change Potential, if a ground floor slab is constructed with a cast in-situ suspended floor slab, an engineered design will be required for the heave precautions.

A summary of heave precautions is presented in Table 10.4.

TABLE 10.4 SUMMARY OF HEAVE PRECAUTIONS

		MINIMUM VOID DIMENSION FOR FOUNDATIONS, GROUND BEAMS AND SUSPENDED IN-SITU CONCRETE GROUND FLOORS		MINIMUM VOID DIMENSIONS UNDER PRECAST CONCRETE AND SUSPENDED TIMBER FLOORS
Plasticity Index of Soil	**Required Foundation Depth (m)**	**Thickness of Void Former Against Side of Foundation or Ground Beam (mm)**	**Thickness of Void Former on Underside of Edge Beam and Floor Slab (mm)**	**Void Dimension (mm)**
High Plasticity (> 40)	> 2.5	Engineer Design		Engineer Design
	2.0–2.5	35	150	300
	1.5–2.0	25	75	
Moderate Plasticity (20–40)	> 2.5	Engineer Design		Engineer Design
	2.0–2.5	25	100	250
	1.5–2.0	25	50	
Low Plasticity (< 20)	2.0–2.5	N/A	50	200
	> 2.0	No Special Precautions		

10.7. HIGHWAYS CONSTRUCTION

A programme of remediation and enabling works will be required to remediate the proposed road subgrade in accordance with the requirements of the Manual of Contract Documents for Highway Works Volume 1 Specification For Highway Works (Series 600-Earthworks) for a method compaction.

It is considered that the material can be re-engineered using method compaction to achieve a CBR in excess of 5% if works are completed in favourable climatic conditions.

10.8. DRAINAGE

The presence of substantial depths of Made Ground across some areas of the site may result in settlement. It is therefore recommended that drain runs are designed using steeper gradients and flexible joints to allow for some differential settlement.

Furthermore, the site is predominantly underlain by likely low-permeability CLAY. Therefore, the use of soakaway drainage will be limited, and it is not recommended that soakaways are utilised for disposal of surface water runoff.

Proposed drainage has been outlined within Proposed Drainage Strategy Report (Ref: 608623-0000-PEV-GHX0011-ZZ-RP-C-0502, Dated 7th April 2021).

10.9. CONCRETE DURABILITY

Based upon the results of the chemical analyses it is considered that subsurface concrete can be designed in accordance with Design Sulphate Class DS-1, Aggressive Chemical Environment for Concrete Classification (ACEC) AC-1s in accordance with the recommendations provided in BRE *Special Digest 1* (2005).

10.10. EXCAVATIONS

Site observations indicated that excavations should be feasible in the near surface with normal plant; however, obstructions will be present beneath existing buildings. It is anticipated that any obstructions will be grubbed out during the reduced-level dig for the substructure works.

However, due to the depth and variability of the Made Ground and likelihood of trench collapse, it is considered that all excavations are supported or battered back in accordance with guidance contained in CIRIA R97.

If local pumping of groundwater is required during the advancement of excavations for the proposed foundations then consideration should be given to the potential for dewatering gravels in the surrounding areas that may cause structural damage to building substructures in close proximity to the site.

TABLE 10.5 CIVIL ENGINEERING EXCAVATION RISK MATRIX

RISK ITEM	PRESENT	COMMENT
Running Sands	No	No running sands have been identified.
Minor Water Ingress	Yes	Minor water ingress will require localised dewatering/sump pumping during the construction of site drainage infrastructure. Ingress of water into foundation excavation will potentially flood foundation excavations, limiting the viability of spread foundations to be constructed.
Shallow Bedrock	No	Cohesive drift deposits are present to depths in excess of 5.45 m bgl.

10.11. CONSTRUCTION ACTIVITY AND INSPECTION

The following activities and inspections should be incorporated into the site works:

- Due to the variability of the soils at the site, it is recommended that sufficient allowance is made for the inspection of formations and subformations to foundations and pavement construction.
- Excavations where access is required should be subject to a risk assessment from a competent person and, where appropriate, mitigation measures such as benching back the sides or use of support systems in accordance with CIRIA R97 should be utilised.
- It is considered that dewatering may be required, especially following periods of heavy rainfall. Removal of surface water and water within trenches should be possible with conventional sump pumping. Discharge of any water should be agreed with the relevant regulatory body and be undertaken under a trade effluent discharge, where required. Measures to remove silt and suspended solids may be required and consideration should be given to provision of space for settling tanks or an attenuation pond.
- Where access to confined spaces is required, appropriate mitigation measures should be addressed within the construction stage health and safety plan. Particular account should be taken of the gas results.
- The presence of potential contamination and mitigation measures should be addressed as part of the construction stage health and safety plan and should include measures to design out the risks, reduce their impact and, finally, to include the use of personnel protective equipment (PPE).

10.12. GEOTECHNICAL RISK REGISTER

POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Remediation of contaminated soils	On site	<5 %	Material at WS106 deemed to have a potential vapour risk will require hotspot removal, resulting the requirement to backfill the resulting void. Should significant backfill be needed deeper or specialist foundations may be required in those areas.
Obstructions	On site	20	Obstructions will be present beneath the existing buildings.
Artificially levelled and filled platforms	South east	20	The exercise land appear to have been levelled and artificially backfilled.
Trench collapse	On site	10	Made Ground present beneath the site is likely to be loosely compacted and possibly prone to collapse.
Mature trees	On site	350	A tree survey has been undertaken to support the planning application with findings recorded within Arboricultural Impact Assessment and Method Statement (Ref: 08623-0000-TYL-GHX0000-XX-RP-X-0002, Dated 27th July 2021)
Volume change potential clay	On site	100	Assessment of the cohesive soils indicates that they have low and moderate volume change potential, and therefore heave precautions will be required.
Peat	On site	TBC	None identified, however there is the potential for peat or organic soils to be present in the location of existing and former ponds. A relict topsoil layer was identified between 0.40 m and 0.60 m bgl and organic matter was also noted in WS106 between 0.80 m to 1.50 m bgl.
Running sands	N/A	N/A	Data searches indicate low risk.
Ground dissolution	N/A	N/A	Data searches indicate no hazard.
Concrete design	On site	N/A	DS-1, AC-1s.

POTENTIAL ABNORMAL CONSTRAINT	LOCATION ON SITE	ESTIMATED AREA OF SITE AT RISK (%)	ASSESSMENT AND MITIGATION
Low-permeability ground	On site	100	Soakaways unlikely to be effective in areas where low permeability cohesive deposits are present. Proposed Drainage for the site has been outlines within Proposed Drainage Report (Ref 608623-0000-PEV-GHX0011-ZZ-RP-C-0502, Dated 7th April 2021)
Services/sensitive structures	On site	TBC	A review of online services has identified a number of services within the site boundary. Piling may not be possible within close proximity to any sensitive infrastructure.
Abnormal foundation solutions	On site	5	Isolated areas of deep Made Ground and soft/loose deposits have been encountered, therefore an engineered foundation may be required in these locations.
Areas not investigated	Central sector/East	20	The ground beneath the existing buildings and the area to the east surrounding the large pond has not been investigated to date.
Surface water features	On site	10	Two ponds and a drainage network are present.
Current ponds to be filled	East /North West	10	There are two existing ponds on site, however it is not known whether these will remain as part of the final development. There is the potential for peat or organic soils to be present in the location of the existing ponds. Dependent on development levels, structures in these areas may require a driven pile foundation.
Historically infilled pond	Central sector	10	The former ponds will need to be clearly identified and investigated to assess the nature of materials and extent of any organic or deleterious elements. Where structures are located within the vicinity of the infilled ponds a piled foundation solution may be required.

10.13. FURTHER WORKS

Based on the findings of the intrusive site investigation, the following additional works are recommended to be completed in due course:

- Further investigation of inaccessible areas.
- Plot-specific foundation schedule (upon receipt of the final development levels).
- Remediation and enabling works strategy.
- Construction phase Surface Water Management Plan.

11. CONCLUSIONS AND RECOMMENDATIONS

11.1. CONTAMINATED LAND ASSESSMENT

Human Health	The Tier I Human Health Assessment has identified elevated concentrations of non-volatile PAH compounds and hydrocarbon fractions C12-C35 (aromatic). The risk to chronic human health associated with the elevated concentrations of non-volatile PAH and TPH compounds can be mitigated through the installation of a suitable cover system where Made Ground remains all areas of landscaping and public open space to remove any potential for direct exposure to impacted soils. The specific design and installation process for the appropriate cover systems will be clearly defined within the site remediation and enabling works strategy. With regards to the elevated TPH C12-C16, these compounds present a potential volatilisation to indoor air risk. These elevated concentrations have only been identified within one location (WS106) and are therefore considered to be a localised hotspot. Therefore, during a process of cut/fill enabling works, a hotspot removal should be undertaken where these soils may be chemically validated to assess chemical suitability for retention on site in an area of no future sensitivity. Chemical analysis of the natural drift deposits has identified these soils to be acceptable for use as subsoil within the proposed areas of landscaping; however, further chemical validation samples will be required to confirm this. Areas of natural topsoil are present in the north of the site. Six samples have been tested to date which suggest that the topsoil is suitable for re-use. Further chemical validation samples will be required to confirm this.
Controlled Waters	The Tier 1 assessment has identified exceedances of the EQS for cadmium, chromium (III), copper, lead, nickel, selenium and zinc. Given the general low soluble nature of the identified contaminants of concern, in addition to the presence of low permeability clay soils, it is considered there is unlikely to be any degree of unacceptable risk to the controlled water receptors and the wider environ.
Ground Gas	Preliminary ground gas monitoring suggests that the site should be classified as CS2 due to elevated concentrations of carbon dioxide (up to 8.6 % v/v) and new prison structures will likely require specialist protection measures
Potable Water	This will need to be confirmed following the completion of a UKWIR risk assessment. Post-remediation and enabling works ground conditions may be different from those identified during this site investigation.

11.2. GEOTECHNICAL ASSESSMENT

Significant obstructions will be present beneath the existing structures. A possible obstruction was noted in WS101 at 3.45 m bgl.

During a phase of cut-and-fill enabling works to create a developable platform, all below-ground obstructions will require grubbing out to the base of the Made Ground to enable the construction of proposed plots.

Based on the assessment of the relative undrained shear strength, relative in-situ densities and corresponding safe net allowable bearing pressure, the suitable target founding stratum has been identified as the underlying firm to very stiff glacial clays and localised areas of medium-dense sands.

Where proposed levels remain similar, it is likely that structures could be constructed using strip or trench fill foundations bearing on the underlying firm to very stiff clays or medium dense sands, subject to the required bearing stratum being present at a shallow depth and the absence of tree influence.

Where the suitable founding stratum is greater than 2.50 m bgl and in areas of deep Made Ground an engineered foundation solution will be required. Where structures are located within the vicinity of the infilled ponds, ground improvement may be required.

There is the potential for peat or organic soils to be present in the location of the existing ponds. Dependent on development levels, structures in these areas may require a driven pile foundation.

Foundation depths should take account of the presence of existing and proposed trees, with foundations deepened locally to mitigate the potential for volumetric instability attributed to fluctuations in moisture content, in accordance with the requirements of NHBC standards.

END OF REPORT

APPENDIX I
LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the client as indicated in Section 1.3.

2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.

3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.

4. During the site walkover, reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover, no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.

5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.

6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials, this is for indicative purposes only and do not constitute or replace full and proper surveys.

8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.

10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

APPENDIX II
GLOSSARY

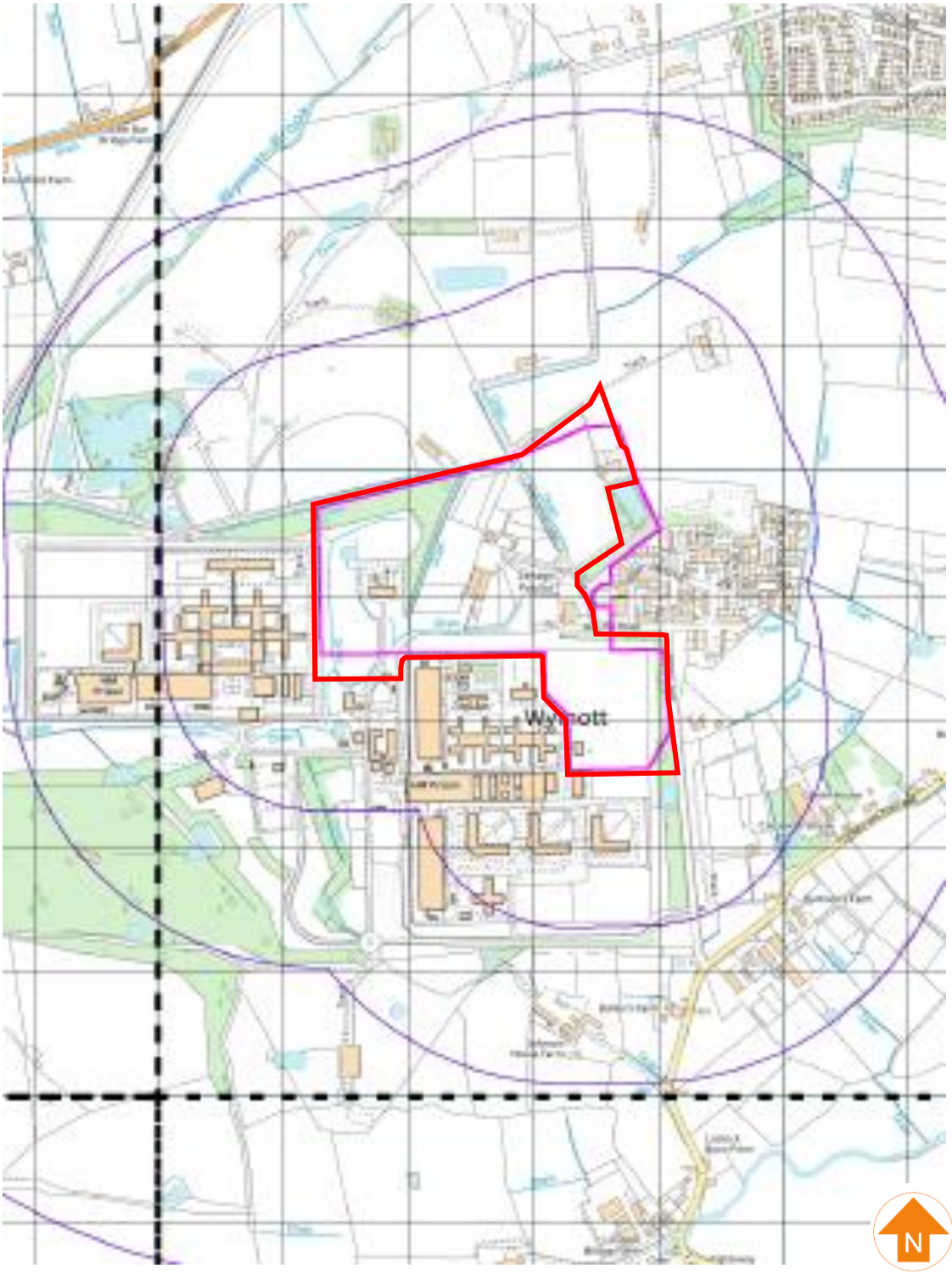
TERMS

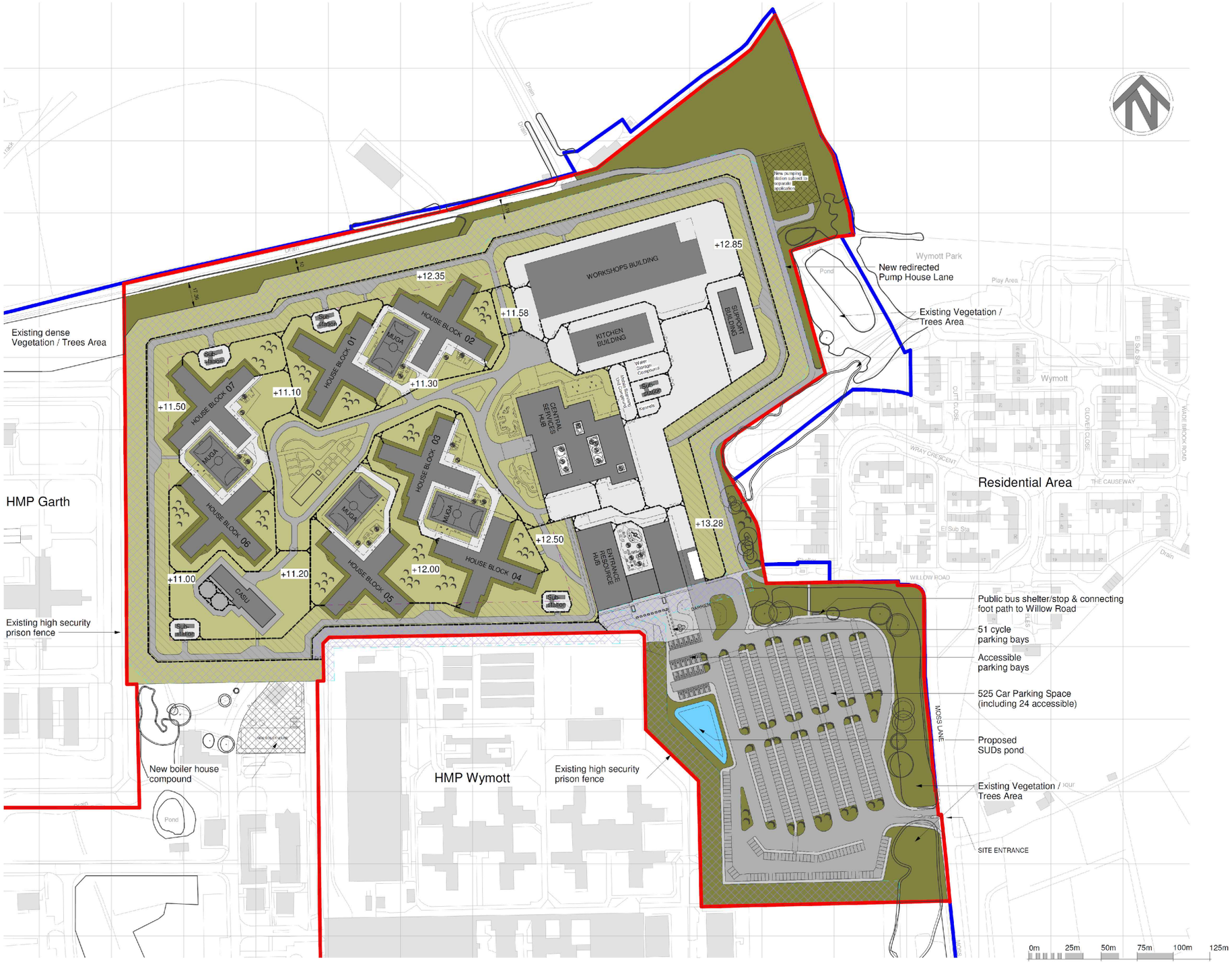
ACM	Asbestos-containing material	**MMP**	Materials management plan
ADS	Acoustic design statement	**ND**	Not detected
AST	Above-ground storage tank	**NDP**	Nuclear density probe
BGS	British Geological Survey	**NMP**	Noise management plan
BSI	British Standards Institute	**NPSE**	Noise policy statement for England
BTEX	Benzene, toluene, ethylbenzene, xylenes	**NR**	Not recorded
CA	Coal Authority	**PAH**	Polycyclic aromatic hydrocarbon
CBR	California bearing ratio	**PCB**	Polychlorinated biphenyl
CIEH	Chartered Institute of Environmental Health	**PI**	Plasticity index
CIRIA	Construction Industry Research Association	**PID**	Photo ionisation detector
CLEA	Contaminated land exposure assessment	**POS**	Public open space
CML	Council of Mortgage Lenders	**PPE**	Personnel protective equipment
CoC	Contaminants of concern	**ProPG**	Professional practice guidance
CSM	Conceptual site model	**QA**	Quality assurance
DNAPL	Dense non-aqueous phase liquid (chlorinated solvents, PCB)	**SGV**	Soil guideline value
DWS	Drinking water standard	**SPH**	Separate-phase hydrocarbon
EA	Environment Agency	**SPT**	Standard penetration test
EQS	Environmental quality standard	**SVOC**	Semi-volatile organic compound
FFL	Finished floor level	**TPH**	Total and speciated petroleum hydrocarbon
GAC	General assessment criteria	**TPH CWG**	Total Petroleum Hydrocarbon (Criteria Working Group)
GL	Ground level	**UKWIR**	United Kingdom Water Infrastructure Risk
GSV	Gas screening value	**UST**	Underground storage tank
HCV	Health criteria value	**VCC**	Vibro-concrete column
ICSM	Initial conceptual site model	**VOC**	Volatile organic compound
LEL	Lower explosive limit	**VRSC**	Vibro-replacement stone columns
LMRL	Lower method reporting limit	**VSC**	Vibro-stone columns
LNAPL	Light non-aqueous phase liquid (petrol, diesel, kerosene)	**WHO**	World Health Organisation
MCV	Moisture condition value	**WRAP**	Waste and Resources Action Programme

MIBK	Methyl isobutyl ketone	**WTE**	Water table elevation
m	Metres	**ppm**	Parts per million
km	Kilometres	**mg/m^3**	Milligram per metre cubed
% v/v	Percent volume in air	**m bgl**	Metres below ground level
mb	Millibars (atmospheric pressure)	**m bcl**	Metre below cover level
l/hr	Litres per hour	**mAOD**	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	**kN/m^2**	Kilonewtons per metre squared
ppb	Parts per billion	**µm**	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	**SSRT**	Site Specific Remediation Target
PSD	Particle Size Distribution	**DD**	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	**Mc**	Moisture Content
ρ	Bulk Density	**GPR**	Ground Penetrating Radar
NDP	Nuclear Density Probe	**FFL**	Finished Floor Level
LEL	Lower Explosive Limit	**UKWIR**	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	**LOD**	Limit of Detection

APPENDIX III
DRAWINGS

DRAWING 14-451-001 – SITE LOCATION PLAN





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P1	REVB	16.12.2020	LM	NS
P1	REVA	08.12.2020	HM	NS
Phase	Issue	Date	Drawn	Checked

Notes:

Client:
Pick Everard

Job No:
14-451

Date:
05.08.2021

Drawing No:
002

Scale:
NTS

Job Title:
Land adjacent to HMP Garth and HMP Wymott

Drawing Title:
Proposed Development Plan

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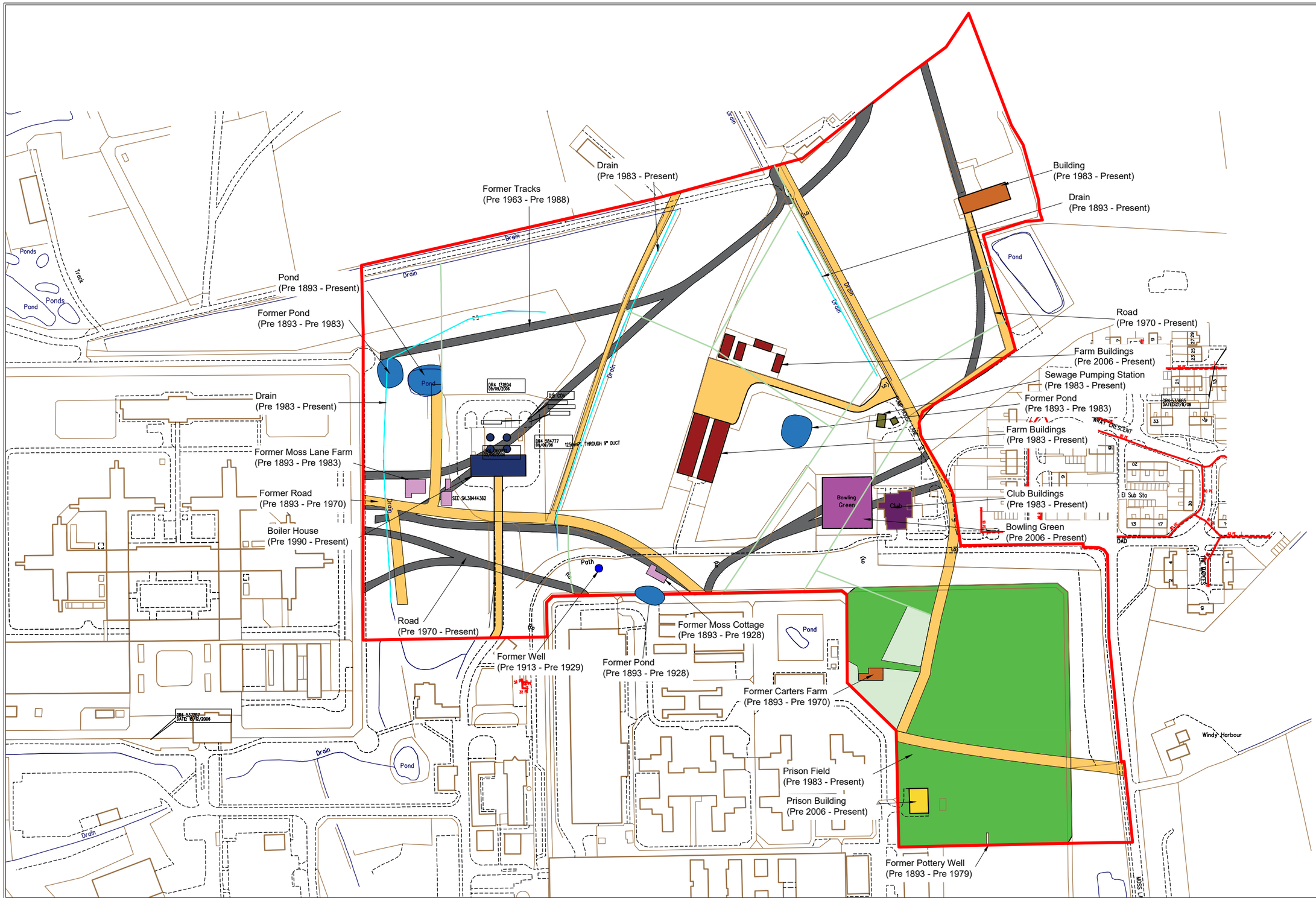

Historical Features

- Pond (Pre 1893 - Present)
- Former Moss Lane Farm (Pre 1893 - Pre 1983)
- Roads (Pre 1893 - Present)
- Former Tracks (Pre 1963 - Pre 1988)
- Former Carters Farm (Pre 1893 - Pre 1970)
- Boiler House (Pre 1990 - Present)
- Bowling Green (Pre 1990 - Present)
- Farm Buildings (Pre 2006 - Present)
- Club Buildings (Pre 1983 - Present)
- Drain (Pre 1893 - Present)
- Former Field Boundaries (Pre 1893 - Pre 1970)
- Prison Field (Pre 1983 - Present)
- Prison Buildings (Pre 2006 - Present)
- Sewage Pumping House (Pre 1983 - Present)
- Former Pottery Well (Pre 1893 - Pre 1979)
- Former Well (Pre 1913 - Pre 1929)

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVD	12.08.2021	LM	VW
P1	REVC	16.12.2020	LM	NS
P1	REVB	15.12.2020	HM	NS
P1	REVA	14.12.2020	HM	NS

Client: Pick Everard

Job No: 14-451

Date: 12.08.2021

Drawing No: 003

Scale: NTS

Job Title: Land adjacent to HMP Garth and HMP Wymott

Drawing Title: Historical Features Plan

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Site Features

- Woodland
- Sports Pitch
- Pond
- Boiler Room
- Site Cabin
- Farm Buildings
- Prison Wall
- Sewage Pumping Station
- Changing Roooms
- Covid Ward

Notes:

P1	REVA	11.12.2020	LM	IM
Phase	Issue	Date	Drawn	Checked

Client: Pick Everard

Job No: 14-451

Date: 11.12.2020

Drawing No: 004

Scale: NTS

Job Title: Land adjacent to HMP Garth and HMP Wymott

Drawing Title: Site Features Plan

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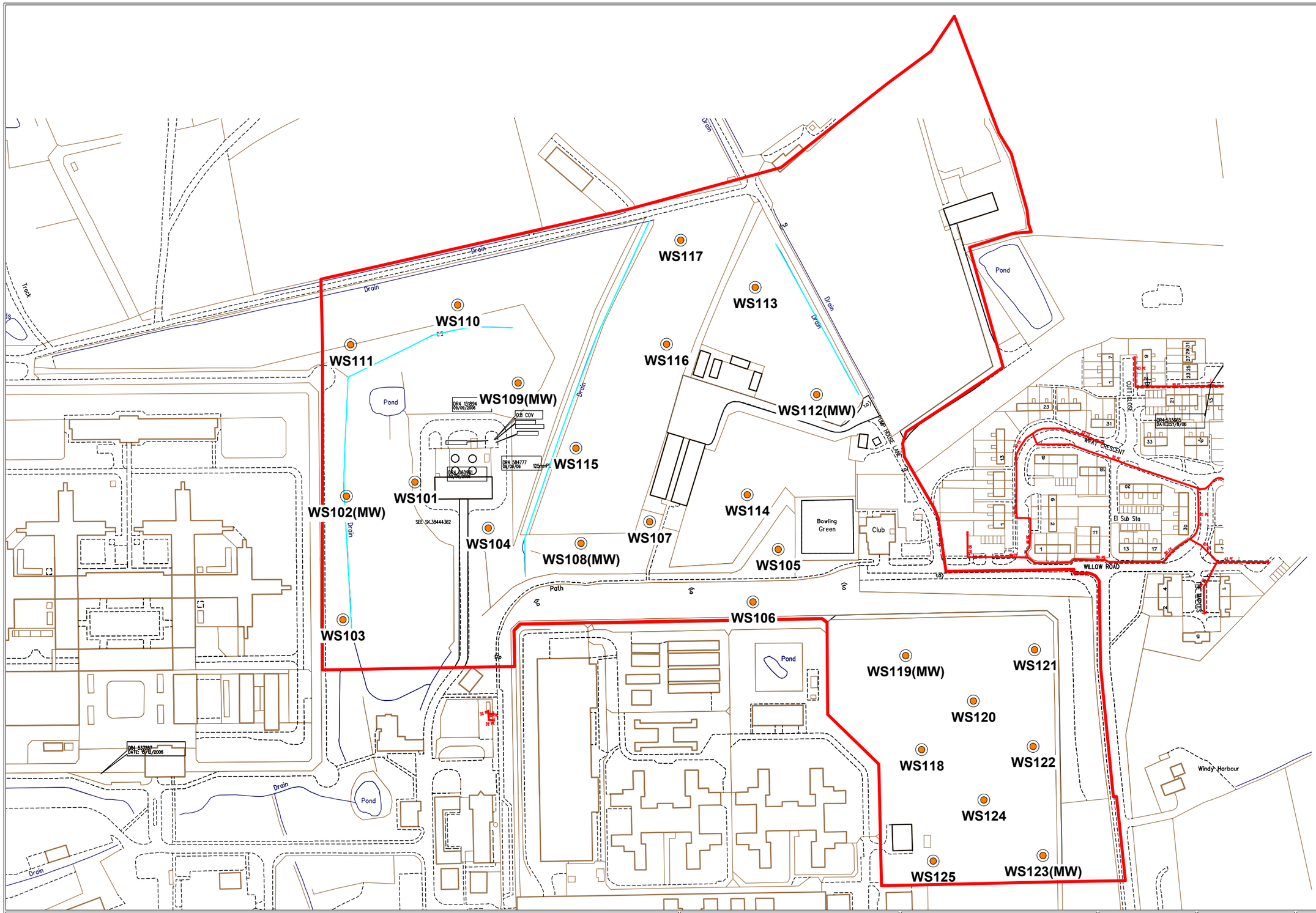

Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVD	12.08.2021	LM	VW
P1	REVC	11.12.2020	LM	IM
P1	REVB	08.12.2020	HM	IM
P1	REVA	10.11.2020	LM	MJ

Client: Pick Everard

Job No: 14-451

Date: 12.08.2021

Drawing No: 005

Scale: NTS

Job Title: Land adjacent to HMP Garth and HMP Wymott

Drawing Title: Exploratory Hole Location Plan

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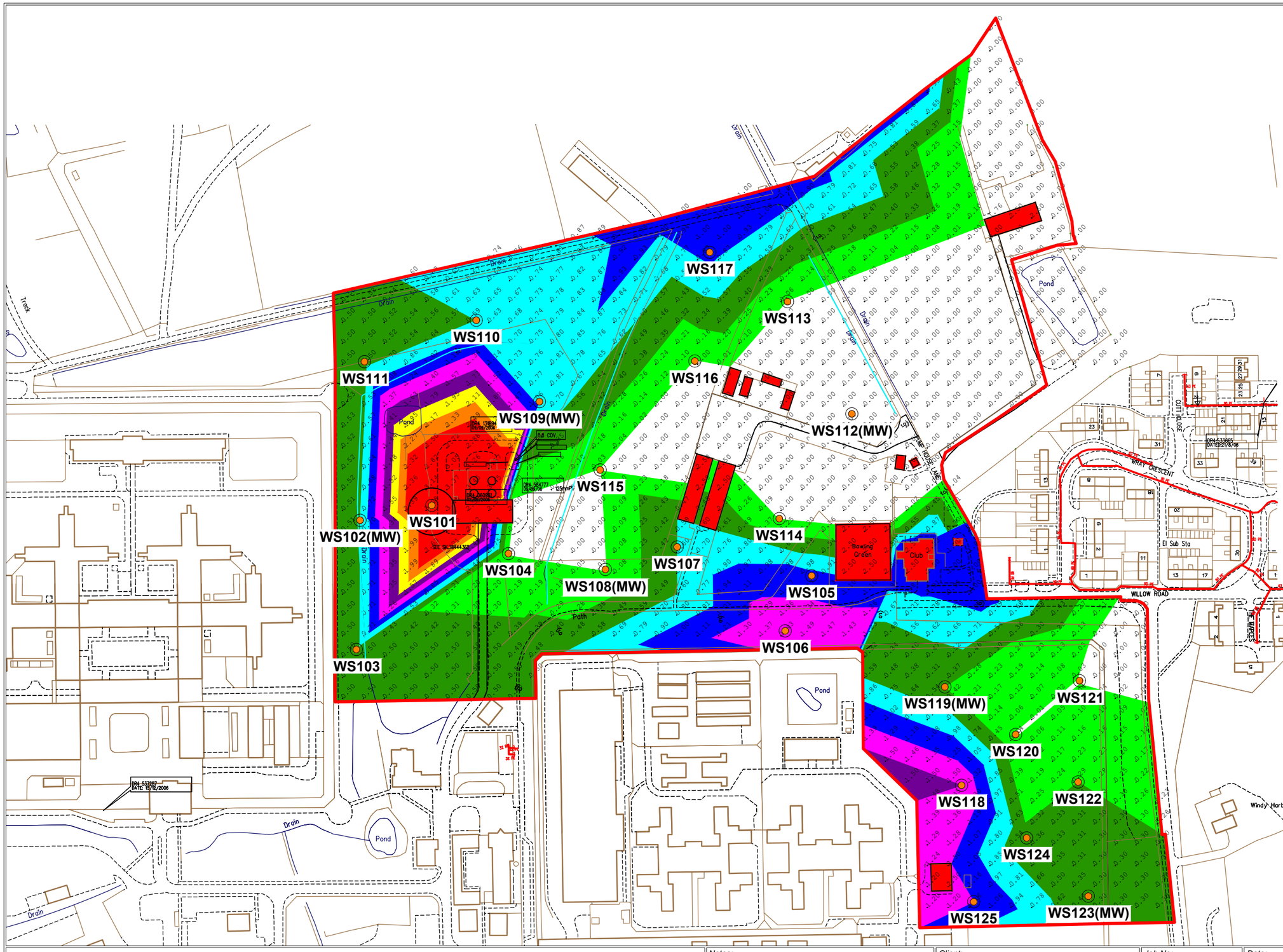

Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install
- Full Extent of Made ground Not Identified

Made Ground Depth (m)

- Depth of Made Ground 0.00 - 0.29m
- Depth of Made Ground 0.30 - 0.59m
- Depth of Made Ground 0.60 - 0.89m
- Depth of Made Ground 0.90 - 1.19m
- Depth of Made Ground 1.20 - 1.49m
- Depth of Made Ground 1.50 - 1.79m
- Depth of Made Ground 1.80 - 2.09m
- Depth of Made Ground 2.10 - 2.39m
- Depth of Made Ground >2.40m

Notes:

Client: Pick Everard

Job No: 14-451

Date: 12.08.2021

Drawing No: 006

Scale: NTS

Phase	Issue	Date	Drawn	Checked
P1	REVB	12.08.2021	LM	VW
P1	REVA	14.12.2020	HM	NS

Job Title: Land adjacent to HMP Garth and HMP Wymott

Drawing Title: Depth of Made Ground Plan

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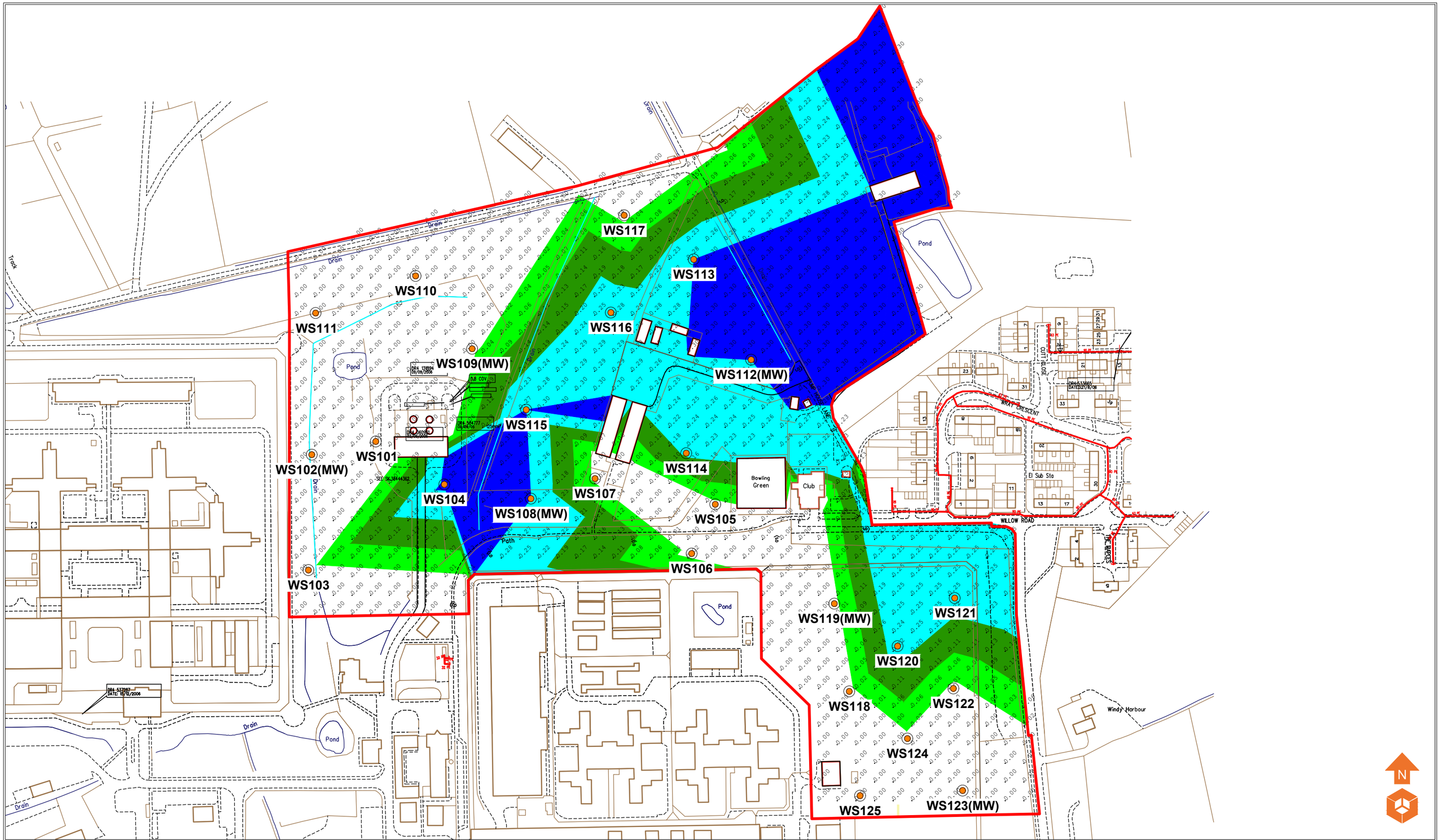

Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install
- Topsoil Not Identified

Topsoil Depth (m)

- Depth of Topsoil 0.00 - 0.09m
- Depth of Topsoil 0.10 - 0.19m
- Depth of Topsoil 0.20 - 0.29m
- Depth of Topsoil 0.30 - 0.39m
- Depth of Topsoil 0.40 - 0.49m
- Depth of Topsoil 0.50 - 0.59m
- Depth of Topsoil 0.60 - 0.69m
- Depth of Topsoil 0.70 - 0.79m
- Depth of Topsoil >0.80m

Notes:

Client: Pick Everard

Job No: 14-451

Date: 12.08.2021

Drawing No: 007

Scale: NTS

Phase	Issue	Date	Drawn	Checked
P1	REVB	12.08.2021	LM	VW
P1	REVA	15.12.2020	HM	NS

Job Title: Land adjacent to HMP Garth and HMP Wymott

Drawing Title: Depth of Topsoil Plan

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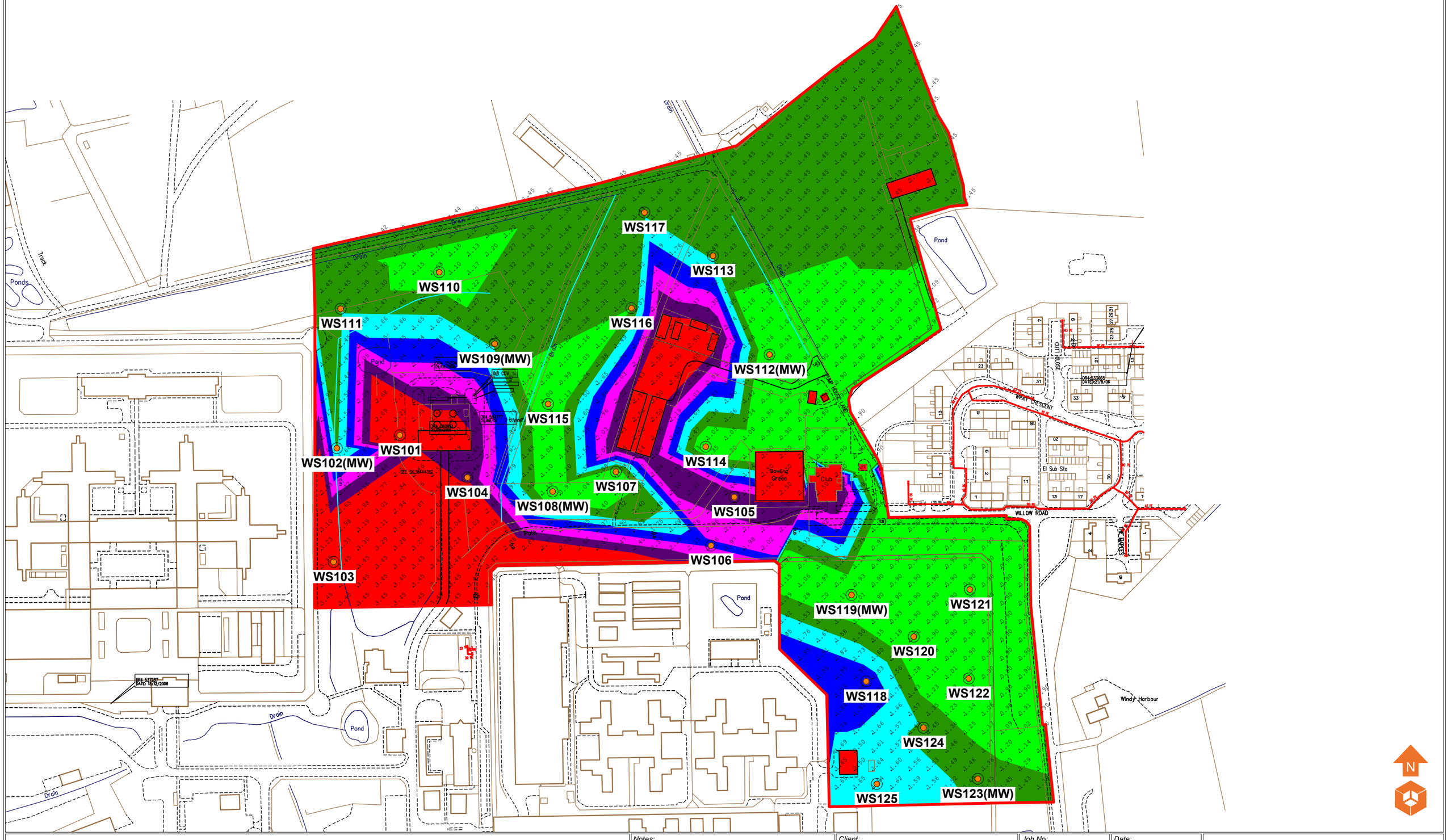

Location Symbols

- WS101 — Approximate Window Sample Probehole Location
- WS101(MW) — Approximate Window Sample Probehole Location with Install

Shallow Spread Footings

- ☐ Depth to Founding Strata 0.00 - 1.24m
- ☐ Depth to Founding Strata 1.25 - 1.49m

Mass Trench Fill Footings

- ☐ Depth to Founding Strata 1.50 - 1.74m
- ☐ Depth to Founding Strata 1.75 - 1.99m
- ☐ Depth to Founding Strata 2.00 - 2.24m

Engineered Footings

- ☐ Depth to Founding Strata 2.25 - 2.49m
- ☐ Depth to Founding Strata >2.50m

Notes:

Client: Pick Everard

Job No: 14-451

Date: 12.08.2021

Drawing No: 008

Scale: NTS

Phase	Issue	Date	Drawn	Checked
P1	REVB	12.08.2021	LM	VW
P1	REVA	15.12.2020	HM	NS

Job Title: Albatross & Razorbill

Drawing Title: Depth To Founding Strata Plan

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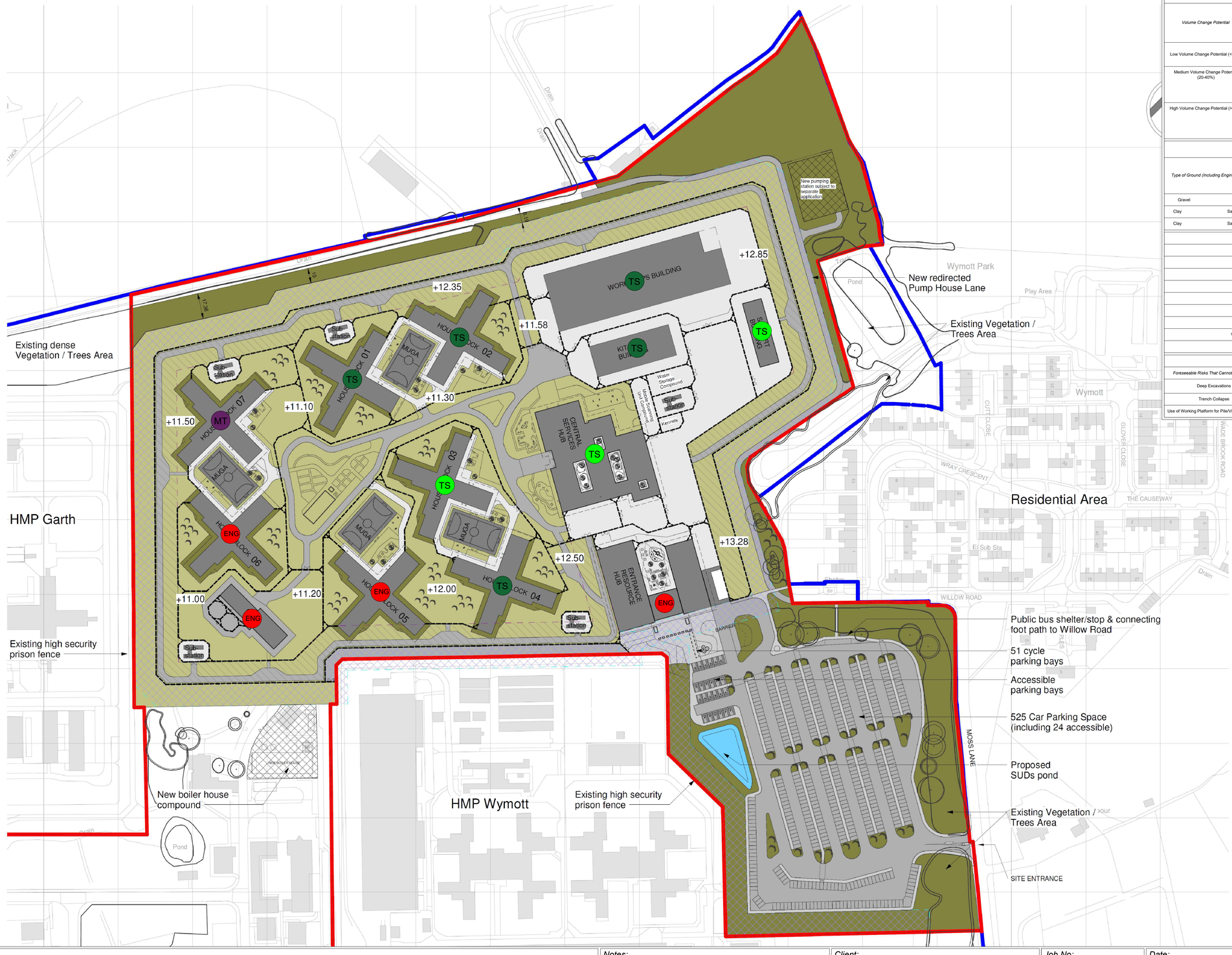

Summary of Heave Precaution Requirements

Volume Change Potential	*Required Foundation Depth (m)*	*Minimum Void Dimensions for Foundations, Ground Beams & Suspended In-Situ Concrete Ground Floors*		*Minimum Void Dimensions Under Pre-Cast Concrete & Suspended Timber Floors*
		Thickness of Void Former Against Side of Foundation of Ground Beam (mm)	*Thickness of Void Former on Underside of Edge Beam & Floor Slab (mm)*	*Void Dimension (mm)*
Low Volume Change Potential (<20%)	>2.00	No Special Precautions		200
	2.00-2.50	-	50	
Medium Volume Change Potential (20-40%)	1.50-2.00	25	50	250
	2.00-2.50	25	100	
	>2.50	Engineer Design		Engineer Design
High Volume Change Potential (>40%)	1.50-2.00	25	75	300
	2.00-2.50	35	150	
	>2.50	Engineer Design		Engineer Design

Minimum Width of Strip Footings

Type of Ground (Including Engineered Fill)		*Condition of Ground*	*Total Load of Load-Bearing Walling more than (kN/linear metre)*					
			20	30	40	50	60	70
			Minimum Width of Strip Foundation (mm)					
Gravel	Sand	Medium Dense to Dense	250	300	400	500	600	650
Clay	Sandy Clay	Stiff	250	300	400	500	600	650
Clay	Sandy Clay	Firm	300	350	450	600	750	850

Items Considered

Bearing Capacity	TBC
Trees	TBC
Historical	TBC
Groundwater Table	TBC
FFL	TBC
Contamination	TBC
Remediation	TBC
Volume Change Potential	TBC
Root Protection Areas	TBC

Residual Risks

Foreseeable Risks That Cannot be Avoided	*Applicable (Y/N)*	*Action to Reduce Risk*	Justification for Design Decision
Deep Excavations	Y	Identify locations on drawing and depths on schedule	Lesser risk than other alternatives
Trench Collapse	Y	Risk highlighted on drawing	Lesser risk than other alternatives
Use of Working Platform for Pile/Vibro Operations	Y	Compliance with working platform directive required	Pile/Vibro foundation less risky than other alternatives

Anticipated Foundation Types

- TS — Traditional Strip Foundations. Minimum depth 900mm below proposed Final Finished Level. Maximum safe bearing pressure limited to 100kN/m2.
- MT — Mass Trench Fill Foundations. Minimum depth 1250mm below proposed Final Finished Level. Maximum safe bearing pressure limited to 150kN/m2.
- V — Vibro Stone Ground Compaction. In accordance with NHBC Chapter 4.2.
- P — Piled Foundations. Where the maximum foundation depth exceeds 2.50m a piled foundation option rather than a trench fill / deep reinforced strip foundations may be adopted. Column or line loads supported by ground beams.
- R — Raft Foundations. Maximum safe bearing pressure limited to 50kN/m2 on approved engineered granular fill. Raft foundations to be designed by a structural engineer in accordance with Chapter 4.5 of NHBC 2013. Raft foundations are considered suitable to mitigate against potential influence of clay heave / desiccation in accordance with Section 4.2, sub section D7E.
- TB — Traditional Strip / Trench Block Foundations. Traditional strip founded at 450mm below current level with build up in Trench Block and subsequent backfill to development level.
- 1.1 — Colours on Plot Corners to be Used When Referring to Foundation Schedule. (Pending Final Layout & Levels)

Depth to Target Founding Strata

- Footings 0.75 - 0.90m Deep. From Final Finished Level. In accordance with NHBC Chapter 4.2
- Footings 0.90 - 1.25m Deep. From Final Finished Level. In accordance with NHBC Chapter 4.2
- Footings 1.25 - 1.50m Deep. From Final Finished Level. In accordance with NHBC Chapter 4.2
- Footings 1.50 - 1.75m Deep. From Final Finished Level. In accordance with NHBC Chapter 4.2
- Footings 1.75 - 2.00m Deep. From Final Finished Level. In accordance with NHBC Chapter 4.2
- Footings 2.00 - 2.25m Deep. From Final Finished Level. In accordance with NHBC Chapter 4.2
- Footings 2.25 - 2.50m Deep. From Final Finished Level. In accordance with NHBC Chapter 4.2

Engineered Foundation Solutions

- Footings >2.50m Deep. From Final Finished Level. In accordance with NHBC Chapter 4.2
- Vibro
- Low Volume Change Potential Clay. Heave precautions required to underside of cast in-situ floor slab (with no sub-floor void) within conjected zone of tree influence. Heave precautions not required to foundation.

Notes:

Client: Pick Everard

Job No: 14-451

Date: 05.08.2021

Drawing No: 009

Scale: NTS

Phase	Issue	Date	Drawn	Checked
P1	REVC	05.08.2021	CB	SE
P1	REVB	16.12.2020	LM	NS
P1	REVA	15.12.2020	HM	NS

Job Title: Land adjacent to HMP Garth and HMP Wymott

Drawing Title: Concept Foundation Zoning Plan

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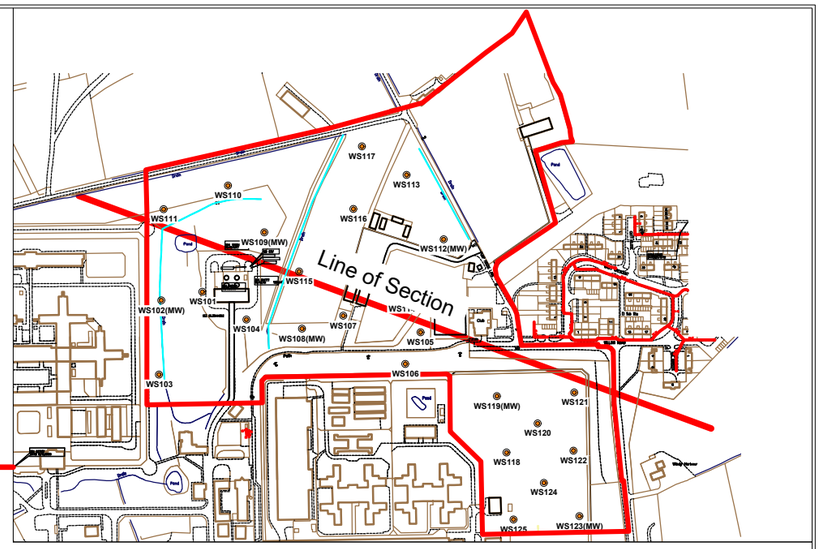
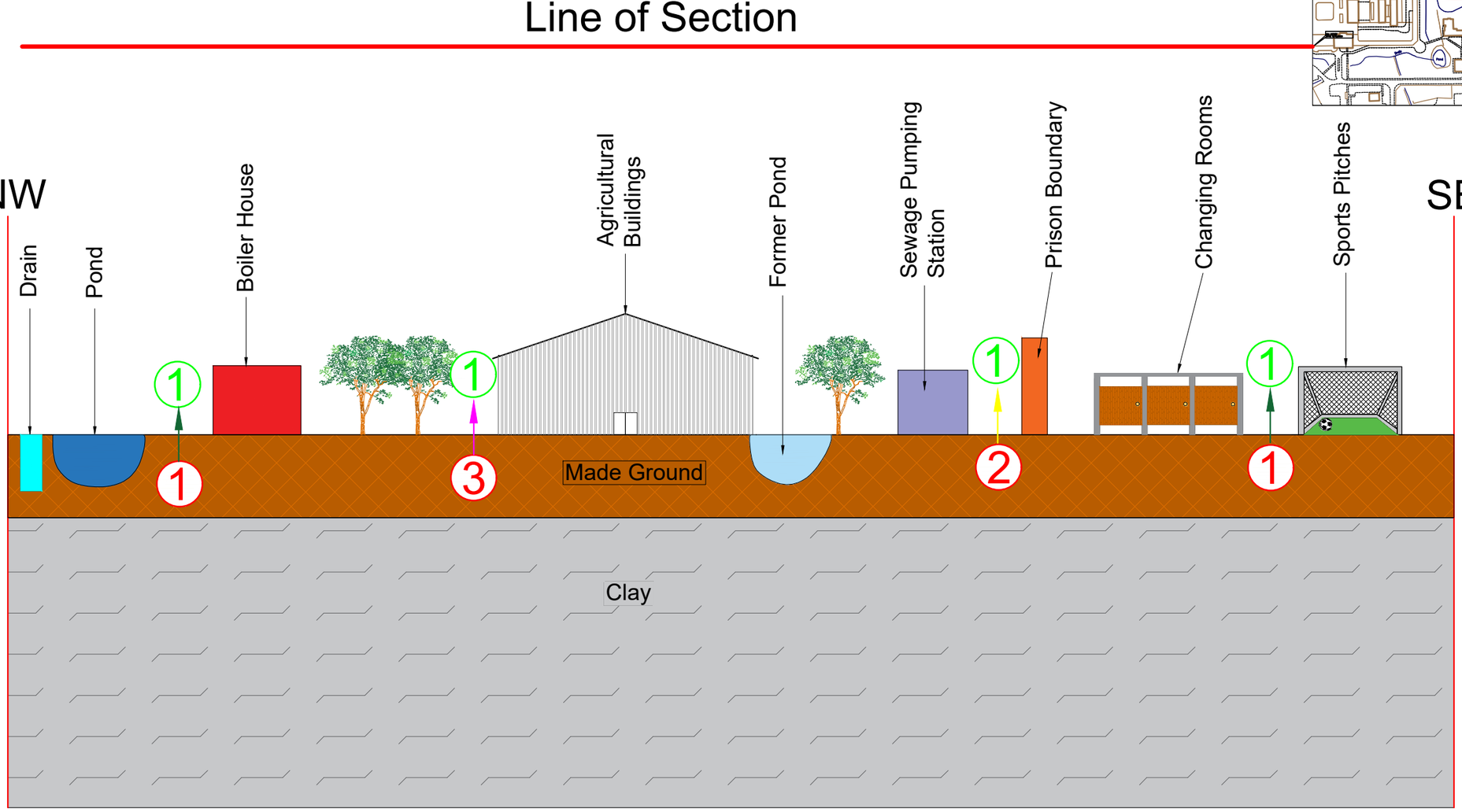




Geology Key

- Made Ground
- Clay
- Pond
- Former Pond
- Drain
- Sewage Pumping Station
- Prison Boundary
- Boiler House

Sources

1. Non Volatile PAH
2. Semi Volatile hydrocarbon compounds
3. Hazardous Ground Gases

Pathways

- Dermal Contact / Ingestion
- Vapour Inhalation
- Inhalation / Accumalation

Receptors

1. Future End Users

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVC	12.08.2021	LM	SE
P1	REVB	16.12.2020	LM	SE
P1	REVA	15.05.2020	LM	SE

Client: Pick Everard

Job No: 14-451

Date: 12.08.2021

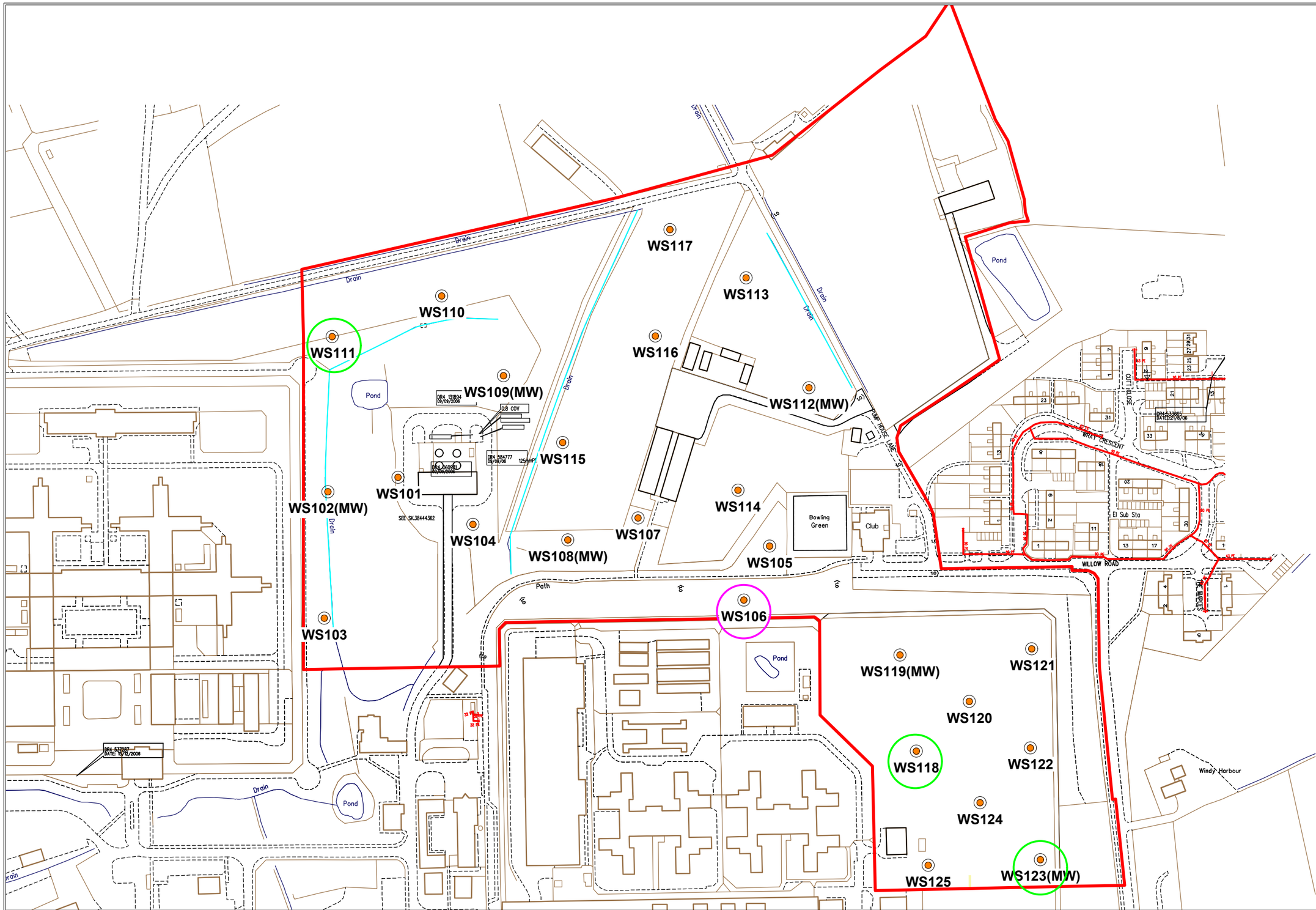
Drawing No: 010

Scale: 1:1000 @ A3

Job Title: Land adjacent to HMP Garth and HMP Wymott

Drawing Title: Conceptual Site Model

Environmental Engineering Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk



Location Symbols

- Approximate Window Sample Probehole Location
- Approximate Window Sample Probehole Location with Install

Contamination Exceedances

- Non-Volatile PAH
- TPH C12 - C35 (Aromatic)

Notes:

Phase	Issue	Date	Drawn	Checked
P1	REVB	12.08.2021	LM	VW
P1	REVA	11.12.2020	LM	IM

Client: Pick Everard

Job Title: Land adjacent to HMP Garth and HMP Wymott

Job No: 14-451

Date: 12.08.2021

Drawing No: 018

Scale: NTS

Drawing Title: Contamination Exceedances Plan

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APPENDIX IV
PHOTOGRAPHS

PLATE 1 VIEW OF SOUTH EAST SECTOR – PRISON SPORTS PITCHES

PLATE 2 VIEW OF SOUTH EAST SECTOR – PRISON SPORTS PITCHES

PLATE 3 AGRICULTURAL LAND – CENTRAL SECTOR

PLATE 4 AGRICULTURAL LAND – CENTRAL SECTOR

PLATE 5 LANDSCAPING TO THE NORTH OF THE PRISON

PLATE 6 WOODLAND AREA – NORTH WEST

PLATE 7 WS106 ARISINGS

PLATE 8 WS113 ARISINGS

APPENDIX V
E3P EXPLORATORY HOLE LOGS

Borehole Log

Borehole No. **WS101**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords:	350327E - 420807N	Hole Type WS
Location:	Leyland		Level:		Scale 1:50
Client:	Pick Everard		Dates:	29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		1.00	SPT	0 (0 for 0mm/0 for 0mm)				MADE GROUND: Dark brown silty clayey gravelly fine to medium sand with occasional rootlets (Topsoil). Gravel is fine to medium angular to sub-angular of mudstone brick and concrete.
					1.50			
	▼ 2.00	2.00	SPT	N=18 (2,2/4,5,5,4)				MADE GROUND: Firm brown gravelly clay. Gravel is fine to medium angular to subangular of brick mudstone and concrete.
					2.50			
		3.00	SPT	50 (8,10/50 for 275mm)				MADE GROUND: Soft brown gravelly clay. Gravel is fine subangular to subrounded of mudstone and brick.
					3.45			End of Borehole at 3.45m

Remarks

1. Refused on possible obstructions at 3.45m bgl. 2. Water strike encountered at 2.00m bgl.

Borehole Log

Borehole No. **WS102**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords: 350286E - 420800N	Hole Type WS
Location:	Leyland		Level:	Scale 1:50
Client:	Pick Everard		Dates: 29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.16			MADE GROUND: Dark brown very clayey silty fine to medium sand with frequent rootlets (Topsoil).
					0.60			MADE GROUND: Dark brown gravelly fine to coarse sand. Gravel is fine to coarse angular to sub-angular of brick concrete and mixed natural lithologies.
		1.00	SPT	N=8 (1,1/2,2,2,2)	1.00			Dark brown gravelly CLAY. Gravel is fine to coarse angular to sub-angular of mudstone.
		2.00	SPT	N=15 (3,4/3,4,4,4)				Stiff high strength light brown slightly gravelly CLAY. Gravel is fine to coarse sub-angular to sub-rounded of mudstone. (Very stiff very high strength at circa 3.00m bgl).
		3.00	SPT	N=26 (6,6/6,7,6,7)				
		4.00	SPT	50 (7,11/50 for 275mm)				
					4.45			End of Borehole at 4.45m

Remarks

1. Refused on very stiff clay at 4.45m bgl. 2. Monitoring well installed.

Borehole Log

Borehole No. **WS103**

Sheet 1 of 1

Project Name: Albatross & Razorbill	Project No. 14451	Co-ords: 350299E - 420741N	Hole Type WS
Location: Leyland		Level:	Scale 1:50
Client: Pick Everard		Dates: 29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.20			MADE GROUND: Dark brown silty clayey fine to medium sand with frequent rootlets (Topsoil).
					0.50			MADE GROUND: Dark brown gravelly fine to coarse sand. Gravel is fine to coarse angular to sub-angular of brick concrete and mixed natural lithologies.
					0.80			Firm brown CLAY
		1.00	SPT	N=8 (2,1/1,2,2,3)	1.00			Soft brown CLAY
								Loose dark greyish brown clayey GRAVEL. Gravel is fine to medium angular to sub-angular of mudstone.
		2.00	SPT	N=6 (3,1/1,1,2,2)	2.00			
					2.10			Firm brown gravelly sandy CLAY. Gravel is fine to medium subangular to angular of mudstone.
								Firm medium strength reddish brown CLAY
		3.00	SPT	N=14 (3,3/4,3,4,3)	3.00			Stiff high strength greyish brown gravelly CLAY. Gravel is fine to medium sub-angular to sub-rounded of mudstone.
					3.50			Very stiff very high strength greyish brown CLAY.
		4.00	SPT	N=24 (4,5/5,5,7,7)				
		5.00	SPT	N=24 (6,5/6,6,6,6)				
					5.45			End of Borehole at 5.45m

Remarks
Complete.

Borehole Log

Borehole No. **WS104**

Sheet 1 of 1

Project Name: Albatross & Razorbill	Project No. 14451	Co-ords: 350385E - 420780N	Hole Type WS
Location: Leyland		Level:	Scale 1:50
Client: Pick Everard		Dates: 29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.32			Dark brown clayey silty fine to medium SAND with frequent rootlets (Topsoil).
		1.00	SPT	N=6 (2,3/1,1,2,2)				Firm medium strength brown slightly gravelly CLAY. Gravel is fine to coarse angular to sub-angular of mudstone.
		2.00	SPT	N=8 (1,1/2,2,2,2)				
					2.50			Stiff high strength brown CLAY (Becoming very stiff very high strength at circa 4.00m bgl).
		3.00	SPT	N=12 (3,2/3,3,3,3)				
		4.00	SPT	N=19 (4,5/5,5,4,5)				
		5.00	SPT	N=26 (5,6/6,6,7,7)				
					5.45			End of Borehole at 5.45m

1 2 3 4 5 6 7 8 9 10

Remarks
Complete.

Borehole Log

Borehole No. **WS105**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords: 350577E - 420755N	Hole Type WS
Location:	Leyland		Level:	Scale 1:50
Client:	Pick Everard		Dates: 29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.42			MADE GROUND: Dark brown silty clayey gravelly fine to medium sand with frequent rootlets (Topsoil). Gravel is fine to coarse angular to subrounded of brick, ceramic and mudstone.
					0.70			MADE GROUND: Firm brown slightly gravelly clay. Gravel is fine to medium angular to sub-angular of ceramic.
	▼ 1.00	1.00	SPT	N=5 (1,2/1,1,1,2)	1.00			MADE GROUND: Firm brown gravelly clay. Gravel is fine to coarse angular to subangular of ceramic and asphalt.
								Firm medium strength brown gravelly CLAY. Gravel is fine subangular to subrounded of mixed natural lithologies.
		2.00	SPT	N=9 (2,3/2,3,2,2)	2.00			Stiff high strength reddish brown CLAY
					2.45			Green fine SILT.
					2.55			Stiff reddish brown CLAY
		3.00	SPT	N=16 (3,3/4,5,4,3)				
					3.20			Stiff high strength reddish brown CLAY
					3.80			Very stiff very high strength reddish brown CLAY
		4.00	SPT	N=20 (4,3/4,5,5,6)				
					4.45			End of Borehole at 4.45m

Remarks

1. Complete. 2. Water strike encountered at 1.00m bgl.

Borehole Log

Borehole No. **WS106**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords: 350530E - 420729N	Hole Type WS
Location:	Leyland		Level:	Scale 1:50
Client:	Pick Everard		Dates: 29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.22			MADE GROUND: Dark brown slightly clayey slightly silty fine to medium sand with frequent rootlets (Topsoil).
					0.40			MADE GROUND: Firm brown CLAY.
					0.60			MADE GROUND: Dark brown slightly clayey slightly silty fine to medium sand with frequent rootlets (Topsoil).
					0.80			MADE GROUND: Brown gravelly clay. Gravel is fine to medium angular to subangular of mixed natural lithologies.
		1.00	SPT	N=3 (1,1/1,0,1,1)	1.00			MADE GROUND: Soft dark brown clay with organic matter and hydrocarbon odour.
	▼ 1.50				1.50			MADE GROUND: Very soft dark grey silty gravelly clay with occasional rootlets and organic matter (wood fibres). Gravel is fine to coarse subangular to subrounded of ceramic.
		2.00	SPT	N=7 (2,2/2,1,2,2)				Firm medium strength grey slightly silty sandy CLAY. (Stiff high strength at circa 3.00m bgl) (Very stiff very high strength at circa 4.00m bgl).
		3.00	SPT	N=11 (3,2/2,3,3,3)				
		4.00	SPT	N=18 (3,5/5,5,4,4)				
					4.45			End of Borehole at 4.45m

1 2 3 4 5 6 7 8 9 10

Remarks

1. Complete. 2. Water strike encountered at 1.50m bgl.

Borehole Log

Borehole No. **WS107**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords:	350494E - 420788N	Hole Type WS
Location:	Leyland		Level:		Scale 1:50
Client:	Pick Everard		Dates:	29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.60			MADE GROUND: Dark brown slightly clayey slightly silty gravelly fine to medium sand with frequent rootlets (Topsoil) Gravel is fine to medium angular to sub-angular of ceramic and brick.
		1.00	SPT	N=8 (1,2/2,2,2,2)	1.00			Very stiff slightly sandy brown CLAY.
		2.00	SPT	N=11 (3,2/2,3,3,3)				Stiff high strength brown CLAY. (Very stiff very high strength at circa 3.00m bgl).
		3.00	SPT	N=24 (4,5/6,6,6,6)				
		4.00	SPT	N=27 (6,7/7,6,6,8)				
					4.45			End of Borehole at 4.45m

1 2 3 4 5 6 7 8 9 10

Remarks
Complete.

Borehole Log

Borehole No. **WS108**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords:	350454E - 420760N	Hole Type WS
Location:	Leyland		Level:		Scale 1:50
Client:	Pick Everard		Dates:	29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			Dark brown slightly clayey slightly silty fine to medium SAND with frequent rootlets (Topsoil).
		1.00	SPT	N=7 (2,1/2,2,2,1)				Firm medium strength gravelly brown CLAY. Gravel is fine to medium sub-angular to sub-rounded of mudstone. (Stiff high strength at circa 2.00m bgl) (Very stiff very high strength at circa 3.00m bgl).
		2.00	SPT	N=14 (3,2/3,4,4,3)				
		3.00	SPT	N=29 (3,5/7,7,8,7)				
		4.00	SPT	N=34 (6,8/9,9,8,8)				
					4.45			End of Borehole at 4.45m

1 2 3 4 5 6 7 8 9 10

Remarks

1. Complete. 2. Monitoring well installed.

Borehole Log

Borehole No. **WS109**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords:	350392E - 420869N	Hole Type WS
Location:	Leyland		Level:		Scale 1:50
Client:	Pick Everard		Dates:	29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.50			MADE GROUND: Dark brown slightly silty gravelly fine to medium sand with frequent rootlets (Topsoil). Gravel is fine to coarse angular to sub-angular of ceramic and brick.
					0.80			MADE GROUND: Firm dark greyish brown gravelly CLAY. Gravel is fine to coarse subangular to angular of brick and ceramic.
		1.00	SPT	N=11 (2,3/3,2,3,3)	1.00			Firm dark greyish brown CLAY.
		2.00	SPT	N=16 (3,4/4,4,4,4)				Stiff high strength reddish brown slightly gravelly CLAY. Gravel is fine subangular to subrounded of mudstone. (Very stiff high strength at circa 3.00m bgl).
		3.00	SPT	N=22 (2,3/5,6,5,6)				
					3.50			Very stiff very high strength reddish brown slightly gravelly CLAY. Gravel is medium to coarse subrounded to rounded of mudstone.
		4.00	SPT	N=19 (5,5/5,4,5,5)				
					4.45			End of Borehole at 4.45m

1 2 3 4 5 6 7 8 9 10

Remarks
Complete.

Borehole Log

Borehole No. **WS110**

Sheet 1 of 1

Project Name: Albatross & Razorbill	Project No. 14451	Co-ords: 350345E - 420904N	Hole Type WS
Location: Leyland		Level:	Scale 1:50
Client: Pick Everard		Dates: 29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.50			MADE GROUND: Dark brown slightly gravelly slightly clayey slightly silty fine to medium sand with frequent rootlets (Topsoil). Gravel is fine to coarse subrounded to angular of ceramic and brick.
					0.60			MADE GROUND: Fine to coarse subangular to angular gravel of asphalt.
		1.00	SPT	N=13 (2,2/2,3,4,4)				Stiff high strength slightly gravelly brown CLAY. Gravel is fine to medium subrounded to subangular of mudstone.
	1.50							
		2.00	SPT	N=13 (3,4/3,3,4,3)	2.00			Stiff high strength very gravelly brown CLAY. Gravel is fine sub-angular to angular of mudstone. (Very stiff very high strength at circa 3.00m bgl).
		3.00	SPT	N=22 (4,5/5,6,6,5)				
		4.00	SPT	N=21 (5,4/4,5,6,6)				
					4.45			End of Borehole at 4.45m

1 2 3 4 5 6 7 8 9 10

Remarks

1. Complete. 2. Water strike encountered at 1.50m bgl.

Borehole Log

Borehole No. **WS111**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords:	350291E - 350291N	Hole Type WS
Location:	Leyland		Level:		Scale 1:50
Client:	Pick Everard		Dates:	29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.50			MADE GROUND. Dark brown slightly clayey slightly silty gravelly fine to medium sand with frequent rootlets (topsoil) (Topsoil). Gravel is fine to medium subangular to angular of brick.
					0.70			Very stiff brown CLAY.
		1.00	SPT	N=12 (3,3/3,3,3,3)	1.00			Brown gravelly fine to medium SAND. Gravel is fine to coarse sub-angular to sub-rounded of mudstone.
		2.00	SPT	N=13 (3,3/4,3,3,3)				Stiff high strength reddish brown CLAY. (Very stiff very high strength at circa 3.00m bgl).
		3.00	SPT	N=25 (4,6/6,7,6,6)				
		4.00	SPT	N=25 (6,5/5,7,6,7)				
					4.45			End of Borehole at 4.45m

1 2 3 4 5 6 7 8 9 10

Remarks
Complete.

Borehole Log

Borehole No. **WS112**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords:	350617E - 420867N	Hole Type WS
Location:	Leyland		Level:		Scale 1:50
Client:	Pick Everard		Dates:	29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			Dark brown slightly clayey slightly silty fine to medium SAND with frequent rootlets (Topsoil)
								Stiff reddish brown and grey mottled CLAY
		1.00	SPT	N=8 (2,3/2,2,2,2)	1.00			Stiff high strength reddish brown CLAY
		2.00	SPT	N=12 (3,4/3,3,3,3)				
		3.00	SPT	N=17 (4,4/4,4,4,5)	3.00			Stiff high strength reddish brown CLAY. (Very stiff very high strength at circa 4.00m bgl).
		4.00	SPT	N=20 (5,5/4,5,5,6)				
					4.45			End of Borehole at 4.45m

Remarks
Complete.

Borehole Log

Borehole No. **WS113**

Sheet 1 of 1

Project Name: Albatross & Razorbill	Project No. 14451	Co-ords: 350587E - 420950N	Hole Type WS
Location: Leyland		Level:	Scale 1:50
Client: Pick Everard		Dates: 29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			Dark brown slightly clayey slightly silty gravelly fine to medium SAND with frequent rootlets (Topsoil). Gravel is fine to medium sub-angular to sub-rounded of mixed natural lithologies.
					0.50			Firm brown very sandy very gravelly CLAY. Gravel is fine to medium subrounded to rounded of mudstone.
		1.00	SPT	N=9 (2,2/2,3,2,2)	1.00			Firm reddish brown slightly sandy CLAY
					1.20			Brown very clayey very gravelly fine to medium SAND. Gravel is fine to medium subangular to subrounded of mudstone.
		2.00	SPT	N=8 (1,3/2,2,2,2)	2.00			Stiff high strength brown gravelly CLAY. Gravel is medium to coarse subrounded to subangular of mudstone.
		3.00	SPT	N=23 (4,6/6,6,5,6)				Stiff high strength slightly gravelly brown gravelly CLAY. Gravel is fine to medium sub-angular to sub-rounded of mudstone. (Very stiff very high strength at circa 3.00m bgl).
		4.00	SPT	N=22 (5,4/6,5,5,6)				
					4.45			End of Borehole at 4.45m

Remarks
Complete.

Borehole Log

Borehole No. **WS114**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords: 350553E - 420797N	Hole Type WS
Location:	Leyland		Level:	Scale 1:50
Client:	Pick Everard		Dates: 29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.23			Dark brown slightly clayey slightly silty fine to medium SAND with (Topsoil) with frequent rootlets. Stiff high strength brown CLAY (Very stiff high strength at circa 2.00m bgl).
		1.00	SPT	N=9 (2,1/2,2,2,3)				
		2.00	SPT	N=18 (3,2/5,5,4,4)				
					2.40			Stiff slightly gravelly brown gravelly CLAY. Gravel is fine to medium sub-rounded to rounded of mudstone.
		3.00	SPT	N=23 (4,5/6,6,5,6)				
					3.20			Very stiff very high strength brown CLAY
		4.00	SPT	N=25 (6,7/7,6,6,6)				
					4.45			End of Borehole at 4.45m

Remarks
Complete.

Borehole Log

Borehole No. **WS115**

Sheet 1 of 1

Project Name: Albatross & Razorbill	Project No. 14451	Co-ords: 350443E - 420830N	Hole Type WS
Location: Leyland		Level:	Scale 1:50
Client: Pick Everard		Dates: 29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			Dark brown slightly clayey slightly silty fine to medium SAND with frequent rootlets (Topsoil)
					0.40			Light brown fine to medium gravelly fine to medium SAND. Gravel is fine to medium sub-angular to sub-rounded of mudstone.
		1.00	SPT	N=12 (3,3/2,2,4,4)				Medium dense grey very clayey slightly silty fine to medium SAND.
		2.00	SPT	N=24 (5,6/6,5,6,7)	2.00			Very stiff very high strength brown gravelly CLAY. Gravel is fine angular to subangular of mudstone.
		3.00	SPT	50 (8,10/50 for 275mm)				
					3.45			End of Borehole at 3.45m

1 2 3 4 5 6 7 8 9 10

Remarks

Refused on very stiff clay at 3.45m bgl.

Borehole Log

Borehole No. **WS116**

Sheet 1 of 1

Project Name: Albatross & Razorbill	Project No. 14451	Co-ords: 350505E - 420896N	Hole Type WS
Location: Leyland		Level:	Scale 1:50
Client: Pick Everard		Dates: 29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.28			Dark brown slightly gravelly slightly clayey slightly silty fine to medium SAND with frequent rootlets (Topsoil). Gravel is fine to coarse subangular to subrounded of mudstone.
					0.70			Grey very clayey slightly silty fine to medium SAND.
					0.75			Grey silty GRAVEL. Gravel is fine to medium angular to sub-angular of mixed natural lithologies.
		1.00	SPT	N=8 (2,1/1,2,3,2)				Stiff high strength brown slightly gravelly reddish brown CLAY. Gravel is fine to coarse angular to sub-angular of mudstone.
		2.00	SPT	N=15 (2,2/2,3,5,5)				
		3.00	SPT	N=19 (5,5/5,5,4,5)	3.00			Very stiff very high strength slightly silty reddish brown CLAY.
		4.00	SPT	N=26 (4,5/5,6,7,8)				
					4.45			End of Borehole at 4.45m

Remarks
Complete.

Borehole Log

Borehole No. **WS117**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords: 350518E - 420996N	Hole Type WS
Location:	Leyland		Level:	Scale 1:50
Client:	Pick Everard		Dates: 29/10/2020	Logged By I.McQuillan

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			MADE GROUND: Dark brown slightly clayey slightly silty fine to medium sand with frequent rootlets (Topsoil)
	1.00	1.00	SPT	N=9 (1,1/1,0,3,5)	1.00			MADE GROUND: Brown very clayey very gravelly fine to medium sand. Gravel is fine to coarse angular to sub-rounded of brick and mixed natural lithologies.
		2.00	SPT	N=26 (5,4/6,7,7,6)				Stiff high strength slightly gravelly reddish brown CLAY. Gravel is fine to medium angular to sub-angular of mudstone. (Very stiff very high strength at circa 2.00m bgl).
		3.00	SPT	50 (6,11/50 for 70mm)				
					3.45			End of Borehole at 3.45m

Remarks

1. Refused on very stiff clay at 3.45m bgl. 2. Water strike encountered at 1.00m bgl.

Borehole Log

Borehole No. **WS118**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords:	350664E - 420619N	Hole Type WS
Location:	Leyland		Level:		Scale 1:50
Client:	Pick Everard		Dates:	29/10/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.40			MADE GROUND: Firm light brown gravelly clay with rootlets. The gravel is fine subrounded of sandstone. (Topsoil)
					0.60			MADE GROUND: Firm brown very gravelly clay. Gravel is fine to coarse sub-angular to sub-rounded of sandstone, mudstone and brick.
	1.00	1.00	SPT	N=4 (1,0/0,1,1,2)				MADE GROUND: Firm slightly gravelly black clay with rootlets and strong organic odour. The gravel is fine sub-angular of brick.
					1.50			Stiff high strength brown gravelly CLAY. Gravel is fine to medium sub-rounded of sandstone and mudstone. (Very stiff very high strength at circa 4.00m bgl).
		2.00	SPT	N=10 (2,2/3,2,2,3)				
		3.00	SPT	N=16 (4,3/4,4,4,4)				
		4.00	SPT	N=22 (4,5/5,5,6,6)				
					4.45			End of Borehole at 4.45m

1 2 3 4 5 6 7 8 9 10

Remarks

1. Complete. 2. Water strike encountered at 1.00m bgl.

Borehole Log

Borehole No. **WS119**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords: 350641E - 420701N	Hole Type WS
Location:	Leyland		Level:	Scale 1:50
Client:	Pick Everard		Dates: 29/10/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			MADE GROUND: Firm dark brown gravelly clay with rootlets. Gravel is fine angular of brick. (Topsoil)
		1.00	SPT	N=8 (2,2/2,2,2,2)				Stiff high strength orangish brown mottled grey slightly gravelly CLAY with mudstone cobble at 1.3 m bgl. Gravel is fine subrounded to rounded mudstone and sandstone.
		2.00	SPT	N=10 (2,3/3,3,2,2)				
	3.00	3.00	SPT	N=14 (3,4/3,3,4,4)	3.00			Stiff high strength orangish brown mottled grey slightly gravelly CLAY. The gravel is fine to medium sub rounded to rounded mudstone and sandstone. (Very stiff very high strength at circa 4.00m bgl).
		4.00	SPT	N=20 (5,5/5,5,5,5)				
					4.45			End of Borehole at 4.45m

Remarks

1. Complete 2. Response zone 0.5-4.0 m bgl 3. Water strike encountered at 3.00m bgl.

Borehole Log

Borehole No. **WS120**

Sheet 1 of 1

Project Name: Albatross & Razorbill	Project No. 14451	Co-ords: 350696E - 420672N	Hole Type WS
Location: Leyland		Level:	Scale 1:50
Client: Pick Everard		Dates: 29/10/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25			Firm dark brown to black CLAY with rootlets. (Topsoil)
		1.00	SPT	N=9 (2,2/3,2,2,2)				Stiff high strength orangish brown mottled grey slightly gravelly CLAY. The gravel is fine sub rounded to rounded mudstone and sandstone. (Very stiff very high strength at circa 3.00m bgl).
		2.00	SPT	N=14 (3,3/3,4,4,3)				
		3.00	SPT	N=18 (4,4/4,5,4,5)				
		4.00	SPT	N=18 (4,5/5,4,4,5)				
					4.45			End of Borehole at 4.45m

1 2 3 4 5 6 7 8 9 10

Remarks

1. Complete

Borehole Log

Borehole No. **WS121**

Sheet 1 of 1

Project Name: Albatross & Razorbill	Project No. 14451	Co-ords: 350764E - 420703N	Hole Type WS
Location: Leyland		Level:	Scale 1:50
Client: Pick Everard		Dates: 29/10/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.25			Soft to firm slightly gravelly CLAY with rootlets. Gravel is fine to medium sub angular of sandstone. (Topsoil)
		1.00	SPT	N=10 (2,2/3,3,2,2)				Stiff high strength orangish brown mottled grey slightly gravelly CLAY. The gravel is fine sub rounded to rounded of mudstone and sandstone.
		2.00	SPT	N=15 (3,3/4,4,4,3)				
	▼ 3.00	3.00	SPT	N=18 (4,4/4,5,5,4)	3.00			Very stiff very high strength orangish brown very sandy CLAY.
					3.40			Medium dense orangish brown with black flecks fine SAND.
		4.00	SPT	N=13 (4,3/3,3,4,3)				
					4.45			End of Borehole at 4.45m

1 2 3 4 5 6 7 8 9 10

Remarks

1. Complete. 2. Water strike encountered at 3.00m bgl.

Borehole Log

Borehole No. **WS122**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords:	350759E - 420629N	Hole Type WS
Location:	Leyland		Level:		Scale 1:50
Client:	Pick Everard		Dates:	29/10/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.10			MADE GROUND: Soft to firm slightly gravelly clay with rootlets. The gravel is fine to medium sub angular of sandstone. (Topsoil)
					0.30			MADE GROUND: Brown and black very sandy clayey gravel. Gravel is fine to coarse angular to sub-angular of sandstone, concrete and brick.
					0.60			Firm black to dark brown slightly gravelly CLAY with rootlets. Gravel is fine subrounded of sandstone.
		1.00	SPT	N=11 (1,1/2,2,3,4)				Stiff high strength orangish brown mottled grey slightly gravelly CLAY. Gravel is fine subrounded to rounded of mudstone and sandstone.
		2.00	SPT	N=12 (4,3/3,3,3,3)				
		3.00	SPT	N=12 (3,3/3,3,3,3)	3.00			Stiff orangish brown very sandy CLAY.
					3.20			Stiff high strength orangish brown mottled grey slightly gravelly CLAY. The gravel is fine sub rounded to rounded of mudstone and sandstone. (Very stiff very high strength at circa 4.00m bgl).
		4.00	SPT	N=19 (4,5/5,5,4,5)				
					4.45			End of Borehole at 4.45m

Remarks

1. Complete

Borehole Log

Borehole No. **WS123**

Sheet 1 of 1

Project Name: Albatross & Razorbill	Project No. 14451	Co-ords: 350770E - 420535N	Hole Type WS
Location: Leyland		Level:	Scale 1:50
Client: Pick Everard		Dates: 29/10/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.15			MADE GROUND: Soft to firm slightly gravelly clay with rootlets. Gravel is fine to medium sub angular of sandstone. (Topsoil)
					0.30			MADE GROUND: Black very sandy ashy gravel. Gravel is fine to coarse angular to sub-angular of sandstone and limestone.
		1.00	SPT	N=8 (1,1/2,2,2,2)				Stiff high strength orangish brown mottled grey slightly gravelly CLAY. The gravel is fine sub rounded to rounded mudstone and sandstone. (Very stiff very high strength at circa 3.00m bgl).
		2.00	SPT	N=12 (2,2/3,3,3,3)				
		3.00	SPT	N=21 (3,3/4,6,6,5)				
		4.00	SPT	N=18 (4,5/5,5,4,4)				
					4.45			End of Borehole at 4.45m

Remarks

1. Complete 2. Response zone 1.0-4.0 m bgl

Borehole Log

Borehole No. **WS124**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords: 350728E - 420571N	Hole Type WS
Location:	Leyland		Level:	Scale 1:50
Client:	Pick Everard		Dates: 29/10/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.30			MADE GROUND: Yellowish brown clayey medium sand with rootlets.
					0.35			MADE GROUND: Black very sandy ashy gravel. Gravel is fine to coarse angular to sub-angular of sandstone and limestone.
		1.00	SPT	N=7 (2,1/1,2,2,2)				Firm medium strength orangish brown with mottled grey slightly gravelly CLAY. The gravel is fine sub rounded to rounded mudstone and sandstone. (Stiff high strength at circa 2.00m bgl) (Very stiff very high strength at circa 4.00m bgl).
		2.00	SPT	N=11 (2,3/3,3,2,3)				
		3.00	SPT	N=14 (3,3/3,4,3,4)				
	3.50							
		4.00	SPT	N=22 (4,5/5,5,6,6)				
					4.45			End of Borehole at 4.45m

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Remarks

1. Complete. 2. Water strike encountered at 3.50m bgl.

Borehole Log

Borehole No. **WS125**

Sheet 1 of 1

Project Name:	Albatross & Razorbill	Project No. 14451	Co-ords: 350675E - 420536N	Hole Type WS
Location:	Leyland		Level:	Scale 1:50
Client:	Pick Everard		Dates: 29/10/2020	Logged By M. Jackson

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
					0.05			MADE GROUND: Soft to firm slightly gravelly clay with rootlets. The gravel is fine to medium sub angular of sandstone. (Topsoil)
					0.90			MADE GROUND: Firm dark brown gravelly clay. The gravel is fine to coarse angular to sub-rounded of sandstone, concrete and brick.
		1.00	SPT	N=9 (2,2/2,2,3,2)	1.20			MADE GROUND: Stiff dark brown very gravelly ashy clay. Gravel is fine to coarse angular to sub-rounded of sandstone, concrete and brick.
		2.00	SPT	N=11 (3,3/2,3,3,3)				Stiff high strength orangish brown mottled grey slightly gravelly CLAY. The gravel is fine sub rounded to rounded of mudstone and sandstone. (Very stiff very high strength at circa 3.00m bgl).
		3.00	SPT	N=23 (4,4/5,6,6,6)				
		4.00	SPT	N=26 (6,7/6,6,7,7)				
					4.45			End of Borehole at 4.45m

1 2 3 4 5 6 7 8 9 10

Remarks

1. Complete

APPENDIX VI
CHEMICAL TESTING RESULTS

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Analytical Report Number : 20-39132

Project / Site name:	Albatross	**Samples received on:**	02/11/2020
Your job number:		**Samples instructed on/ Analysis started on:**	03/11/2020
Your order number:	14 451 SE G	**Analysis completed by:**	09/11/2020
Report Issue Number:	1	**Report issued on:**	09/11/2020
Samples Analysed:	2 leachate samples - 8 soil samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 20-39132
Project / Site name: Albatross
Your Order No: 14 451 SE G

Lab Sample Number				1671277	1671278	1671279	1671280
Sample Reference				WS101	WS101	WS102	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	2.30	0.10	0.10
Date Sampled				29/10/2020	29/10/2020	29/10/2020	29/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	22	27	20	19
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.5	0.4
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	-	Not-detected
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	-	7.7	-	-
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	-	440	-	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	-	0.036	-	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	-	72	-	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	-	35.9	-	-
Sulphide	mg/kg	1	MCERTS	-	81	-	-
Total Sulphur	mg/kg	50	MCERTS	-	1400	-	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	4.6	-	-
Total Phenols							
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	< 1.0	-	-
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	-	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.24	-	-	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.15	-	-	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	1.6	-	-	0.44
Anthracene	mg/kg	0.05	MCERTS	0.4	-	-	0.12
Fluoranthene	mg/kg	0.05	MCERTS	2.2	-	-	1.2
Pyrene	mg/kg	0.05	MCERTS	2	-	-	1.1
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.2	-	-	0.8
Chrysene	mg/kg	0.05	MCERTS	0.81	-	-	0.57
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.1	-	-	0.9
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.33	-	-	0.47
Benzo(a)pyrene	mg/kg	0.05	MCERTS	0.9	-	-	0.79
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.45	-	-	0.49
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.11	-	-	0.12
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.51	-	-	0.56
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	12	-	-	7.5

Analytical Report Number: 20-39132
Project / Site name: Albatross
Your Order No: 14 451 SE G

Lab Sample Number				1671277	1671278	1671279	1671280
Sample Reference				WS101	WS101	WS102	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	2.30	0.10	0.10
Date Sampled				29/10/2020	29/10/2020	29/10/2020	29/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	14	16	6.9	15
Barium (aqua regia extractable)	mg/kg	1	MCERTS	120	-	82	130
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.3	-	1.1	1.2
Boron (water soluble)	mg/kg	0.2	MCERTS	0.7	-	0.8	0.9
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	33	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	35	29	23	50
Lead (aqua regia extractable)	mg/kg	1	MCERTS	51	15	15	86
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	31	38	44	37
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	42	-	41	43
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	95	65	64	190
Petroleum Hydrocarbons							
TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	-	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	-	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	-	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0	-	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	15	< 1.0	-	10
TPH (C21 - C35)	mg/kg	1	MCERTS	39	< 1.0	-	37
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10	-	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	55	< 10	-	49

Analytical Report Number: 20-39132
Project / Site name: Albatross
Your Order No: 14 451 SE G

Lab Sample Number				1671277	1671278	1671279	1671280
Sample Reference				WS101	WS101	WS102	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	2.30	0.10	0.10
Date Sampled				29/10/2020	29/10/2020	29/10/2020	29/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
VOCs							
Chloromethane	µg/kg	1	ISO 17025	-	-	-	-
Chloroethane	µg/kg	1	NONE	-	-	-	-
Bromomethane	µg/kg	1	ISO 17025	-	-	-	-
Vinyl Chloride	µg/kg	1	NONE	-	-	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	-	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	-	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	-	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	-	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	-	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-
Trichloromethane	µg/kg	1	MCERTS	-	-	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	-	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	-	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	-	-	-
Benzene	µg/kg	1	MCERTS	-	-	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	-	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	-	-	-
Trichloroethene	µg/kg	1	MCERTS	-	-	-	-
Dibromomethane	µg/kg	1	MCERTS	-	-	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	-	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	-	-	-
Toluene	µg/kg	1	MCERTS	-	-	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	-	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	-	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	-	-	-
Tetrachloroethene	µg/kg	1	NONE	-	-	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	-	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	-	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	-	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	-	-	-
Styrene	µg/kg	1	MCERTS	-	-	-	-
Tribromomethane	µg/kg	1	NONE	-	-	-	-
o-Xylene	µg/kg	1	MCERTS	-	-	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	-	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	-	-	-
Bromobenzene	µg/kg	1	MCERTS	-	-	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	-	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	-	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	-	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	-	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	-	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	-	-	-
Butylbenzene	µg/kg	1	MCERTS	-	-	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	-	-	-

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Lab Sample Number				1671277	1671278	1671279	1671280
Sample Reference				WS101	WS101	WS102	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	2.30	0.10	0.10
Date Sampled				29/10/2020	29/10/2020	29/10/2020	29/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	-	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	-	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	-	-	-

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Lab Sample Number				1671277	1671278	1671279	1671280
Sample Reference				WS101	WS101	WS102	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	2.30	0.10	0.10
Date Sampled				29/10/2020	29/10/2020	29/10/2020	29/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
SVOCs							
Aniline	mg/kg	0.1	NONE	-	-	-	-
Phenol	mg/kg	0.2	ISO 17025	-	-	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	-	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	-	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	-	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	-	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	-	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	-	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	-	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	-	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	-	-	-
Isophorone	mg/kg	0.2	MCERTS	-	-	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	-	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	-	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	-	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	-	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	-	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	-	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	-	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	-	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	-	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	-	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	-	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	-	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	-	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	-	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	-	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	-	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	-	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	-	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	-	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	-	-	-
Fluorene	mg/kg	0.05	MCERTS	-	-	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	-	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	-	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	-	-	-
Anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Carbazole	mg/kg	0.3	MCERTS	-	-	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	-	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	-	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	-	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Chrysene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	-	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	-	-	-

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Lab Sample Number				1671277	1671278	1671279	1671280
Sample Reference				WS101	WS101	WS102	WS104
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	2.30	0.10	0.10
Date Sampled				29/10/2020	29/10/2020	29/10/2020	29/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	-	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	-	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

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Lab Sample Number				1671281	1671282	1671283	1671284
Sample Reference				WS106	WS106	WS109	WS109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	0.80	0.10	0.80
Date Sampled				30/10/2020	30/10/2020	30/10/2020	30/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	26	40	30	20
Total mass of sample received	kg	0.001	NONE	0.4	0.4	0.4	0.4
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	-	Not-detected	-
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	6.8	-	-	7.9
Total Cyanide	mg/kg	1	MCERTS	< 1	-	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	520	-	-	650
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.054	-	-	0.044
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	110	-	-	89
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	53.9	-	-	44.3
Sulphide	mg/kg	1	MCERTS	81	-	-	2.6
Total Sulphur	mg/kg	50	MCERTS	1100	-	-	540
Total Organic Carbon (TOC)	%	0.1	MCERTS	1.3	-	-	2.6
Total Phenols							
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	-	-	< 1.0
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	-	0.22	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.44	0.97
Pyrene	mg/kg	0.05	MCERTS	< 0.05	-	0.45	0.91
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	0.28	0.61
Chrysene	mg/kg	0.05	MCERTS	< 0.05	-	0.21	0.45
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.27	0.68
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	-	0.19	0.25
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	0.2	0.48
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	-	< 0.05	< 0.05
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	-	2.26	4.35

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Lab Sample Number				1671281	1671282	1671283	1671284
Sample Reference				WS106	WS106	WS109	WS109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	0.80	0.10	0.80
Date Sampled				30/10/2020	30/10/2020	30/10/2020	30/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	10	-	13	13
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	150	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	1.1	-
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	1.6	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	-	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	-	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	47	-	-	32
Copper (aqua regia extractable)	mg/kg	1	MCERTS	30	-	60	89
Lead (aqua regia extractable)	mg/kg	1	MCERTS	20	-	70	110
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	-	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	54	-	35	35
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	-	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	36	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	90	-	86	95
Petroleum Hydrocarbons							
TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	70	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	41	2700	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	140	9400	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	49	3400	< 1.0	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	120	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	240	16000	< 10	< 10

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Lab Sample Number				1671281	1671282	1671283	1671284
Sample Reference				WS106	WS106	WS109	WS109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	0.80	0.10	0.80
Date Sampled				30/10/2020	30/10/2020	30/10/2020	30/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
VOCs							
Chloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Chloroethane	µg/kg	1	NONE	-	< 1.0	-	-
Bromomethane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Vinyl Chloride	µg/kg	1	NONE	-	< 1.0	-	-
Trichlorofluoromethane	µg/kg	1	NONE	-	< 1.0	-	-
1,1-Dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-
1,1,2-Trichloro 1,2,2-Trifluoroethane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Cis-1,2-dichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-
MTBE (Methyl Tertiary Butyl Ether)	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
2,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-
Trichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1,1-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
1,2-Dichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1-Dichloropropene	µg/kg	1	MCERTS	-	< 1.0	-	-
Trans-1,2-dichloroethene	µg/kg	1	NONE	-	< 1.0	-	-
Benzene	µg/kg	1	MCERTS	-	< 1.0	-	-
Tetrachloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-
1,2-Dichloropropane	µg/kg	1	MCERTS	-	< 1.0	-	-
Trichloroethene	µg/kg	1	MCERTS	-	< 1.0	-	-
Dibromomethane	µg/kg	1	MCERTS	-	< 1.0	-	-
Bromodichloromethane	µg/kg	1	MCERTS	-	< 1.0	-	-
Cis-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-
Trans-1,3-dichloropropene	µg/kg	1	ISO 17025	-	< 1.0	-	-
Toluene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1,2-Trichloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
1,3-Dichloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Dibromochloromethane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Tetrachloroethene	µg/kg	1	NONE	-	< 1.0	-	-
1,2-Dibromoethane	µg/kg	1	ISO 17025	-	< 1.0	-	-
Chlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1,1,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
Ethylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
p & m-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-
Styrene	µg/kg	1	MCERTS	-	< 1.0	-	-
Tribromomethane	µg/kg	1	NONE	-	< 1.0	-	-
o-Xylene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,1,2,2-Tetrachloroethane	µg/kg	1	MCERTS	-	< 1.0	-	-
Isopropylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
Bromobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
n-Propylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-
2-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-
4-Chlorotoluene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,3,5-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-
tert-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,2,4-Trimethylbenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-
sec-Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,3-Dichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-
p-Isopropyltoluene	µg/kg	1	ISO 17025	-	< 1.0	-	-
1,2-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,4-Dichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
Butylbenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,2-Dibromo-3-chloropropane	µg/kg	1	ISO 17025	-	< 1.0	-	-

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Lab Sample Number				1671281	1671282	1671283	1671284
Sample Reference				WS106	WS106	WS109	WS109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	0.80	0.10	0.80
Date Sampled				30/10/2020	30/10/2020	30/10/2020	30/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,2,4-Trichlorobenzene	µg/kg	1	MCERTS	-	< 1.0	-	-
Hexachlorobutadiene	µg/kg	1	MCERTS	-	< 1.0	-	-
1,2,3-Trichlorobenzene	µg/kg	1	ISO 17025	-	< 1.0	-	-

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Project / Site name: Albatross
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Lab Sample Number				1671281	1671282	1671283	1671284
Sample Reference				WS106	WS106	WS109	WS109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	0.80	0.10	0.80
Date Sampled				30/10/2020	30/10/2020	30/10/2020	30/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
SVOCs							
Aniline	mg/kg	0.1	NONE	-	< 0.1	-	-
Phenol	mg/kg	0.2	ISO 17025	-	< 0.2	-	-
2-Chlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-
Bis(2-chloroethyl)ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-
1,3-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-
1,2-Dichlorobenzene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
1,4-Dichlorobenzene	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Bis(2-chloroisopropyl)ether	mg/kg	0.1	MCERTS	-	< 0.1	-	-
2-Methylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Hexachloroethane	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Nitrobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
4-Methylphenol	mg/kg	0.2	NONE	-	< 0.2	-	-
Isophorone	mg/kg	0.2	MCERTS	-	< 0.2	-	-
2-Nitrophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-
2,4-Dimethylphenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Bis(2-chloroethoxy)methane	mg/kg	0.3	MCERTS	-	< 0.3	-	-
1,2,4-Trichlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Naphthalene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
2,4-Dichlorophenol	mg/kg	0.3	MCERTS	-	< 0.3	-	-
4-Chloroaniline	mg/kg	0.1	NONE	-	< 0.1	-	-
Hexachlorobutadiene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
4-Chloro-3-methylphenol	mg/kg	0.1	NONE	-	< 0.1	-	-
2,4,6-Trichlorophenol	mg/kg	0.1	MCERTS	-	< 0.1	-	-
2,4,5-Trichlorophenol	mg/kg	0.2	MCERTS	-	< 0.2	-	-
2-Methylnaphthalene	mg/kg	0.1	NONE	-	< 0.1	-	-
2-Chloronaphthalene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
Dimethylphthalate	mg/kg	0.1	MCERTS	-	< 0.1	-	-
2,6-Dinitrotoluene	mg/kg	0.1	MCERTS	-	< 0.1	-	-
Acenaphthylene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Acenaphthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
2,4-Dinitrotoluene	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Dibenzofuran	mg/kg	0.2	MCERTS	-	< 0.2	-	-
4-Chlorophenyl phenyl ether	mg/kg	0.3	ISO 17025	-	< 0.3	-	-
Diethyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-
4-Nitroaniline	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Fluorene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Azobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Bromophenyl phenyl ether	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Hexachlorobenzene	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Phenanthrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Carbazole	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Dibutyl phthalate	mg/kg	0.2	MCERTS	-	< 0.2	-	-
Anthraquinone	mg/kg	0.3	MCERTS	-	< 0.3	-	-
Fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Butyl benzyl phthalate	mg/kg	0.3	ISO 17025	-	< 0.3	-	-
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Chrysene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	< 0.05	-	-

Analytical Report Number: 20-39132
Project / Site name: Albatross
Your Order No: 14 451 SE G

Lab Sample Number				1671281	1671282	1671283	1671284
Sample Reference				WS106	WS106	WS109	WS109
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.20	0.80	0.10	0.80
Date Sampled				30/10/2020	30/10/2020	30/10/2020	30/10/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	< 0.05	-	-
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	< 0.05	-	-

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 20-39132
Project / Site name: Albatross

Your Order No: 14 451 SE G

Lab Sample Number				1671285	1671286
Sample Reference				WS103	WS106
Sample Number				None Supplied	None Supplied
Depth (m)				0.20	0.80
Date Sampled				29/10/2020	30/10/2020
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
General Inorganics					
pH	pH Units	N/A	ISO 17025	7.8	7.9
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0
Total Phenols					
Total Phenols (monohydric)	µg/l	1	ISO 17025	12	10
Speciated PAHs					
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01	< 0.01
Total PAH					
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2	< 0.2
Heavy Metals / Metalloids					
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0	12
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08	0.1
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	0.7	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	7.4	12
Lead (dissolved)	µg/l	1	ISO 17025	3.2	8.1
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.3	2.5
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	18	27
Monoaromatics & Oxygenates					
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10	< 10

Analytical Report Number: 20-39132
Project / Site name: Albatross

Your Order No: 14 451 SE G

Lab Sample Number				1671285	1671286
Sample Reference				WS103	WS106
Sample Number				None Supplied	None Supplied
Depth (m)				0.20	0.80
Date Sampled				29/10/2020	30/10/2020
Time Taken				None Supplied	None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Petroleum Hydrocarbons					
TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-39132
Project / Site name: Albatross

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1671277	WS101	None Supplied	0.1	Brown loam and clay with gravel and vegetation.
1671278	WS101	None Supplied	2.3	Brown clay and sand with gravel.
1671279	WS102	None Supplied	0.1	Brown clay.
1671280	WS104	None Supplied	0.1	Brown clay and sand with gravel and vegetation.
1671281	WS106	None Supplied	1.2	Brown clay and sand with gravel.
1671282	WS106	None Supplied	0.8	Brown clay and sand with vegetation.
1671283	WS109	None Supplied	0.1	Brown clay and sand with vegetation.
1671284	WS109	None Supplied	0.8	Brown clay and sand with vegetation.

Analytical Report Number : 20-39132
Project / Site name: Albatross

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in leachate - LOW LEVEL 1 ug/l	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In house method.	L005-PL	W	ISO 17025
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS

Analytical Report Number : 20-39132
Project / Site name: Albatross

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Semi-volatile organic compounds in soil	Determination of semi-volatile organic compounds in soil by extraction in dichloromethane and hexane followed by GC-MS.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
Volatile organic compounds in soil	Determination of volatile organic compounds in soil by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 20-39338

Project / Site name:	Albatross	**Samples received on:**	03/11/2020
Your job number:		**Samples instructed on/ Analysis started on:**	04/11/2020
Your order number:	14 451 SE G	**Analysis completed by:**	10/11/2020
Report Issue Number:	1	**Report issued on:**	10/11/2020
Samples Analysed:	1 leachate sample - 6 soil samples		

Signed:

Will Fardon
Technical Reviewer (CS Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 20-39338
Project / Site name: Albatross
Your Order No: 14 451 SE G

Lab Sample Number				1672244	1672245	1672246	1672247
Sample Reference				WS103	WS111	WS113	WS114
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.10	0.20	0.10	0.20
Date Sampled				29/10/2020	02/11/2020	02/11/2020	02/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	25	22	20	24
Total mass of sample received	kg	0.001	NONE	0.5	0.4	0.2	0.4
Asbestos in Soil	Type	N/A	ISO 17025	-	Not-detected	-	Not-detected
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	7.8	7.7	-	-
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	930	650	-	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.03	0.025	-	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	60	50	-	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	30.2	25.1	-	-
Sulphide	mg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Total Sulphur	mg/kg	50	MCERTS	670	550	-	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	2.4	4.2	-	3.8
Total Phenols							
Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	-	-
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	-	0.94	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	-	3.8	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	-	0.36	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	-	0.71	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	-	5.3	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	-	3.1	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	-	60	< 0.05	0.57
Pyrene	mg/kg	0.05	MCERTS	-	77	< 0.05	0.69
Benzo(a)anthracene	mg/kg	0.05	MCERTS	-	45	< 0.05	0.35
Chrysene	mg/kg	0.05	MCERTS	-	36	< 0.05	0.39
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	-	71	< 0.05	0.52
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	-	26	< 0.05	0.28
Benzo(a)pyrene	mg/kg	0.05	MCERTS	-	70	< 0.05	0.59
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	-	26	< 0.05	0.3
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	-	7	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	-	30	< 0.05	0.32
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	-	462	< 0.80	4.01

Analytical Report Number: 20-39338
Project / Site name: Albatross
Your Order No: 14 451 SE G

Lab Sample Number				1672244	1672245	1672246	1672247
Sample Reference				WS103	WS111	WS113	WS114
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				1.10	0.20	0.10	0.20
Date Sampled				29/10/2020	02/11/2020	02/11/2020	02/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	12	8.5	14
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	86	120
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	-	0.64	1.1
Boron (water soluble)	mg/kg	0.2	MCERTS	-	-	1.1	0.4
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.4	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	23	30	-	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	40	27	16	27
Lead (aqua regia extractable)	mg/kg	1	MCERTS	30	43	23	37
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	31	25	19	30
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	29	40
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	69	96	38	73
Petroleum Hydrocarbons							
TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	7.7	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	32	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	170	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	410	< 1.0	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	22	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10	650	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 20-39338
Project / Site name: Albatross
Your Order No: 14 451 SE G

Lab Sample Number				1672248	1672249
Sample Reference				WS116	WS117
Sample Number				None Supplied	None Supplied
Depth (m)				0.70	0.20
Date Sampled				02/11/2020	03/11/2020
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Stone Content	%	0.1	NONE	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	15	14
Total mass of sample received	kg	0.001	NONE	0.5	0.5

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected

General Inorganics

pH - Automated	pH Units	N/A	MCERTS	8.1	-
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	410	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	0.013	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	26	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	13.1	-
Sulphide	mg/kg	1	MCERTS	< 1.0	-
Total Sulphur	mg/kg	50	MCERTS	130	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	0.5	-

Total Phenols

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

Speciated PAHs

Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05

Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80

Analytical Report Number: 20-39338
Project / Site name: Albatross
Your Order No: 14 451 SE G

Lab Sample Number				1672248	1672249
Sample Reference				WS116	WS117
Sample Number				None Supplied	None Supplied
Depth (m)				0.70	0.20
Date Sampled				02/11/2020	03/11/2020
Time Taken				None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**		
Heavy Metals / Metalloids					
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	4.3	6.1
Barium (aqua regia extractable)	mg/kg	1	MCERTS	-	92
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	-	0.97
Boron (water soluble)	mg/kg	0.2	MCERTS	-	< 0.2
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	28	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	12	16
Lead (aqua regia extractable)	mg/kg	1	MCERTS	12	13
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	25	31
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	-	41
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	32	52
Petroleum Hydrocarbons					
TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	< 1.0	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 20-39338
Project / Site name: Albatross

Your Order No: 14 451 SE G

Lab Sample Number				1672250
Sample Reference				WS115
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				02/11/2020
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH	pH Units	N/A	ISO 17025	7.8
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0
Total Phenols				
Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0
Speciated PAHs				
Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01
Total PAH				
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2
Heavy Metals / Metalloids				
Arsenic (dissolved)	µg/l	1	ISO 17025	1.9
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.6
Copper (dissolved)	µg/l	0.7	ISO 17025	18
Lead (dissolved)	µg/l	1	ISO 17025	4.6
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	3.5
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	17

Analytical Report Number: 20-39338
Project / Site name: Albatross

Your Order No: 14 451 SE G

Lab Sample Number				1672250
Sample Reference				WS115
Sample Number				None Supplied
Depth (m)				0.30
Date Sampled				02/11/2020
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Monoaromatics & Oxygenates				
Benzene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10
Petroleum Hydrocarbons				
TPH1 (C10 - C40)	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-39338
Project / Site name: Albatross

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1672244	WS103	None Supplied	1.1	Brown clay and loam with gravel and vegetation.
1672245	WS111	None Supplied	0.2	Brown clay and loam with gravel and vegetation.
1672246	WS113	None Supplied	0.1	Brown clay and loam with gravel and vegetation.
1672247	WS114	None Supplied	0.2	Brown clay and loam with gravel and vegetation.
1672248	WS116	None Supplied	0.7	Brown clay and loam with gravel and vegetation.
1672249	WS117	None Supplied	0.2	Brown clay and loam with gravel and vegetation.

Analytical Report Number : 20-39338
Project / Site name: Albatross

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in leachate - LOW LEVEL 1 ug/l	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In house method.	L005-PL	W	ISO 17025
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS

Analytical Report Number : 20-39338
Project / Site name: Albatross

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 20-39481

Project / Site name:	Albatross	**Samples received on:**	04/11/2020
Your job number:		**Samples instructed on/ Analysis started on:**	04/11/2020
Your order number:	14-451-SE-G	**Analysis completed by:**	11/11/2020
Report Issue Number:	1	**Report issued on:**	11/11/2020
Samples Analysed:	1 leachate sample - 4 soil samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 20-39481
Project / Site name: Albatross
Your Order No: 14-451-SE-G

Lab Sample Number				1673041	1673042	1673043	1673044
Sample Reference				WS118	WS119	WS120	WS121
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	0.10	0.20	0.10
Date Sampled				03/11/2020	03/11/2020	03/11/2020	03/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	34	22	26	38
Total mass of sample received	kg	0.001	NONE	0.3	0.3	0.3	0.3
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	-	-
General Inorganics							
pH - Automated	pH Units	N/A	MCERTS	-	-	6.7	6.4
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	-	-	660	1000
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	-	-	0.014	0.019
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	-	-	28	37
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	-	-	13.8	18.5
Sulphide	mg/kg	1	MCERTS	-	-	< 1.0	1.3
Total Sulphur	mg/kg	50	MCERTS	-	-	520	700
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	2.8	-	6.1
Total Phenols							
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	-	< 1.0	< 1.0
Speciated PAHs							
Naphthalene	mg/kg	0.05	MCERTS	0.23	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.19	< 0.05	< 0.05	0.18
Fluorene	mg/kg	0.05	MCERTS	0.14	< 0.05	< 0.05	0.12
Phenanthrene	mg/kg	0.05	MCERTS	1	0.72	0.59	0.24
Anthracene	mg/kg	0.05	MCERTS	0.27	0.2	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	3.8	1.9	0.94	0.41
Pyrene	mg/kg	0.05	MCERTS	3.8	1.7	0.81	0.4
Benzo(a)anthracene	mg/kg	0.05	MCERTS	2.6	1.3	0.33	0.23
Chrysene	mg/kg	0.05	MCERTS	2	0.77	0.34	0.17
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	3.1	1.3	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	1.6	0.54	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	2.8	1	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	1.5	0.44	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.37	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	1.7	0.47	< 0.05	< 0.05
Total PAH							
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	25.1	10.2	3.01	1.75

Analytical Report Number: 20-39481
Project / Site name: Albatross
Your Order No: 14-451-SE-G

Lab Sample Number				1673041	1673042	1673043	1673044
Sample Reference				WS118	WS119	WS120	WS121
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.80	0.10	0.20	0.10
Date Sampled				03/11/2020	03/11/2020	03/11/2020	03/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Heavy Metals / Metalloids							
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	24	13	12	13
Barium (aqua regia extractable)	mg/kg	1	MCERTS	200	130	-	-
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.9	1	-	-
Boron (water soluble)	mg/kg	0.2	MCERTS	2.4	0.6	-	-
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.8	0.5	0.4	0.5
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	-	38	39
Copper (aqua regia extractable)	mg/kg	1	MCERTS	89	42	33	42
Lead (aqua regia extractable)	mg/kg	1	MCERTS	100	51	43	49
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.4	0.4	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	40	28	33	37
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	49	38	-	-
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	180	110	91	98
Petroleum Hydrocarbons							
TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	< 2.0	< 2.0	< 2.0	< 2.0
TPH (C12 - C16)	mg/kg	4	MCERTS	80	< 4.0	< 4.0	< 4.0
TPH (C16 - C21)	mg/kg	1	MCERTS	110	6.9	< 1.0	< 1.0
TPH (C21 - C35)	mg/kg	1	MCERTS	170	14	< 1.0	< 1.0
TPH (C35 - C40)	mg/kg	10	MCERTS	26	< 10	< 10	< 10
TPH Total C5 - C40	mg/kg	10	MCERTS	380	22	< 10	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 20-39481
Project / Site name: Albatross

Your Order No: 14-451-SE-G

Lab Sample Number				1673045
Sample Reference				WS120
Sample Number				None Supplied
Depth (m)				1.00
Date Sampled				03/11/2020
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH	pH Units	N/A	ISO 17025	8
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0
Total Phenols				
Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0
Speciated PAHs				
Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01
Total PAH				
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2
Heavy Metals / Metalloids				
Arsenic (dissolved)	µg/l	1	ISO 17025	1
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	< 0.4
Copper (dissolved)	µg/l	0.7	ISO 17025	4
Lead (dissolved)	µg/l	1	ISO 17025	4.8
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	< 0.3
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	3.3
Monoaromatics & Oxygenates				
Benzene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10

Analytical Report Number: 20-39481
Project / Site name: Albatross

Your Order No: 14-451-SE-G

Lab Sample Number				1673045
Sample Reference				WS120
Sample Number				None Supplied
Depth (m)				1.00
Date Sampled				03/11/2020
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Petroleum Hydrocarbons				
TPH1 (C10 - C40)	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-39481
Project / Site name: Albatross

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1673041	WS118	None Supplied	0.8	Brown loam and sand with vegetation.
1673042	WS119	None Supplied	0.1	Brown loam and sand with vegetation.
1673043	WS120	None Supplied	0.2	Brown loam and sand with vegetation.
1673044	WS121	None Supplied	0.1	Brown loam and sand with vegetation.

Analytical Report Number : 20-39481
Project / Site name: Albatross

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in leachate - LOW LEVEL 1 ug/l	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In house method.	L005-PL	W	ISO 17025
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS

Analytical Report Number : 20-39481
Project / Site name: Albatross

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 20-39827

Project / Site name:	Albatross	**Samples received on:**	05/11/2020
Your job number:		**Samples instructed on/ Analysis started on:**	05/11/2020
Your order number:	14-451-SE-G	**Analysis completed by:**	12/11/2020
Report Issue Number:	1	**Report issued on:**	12/11/2020
Samples Analysed:	1 leachate sample - 3 soil samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 20-39827
Project / Site name: Albatross
Your Order No: 14-451-SE-G

Lab Sample Number				1675011	1675012	1675013
Sample Reference				WS123	WS124	WS125
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.10	0.10
Date Sampled				04/11/2020	04/11/2020	04/11/2020
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1
Moisture Content	%	0.01	NONE	5.9	17	18
Total mass of sample received	kg	0.001	NONE	0.5	0.5	0.5
Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected
General Inorganics						
pH - Automated	pH Units	N/A	MCERTS	-	8.7	-
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1
Total Sulphate as SO4	mg/kg	50	MCERTS	-	610	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	g/l	0.00125	MCERTS	-	0.07	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/kg	2.5	MCERTS	-	140	-
Water Soluble SO4 (2:1 Leach. Equiv.) 1hr extraction	mg/l	1.25	MCERTS	-	70.3	-
Sulphide	mg/kg	1	MCERTS	-	9.3	-
Total Sulphur	mg/kg	50	MCERTS	-	220	-
Total Organic Carbon (TOC)	%	0.1	MCERTS	-	0.6	-
Total Phenols						
Total Phenols (monohydric)	mg/kg	1	MCERTS	-	< 1.0	-
Speciated PAHs						
Naphthalene	mg/kg	0.05	MCERTS	0.98	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	0.24	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	0.49	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	0.45	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	5.3	0.33	< 0.05
Anthracene	mg/kg	0.05	MCERTS	1.8	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	12	0.57	< 0.05
Pyrene	mg/kg	0.05	MCERTS	11	0.54	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	6.8	0.39	< 0.05
Chrysene	mg/kg	0.05	MCERTS	4.6	0.3	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	5.7	0.31	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	2.5	0.24	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	5.5	0.28	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	2.4	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	0.61	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	2.6	< 0.05	< 0.05
Total PAH						
Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	62.8	2.96	< 0.80

Analytical Report Number: 20-39827
Project / Site name: Albatross
Your Order No: 14-451-SE-G

Lab Sample Number				1675011	1675012	1675013
Sample Reference				WS123	WS124	WS125
Sample Number				None Supplied	None Supplied	None Supplied
Depth (m)				0.20	1.10	0.10
Date Sampled				04/11/2020	04/11/2020	04/11/2020
Time Taken				None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**			
Heavy Metals / Metalloids						
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	12	12	8.6
Barium (aqua regia extractable)	mg/kg	1	MCERTS	140	-	89
Beryllium (aqua regia extractable)	mg/kg	0.06	MCERTS	1.1	-	0.71
Boron (water soluble)	mg/kg	0.2	MCERTS	0.3	-	0.3
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	0.6	0.3	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	-	33	-
Copper (aqua regia extractable)	mg/kg	1	MCERTS	75	29	29
Lead (aqua regia extractable)	mg/kg	1	MCERTS	34	19	23
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	23	32	22
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0
Vanadium (aqua regia extractable)	mg/kg	1	MCERTS	37	-	25
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	130	54	52
Petroleum Hydrocarbons						
TPH (C5 - C6)	mg/kg	1	NONE	< 1.0	< 1.0	< 1.0
TPH (C6 - C8)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1
TPH (C8 - C10)	mg/kg	0.1	MCERTS	< 0.1	< 0.1	< 0.1
TPH (C10 - C12)	mg/kg	2	MCERTS	9.3	2.5	12
TPH (C12 - C16)	mg/kg	4	MCERTS	15	12	25
TPH (C16 - C21)	mg/kg	1	MCERTS	44	16	25
TPH (C21 - C35)	mg/kg	1	MCERTS	88	45	59
TPH (C35 - C40)	mg/kg	10	MCERTS	19	< 10	12
TPH Total C5 - C40	mg/kg	10	MCERTS	190	80	150

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number: 20-39827
Project / Site name: Albatross

Your Order No: 14-451-SE-G

Lab Sample Number				1675014
Sample Reference				WS125
Sample Number				None Supplied
Depth (m)				1.00
Date Sampled				04/11/2020
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
General Inorganics				
pH	pH Units	N/A	ISO 17025	7.5
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0
Total Phenols				
Total Phenols (monohydric)	µg/l	1	ISO 17025	1.7
Speciated PAHs				
Naphthalene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01
Fluorene	µg/l	0.01	ISO 17025	< 0.01
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	NONE	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	NONE	< 0.01
Benzo(ghi)perylene	µg/l	0.01	NONE	< 0.01
Total PAH				
Total EPA-16 PAHs	µg/l	0.2	NONE	< 0.2
Heavy Metals / Metalloids				
Arsenic (dissolved)	µg/l	1	ISO 17025	< 1.0
Cadmium (dissolved)	µg/l	0.08	ISO 17025	< 0.08
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0
Chromium (dissolved)	µg/l	0.4	ISO 17025	1.5
Copper (dissolved)	µg/l	0.7	ISO 17025	25
Lead (dissolved)	µg/l	1	ISO 17025	3.1
Mercury (dissolved)	µg/l	0.5	ISO 17025	< 0.5
Nickel (dissolved)	µg/l	0.3	ISO 17025	1.9
Selenium (dissolved)	µg/l	4	ISO 17025	< 4.0
Zinc (dissolved)	µg/l	0.4	ISO 17025	7.7

Analytical Report Number: 20-39827
Project / Site name: Albatross

Your Order No: 14-451-SE-G

Lab Sample Number				1675014
Sample Reference				WS125
Sample Number				None Supplied
Depth (m)				1.00
Date Sampled				04/11/2020
Time Taken				None Supplied
Analytical Parameter (Leachate Analysis)	**Units**	**Limit of detection**	**Accreditation Status**	
Monoaromatics & Oxygenates				
Benzene	µg/l	1	ISO 17025	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	10	NONE	< 10
Petroleum Hydrocarbons				
TPH1 (C10 - C40)	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-39827
Project / Site name: Albatross

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

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

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1675011	WS123	None Supplied	0.2	Brown clay and sand with gravel.
1675012	WS124	None Supplied	1.1	Brown clay and loam with gravel.
1675013	WS125	None Supplied	0.1	Brown clay and loam with gravel.

Analytical Report Number : 20-39827
Project / Site name: Albatross

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In house method.	L038-PL	D	MCERTS
BS EN 12457-1 (2:1) Leachate Prep	2:1 (as recieved, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-1.	L043-PL	W	NONE
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
Metals by ICP-OES in leachate	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Hexavalent chromium in leachate	Determination of hexavalent chromium in leachate by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	ISO 17025
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method	L080-PL	W	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Monohydric phenols in leachate - LOW LEVEL 1 ug/l	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Speciated EPA-16 PAHs in leachate	Determination of PAH compounds in leachate by extraction in dichloromethane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L102B-PL	W	NONE
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In house method.	L099-PL	D	MCERTS
pH at 20oC in leachate	Determination of pH in leachate by electrometric measurement.	In house method.	L005-PL	W	ISO 17025
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS

Analytical Report Number : 20-39827
Project / Site name: Albatross

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE
Total Sulphur in soil	Determination of total sulphur in soil by extraction with aqua-regia, potassium bromide/bromate followed by ICP-OES.	In house method.	L038-PL	D	MCERTS
TPH1 (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Leachates)	Determination of dichloromethane extractable hydrocarbons in leachate by GC-MS.	In-house method	L070-PL	W	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In house method.	L009-PL	D	MCERTS
BTEX and MTBE in leachates (Monoaromatics)	Determination of BTEX and MTBE in leachates by headspace GC-MS.	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
TPH in (Soil)	Determination of TPH bands by HS-GC-MS/GC-FID	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	D	MCERTS
Total cyanide in leachate - 1µg/l	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
D.O. for Gravimetric Quant if Screen/ID positive	Dependent option for Gravimetric Quant if Screen/ID positive scheduled.	In house asbestos methods A001 & A006.	A006-PL	D	NONE
Sulphate, water soluble, in soil (1hr extraction)	Sulphate, water soluble, in soil (1hr extraction)	In-house method	L038-PL	D	MCERTS

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

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Analytical Report Number : 20-41763

Project / Site name:	Albatross+ Razorbill	**Samples received on:**	16/11/2020
Your job number:		**Samples instructed on/ Analysis started on:**	17/11/2020
Your order number:		**Analysis completed by:**	24/11/2020
Report Issue Number:	1	**Report issued on:**	24/11/2020
Samples Analysed:	4 water samples		

Signed: A. Czerwińska

Agnieszka Czerwińska
Technical Reviewer (Reporting Team)
For & on behalf of i2 Analytical Ltd.

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

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

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

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

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

Analytical Report Number: 20-41763
Project / Site name: Albatross+ Razorbill

Lab Sample Number				1686179	1686180	1686181	1686182
Sample Reference				WS109	WS112	WS119	WS123
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				13/11/2020	13/11/2020	13/11/2020	13/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
General Inorganics							
pH	pH Units	N/A	ISO 17025	7.2	7	7.5	7.4
Total Cyanide (Low Level 1 µg/l)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Dissolved Organic Carbon (DOC)	mg/l	0.1	NONE	9.88	11.8	12.7	7.94
Total Phenols							
Total Phenols (monohydric)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	3.5
Heavy Metals / Metalloids							
Calcium (dissolved)	mg/l	0.012	ISO 17025	170	100	100	110
Chromium (hexavalent)	µg/l	5	ISO 17025	< 5.0	< 5.0	< 5.0	< 5.0
Arsenic (dissolved)	µg/l	0.15	ISO 17025	1.28	0.99	1.3	1.06
Cadmium (dissolved)	µg/l	0.02	ISO 17025	0.05	0.03	0.04	0.05
Chromium (dissolved)	µg/l	0.2	ISO 17025	5.9	4.8	6.7	4.6
Copper (dissolved)	µg/l	0.5	ISO 17025	4.6	4.1	7.4	6.6
Lead (dissolved)	µg/l	0.2	ISO 17025	< 0.2	< 0.2	0.2	< 0.2
Manganese (dissolved)	µg/l	0.05	ISO 17025	250	65	0.34	24
Mercury (dissolved)	µg/l	0.05	ISO 17025	< 0.05	< 0.05	< 0.05	< 0.05
Nickel (dissolved)	µg/l	0.5	ISO 17025	8.8	3.9	3.5	5.6
Selenium (dissolved)	µg/l	0.6	ISO 17025	1.3	< 0.6	32	3.5
Zinc (dissolved)	µg/l	0.5	ISO 17025	3.4	4.5	7.3	9.2
Monoaromatics & Oxygenates							
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
p & m-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
o-xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Petroleum Hydrocarbons							
TPH1 (C10 - C40)	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C5 - C6	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C6 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aliphatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aliphatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C5 - C7	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C7 - C8	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C8 - C10	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
TPH-CWG - Aromatic >C10 - C12	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C12 - C16	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic >C16 - C21	µg/l	10	NONE	< 10	< 10	< 10	< 10

Analytical Report Number: 20-41763
Project / Site name: Albatross+ Razorbill

Lab Sample Number				1686179	1686180	1686181	1686182
Sample Reference				WS109	WS112	WS119	WS123
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				13/11/2020	13/11/2020	13/11/2020	13/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
TPH-CWG - Aromatic >C21 - C35	µg/l	10	NONE	< 10	< 10	< 10	< 10
TPH-CWG - Aromatic (C5 - C35)	µg/l	10	NONE	< 10	< 10	< 10	< 10

Analytical Report Number: 20-41763
Project / Site name: Albatross+ Razorbill

Lab Sample Number				1686179	1686180	1686181	1686182
Sample Reference				WS109	WS112	WS119	WS123
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				13/11/2020	13/11/2020	13/11/2020	13/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
VOCs							
Chloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Chloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Bromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Vinyl Chloride	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
Trichlorofluoromethane	µg/l	1	NONE	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloro-1,2,2-trifluoroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
MTBE (Methyl Tertiary Butyl Ether)	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
2,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Trichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1-Dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,2-dichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Benzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Trichloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Dibromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Bromodichloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Cis-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Trans-1,3-dichloropropene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2-Trichloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Dibromochloromethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Tetrachloroethene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromoethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Chlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1,1,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
p & m-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Styrene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Tribromomethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
o-Xylene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,1,2,2-Tetrachloroethane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Isopropylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Bromobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
n-Propylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
2-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
4-Chlorotoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,3,5-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
tert-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trimethylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
sec-Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,3-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
p-Isopropyltoluene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0

Analytical Report Number: 20-41763
Project / Site name: Albatross+ Razorbill

Lab Sample Number				1686179	1686180	1686181	1686182
Sample Reference				WS109	WS112	WS119	WS123
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				13/11/2020	13/11/2020	13/11/2020	13/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
1,2-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,4-Dichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Butylbenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2-Dibromo-3-chloropropane	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2,4-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
Hexachlorobutadiene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0
1,2,3-Trichlorobenzene	µg/l	1	ISO 17025	< 1.0	< 1.0	< 1.0	< 1.0

Analytical Report Number: 20-41763
Project / Site name: Albatross+ Razorbill

Lab Sample Number				1686179	1686180	1686181	1686182
Sample Reference				WS109	WS112	WS119	WS123
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				13/11/2020	13/11/2020	13/11/2020	13/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
SVOCs							
Aniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Phenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Chlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,3-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,2-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,4-Dichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroisopropyl)ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Hexachloroethane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Nitrobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Isophorone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Nitrophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,4-Dimethylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bis(2-chloroethoxy)methane	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
1,2,4-Trichlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Naphthalene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobutadiene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Chloro-3-methylphenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,4,6-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,4,5-Trichlorophenol	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Methylnaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2-Chloronaphthalene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Dimethylphthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
2,6-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Acenaphthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
2,4-Dinitrotoluene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Dibenzofuran	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Chlorophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Diethyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
4-Nitroaniline	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Azobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Bromophenyl phenyl ether	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Hexachlorobenzene	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Carbazole	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Dibutyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Anthraquinone	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Butyl benzyl phthalate	µg/l	0.05	NONE	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Chrysene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01

Analytical Report Number: 20-41763
Project / Site name: Albatross+ Razorbill

Lab Sample Number				1686179	1686180	1686181	1686182
Sample Reference				WS109	WS112	WS119	WS123
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				None Supplied	None Supplied	None Supplied	None Supplied
Date Sampled				13/11/2020	13/11/2020	13/11/2020	13/11/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Water Analysis)	**Units**	**Limit of detection**	**Accreditation Status**				
Benzo(b)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(k)fluoranthene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(a)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Indeno(1,2,3-cd)pyrene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Dibenz(a,h)anthracene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01
Benzo(ghi)perylene	µg/l	0.01	ISO 17025	< 0.01	< 0.01	< 0.01	< 0.01

U/S = Unsuitable Sample I/S = Insufficient Sample

Analytical Report Number : 20-41763
Project / Site name: Albatross+ Razorbill

Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Metals in water by ICP-MS (dissolved)	Determination of metals in water by acidification followed by ICP-MS. Accredited Matrices: SW, GW, PW except B=SW,GW, Hg=SW,PW, Al=SW,PW.	In-house method based on USEPA Method 6020 & 200.8 "for the determination of trace elements in water by ICP-MS.	L012-PL	W	ISO 17025
Metals in water by ICP-OES (dissolved)	Determination of metals in water by acidification followed by ICP-OES. Accredited Matrices SW, GW, PW, PrW.(Al, Cu,Fe,Zn).	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L039-PL	W	ISO 17025
Hexavalent chromium in water	Determination of hexavalent chromium in water by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry.	In-house method by continuous flow analyser. Accredited Matrices SW, GW, PW.	L080-PL	W	ISO 17025
Monohydric phenols in water - LOW LEVEL 1 ug/l	Determination of phenols in water by continuous flow analyser. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	ISO 17025
Semi-volatile organic compounds in water	Determination of semi-volatile organic compounds in leachate by extraction in dichloromethane followed by GC-MS.	In-house method based on USEPA 8270	L102B-PL	W	NONE
TPH1 (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS.	In-house method	L070-PL	W	NONE
TPHCWG (Waters)	Determination of dichloromethane extractable hydrocarbons in water by GC-MS, speciation by interpretation.	In-house method	L070-PL	W	NONE
Volatile organic compounds in water	Determination of volatile organic compounds in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Dissolved Organic Carbon in water	Determination of dissolved inorganic carbon in water by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
BTEX and MTBE in water (Monoaromatics)	Determination of BTEX and MTBE in water by headspace GC-MS. Accredited matrices: SW PW GW	In-house method based on USEPA8260	L073B-PL	W	ISO 17025
Low level total cyanide in water	Determination of total cyanide by distillation followed by colorimetry. Accredited matrices: SW PW GW	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	ISO 17025
pH at 20oC in water (automated)	Determination of pH in water by electrometric measurement. Accredited matrices: SW PW GW	In house method.	L099-PL	W	ISO 17025

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

Sample Deviation Report

Analytical Report Number : 20-41763
Project / Site name: Albatross+ Razorbill

Sample ID	Other ID	Sample Type	Lab Sample Number	Sample Deviation	Test Name	Test Ref	Test Deviation
WS109	None Supplied	W	1686179	c	pH at 20oC in water (automated)	L099-PL	c
WS112	None Supplied	W	1686180	c	pH at 20oC in water (automated)	L099-PL	c
WS119	None Supplied	W	1686181	c	pH at 20oC in water (automated)	L099-PL	c
WS123	None Supplied	W	1686182	c	pH at 20oC in water (automated)	L099-PL	c

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

APPENDIX VII
ORIGIN OF TIER I GENERIC ASSESSMENT CRITERIA

CONSTITUENT	ORIGIN OF RISK ASSESSMENT VALUE
Arsenic	2014 LQM/CIEH S4ULs
Cadmium	2014 LQM/CIEH S4ULs
Chromium	2014 LQM/CIEH S4ULs
Lead	2014 LQM/CIEH S4ULs
Mercury	2014 LQM/CIEH S4ULs – methylmercury
Nickel	2014 LQM/CIEH S4ULs
Selenium	2014 LQM/CIEH S4ULs
Copper	2014 LQM/CIEH S4ULs
Zinc	2014 LQM/CIEH S4ULs
Cyanide – Total	2014 LQM/CIEH S4ULs
Phenols – Total	2014 LQM/CIEH S4ULs
Naphthalene	General assessment criteria (GAC) developed by CIEH/LQM Suitable 4 Use Levels with supporting data from SR3, SR7 and existing Tox report where applicable. 1% SOM.
Acenaphthylene	
Acenaphthene	
Fluorene	
Phenanthrene	
Anthracene	
Fluoranthene	
Pyrene	
Benzo(a)Anthracene	
Chrysene	
Benzo(b/k)Fluoranthene [iii]	
Benzo(a)Pyrene	
Indeno(123-cd)Pyrene	
Dibenzo(a,h)Anthracene	
Benzo(ghi)Perylene	
TPH C_5-C_6 (aliphatic)	
TPH C_6-C_8 (aliphatic)	
TPH C_8-C_{10} (aliphatic)	
TPH C_{10}-C_{12} (aliphatic)	
TPH C_{12}-C_{16} (aromatic)	
TPH C_{16}-C_{21} (aromatic)	
TPH C_{21}-C_{35} (aromatic)	

APPENDIX VIII
GEOTECHNICAL TESTING RESULTS

LABORATORY REPORT

4043

Contract Number: PSL20/6283

Report Date: 07 December 2020

Client's Reference: 14-451

Client Name: E3P
Taylor Road
Urmston
Manchester
M41 7JQ

For the attention of: Matt Jackson

Contract Title: Albatross and Razorbill

Date Received: 10/11/2020
Date Commenced: 10/11/2020
Date Completed: 7/12/2020

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

S Royle (Laboratory Manager)
A Watkins (Director)
R Berriman (Quality Manager)

H Daniels (Senior Technician)
S Eyre (Senior Technician)
L Knight (Senior Technician)

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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS101		Liner	1.50	2.00	Dark brown gravelly slightly sandy CLAY.
WS101		D	1.00	1.45	Dark brown slightly gravelly slightly sandy CLAY.
WS101		D	2.00	2.45	Brown slightly gravelly sandy CLAY.
WS102		Liner	0.50	1.00	MADE GROUND brown slightly gravelly very sandy clay.
WS102		D	2.00	2.45	Brown slightly gravelly sandy CLAY.
WS103		Liner	2.50	3.00	Stiff brown slightly gravelly sandy CLAY.
WS103		D	1.00	1.45	Brown mottled grey slightly gravelly sandy CLAY.
WS103		D	2.00	2.45	Brown slightly gravelly sandy CLAY.
WS105		D	2.00	2.45	Brown slightly gravelly sandy CLAY.
WS106		Liner	2.50	3.00	Firm brown slightly gravelly sandy CLAY.
WS106		D	1.00	1.45	MADE GROUND brown slightly gravelly sandy clay.
WS107		D	1.00	1.45	Brown slightly gravelly sandy CLAY.
WS108		Liner	0.50	1.00	Firm brown slightly gravelly sandy CLAY.
WS108		D	2.00	2.45	Brown slightly gravelly sandy CLAY.
WS109		D	1.00	1.45	Brown slightly gravelly sandy CLAY.
WS110		D	1.00	1.45	Brown slightly gravelly sandy CLAY.
WS111		Liner	1.50	2.00	Very stiff brown slightly gravelly sandy CLAY.
WS111		D	1.00	1.45	Brown slightly gravelly sandy CLAY.
WS112		Liner	1.50	2.00	Very stiff brown slightly gravelly sandy CLAY.

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS112		D	2.00	2.45	Brown slightly gravelly sandy CLAY.
WS114		Liner	0.50	1.00	Brown slightly gravelly sandy CLAY.
WS114		D	1.00	1.45	Brown slightly gravelly sandy CLAY.
WS115		Liner	1.50	2.00	Firm brown slightly gravelly sandy CLAY.
WS115		D	2.00	2.45	Brown slightly gravelly sandy CLAY.
WS116		D	1.00	1.45	Brown slightly gravelly sandy CLAY.
WS117		Liner	1.50	2.00	Firm brown slightly gravelly sandy CLAY.
WS117		D	1.00	1.45	Brown slightly gravelly sandy CLAY.
WS123		D	1.00	1.45	Brown slightly gravelly sandy CLAY.
WS123		Liner	2.50	3.00	Very stiff brown slightly gravelly sandy CLAY.
WS124		D	2.00	2.45	Brown slightly gravelly sandy CLAY.
WS125		Liner	1.50	2.00	Brown slightly gravelly sandy CLAY.
WS118		D	1.00	1.45	MADE GROUND dark brown gravelly sandy clay.
WS118		D	2.00	2.45	Brown slightly gravelly sandy CLAY.
WS118		Liner	1.50	2.00	Soft brown gravelly sandy CLAY.
WS119		D	1.00	1.45	Brown slightly gravelly sandy CLAY.
WS120		D	2.00	2.45	Brown slightly gravelly sandy CLAY.
WS120		Liner	2.50	3.00	Firm brown slightly gravelly sandy CLAY.
WS121		D	1.00	1.45	Brown slightly gravelly sandy CLAY.

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
WS121		D	2.00	2.45	Brown slightly gravelly sandy CLAY.
WS121		Liner	0.50	1.00	Stiff brown slightly gravelly sandy CLAY.

UKAS TESTING
4043

PSL
Professional Soils Laboratory

Albatross and Razorbill

Contract No:
PSL20/6283
Client Ref:
14-451

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS101		D	1.00	1.45	33			50	25	25	93	High Plasticity CH
WS101		D	2.00	2.45	23			42	21	21	94	Intermediate Plasticity CI
WS102		D	2.00	2.45	21			40	20	20	92	Intermediate Plasticity CI
WS103		D	1.00	1.45	38			45	21	24	97	Intermediate Plasticity CI
WS103		D	2.00	2.45	24			47	22	25	94	Intermediate Plasticity CI
WS105		D	2.00	2.45	22			37	19	18	94	Intermediate Plasticity CI
WS106		D	1.00	1.45	28			55	26	29	93	High Plasticity CH
WS107		D	1.00	1.45	20			41	21	20	98	Intermediate Plasticity CI
WS108		D	2.00	2.45	18			40	20	20	91	Intermediate Plasticity CI
WS109		D	1.00	1.45	28			40	21	19	97	Intermediate Plasticity CI
WS110		D	1.00	1.45	20			42	20	22	97	Intermediate Plasticity CI
WS111		D	1.00	1.45	23			43	21	22	92	Intermediate Plasticity CI
WS112		D	2.00	2.45	18			38	19	19	90	Intermediate Plasticity CI
WS114		D	1.00	1.45	18			39	19	20	94	Intermediate Plasticity CI
WS115		D	2.00	2.45	21			48	23	25	95	Intermediate Plasticity CI
WS116		D	1.00	1.45	17			40	19	21	94	Intermediate Plasticity CI
WS117		D	1.00	1.45	17			37	18	19	92	Intermediate Plasticity CI
WS123		D	1.00	1.45	17			38	18	20	95	Intermediate Plasticity CI
WS124		D	2.00	2.45	19			41	20	21	97	Intermediate Plasticity CI

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

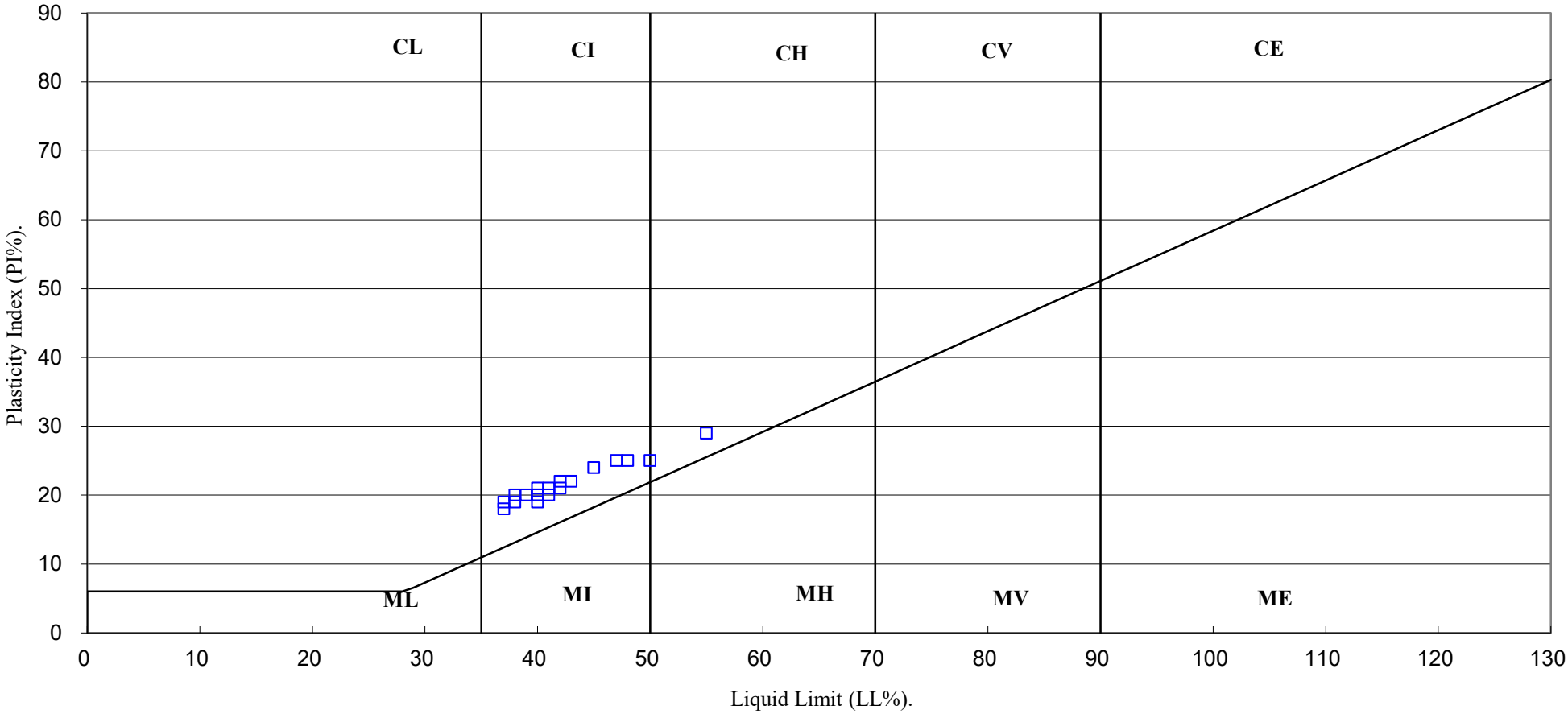
Contract No:

PSL20/6283

Client Ref:

14-451

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	Albatross and Razorbill	Contract No: PSL20/6283 Client Ref: 14-451

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
WS118		D	1.00	1.45	48			66	31	35	83	High Plasticity CH
WS118		D	2.00	2.45	22			37	18	19	98	Intermediate Plasticity CI
WS119		D	1.00	1.45	19			41	20	21	96	Intermediate Plasticity CI
WS120		D	2.00	2.45	18			39	19	20	92	Intermediate Plasticity CI
WS121		D	1.00	1.45	18			43	21	22	91	Intermediate Plasticity CI
WS121		D	2.00	2.45	19			40	20	20	94	Intermediate Plasticity CI

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

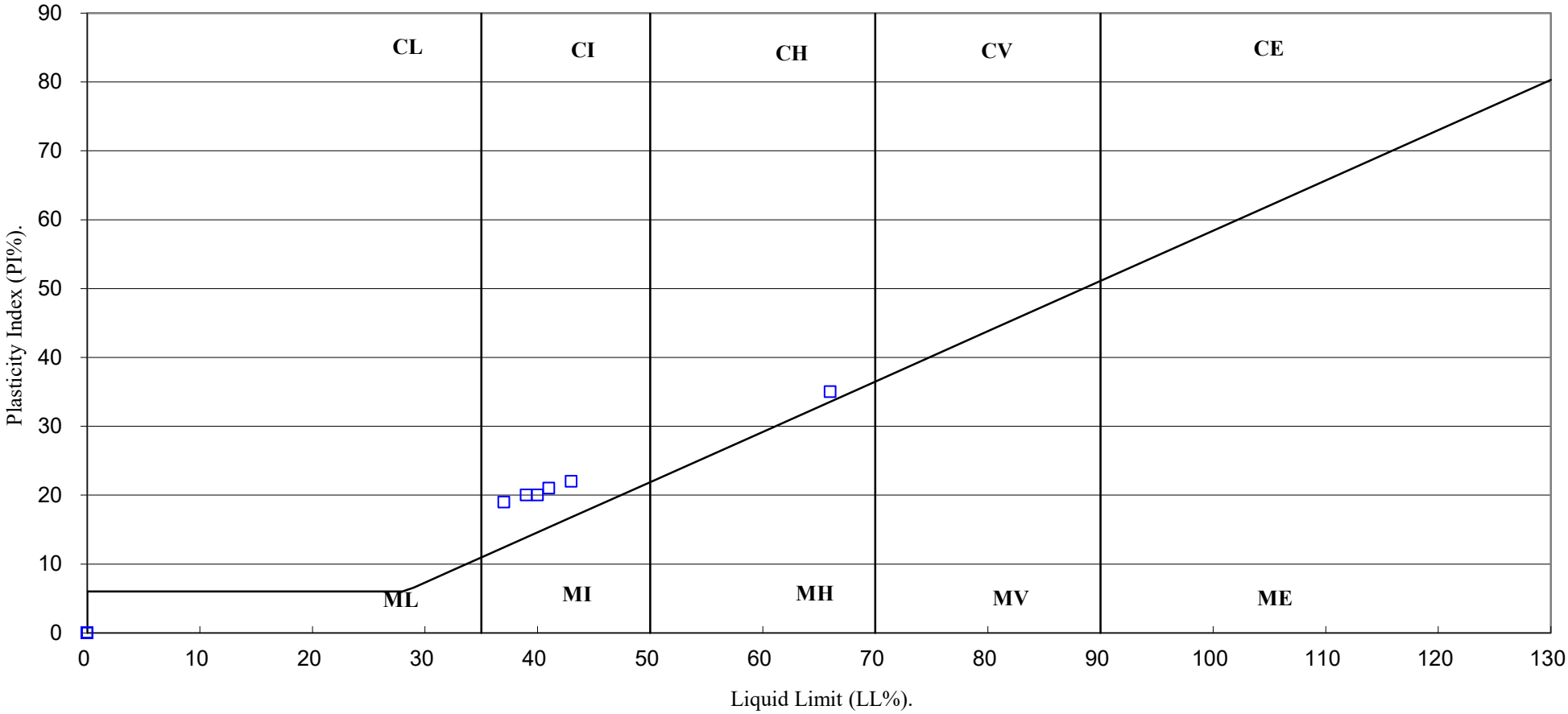
Contract No:

PSL20/6283

Client Ref:

14-451

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	Albatross and Razorbill	Contract No: PSL20/6283 Client Ref: 14-451

PARTICLE SIZE DISTRIBUTION TEST

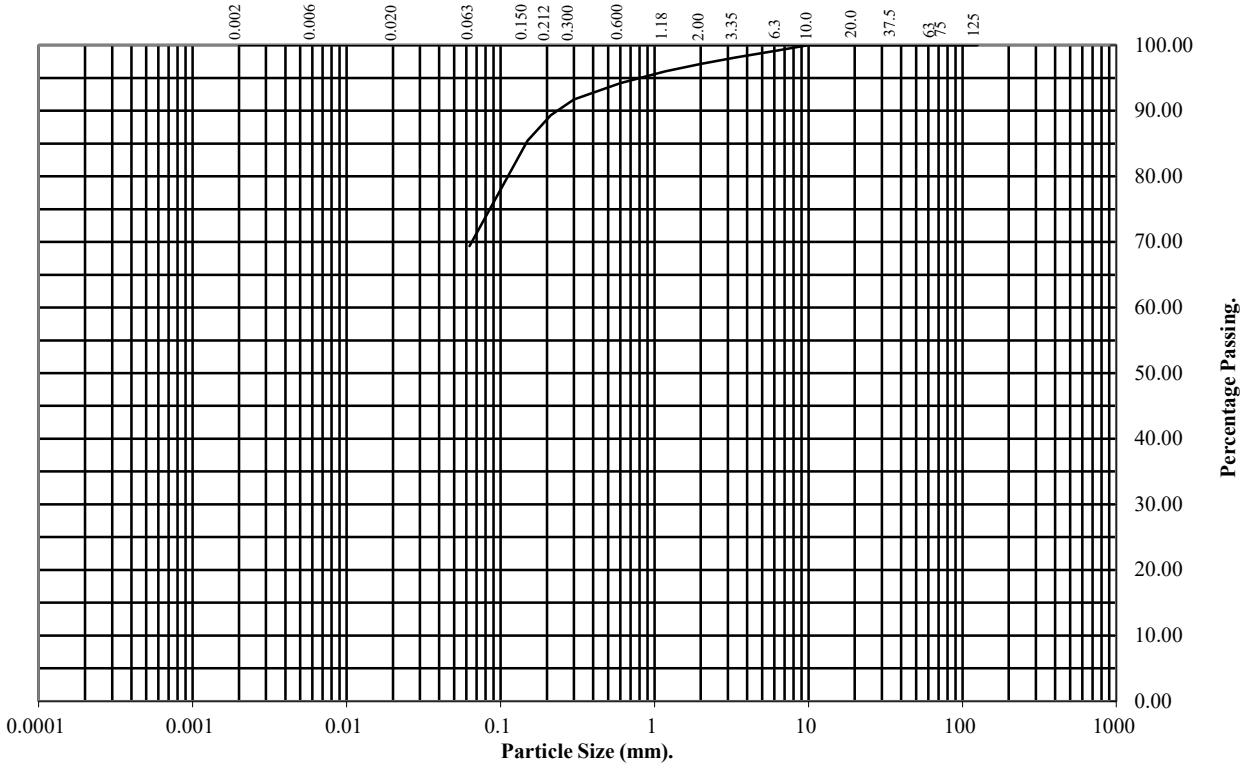
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WS102** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):** **1.00**

Sample Type: **Liner**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	98
2	97
1.18	96
0.6	94
0.3	92
0.212	89
0.15	85
0.063	69

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	28
Silt/Clay	69

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

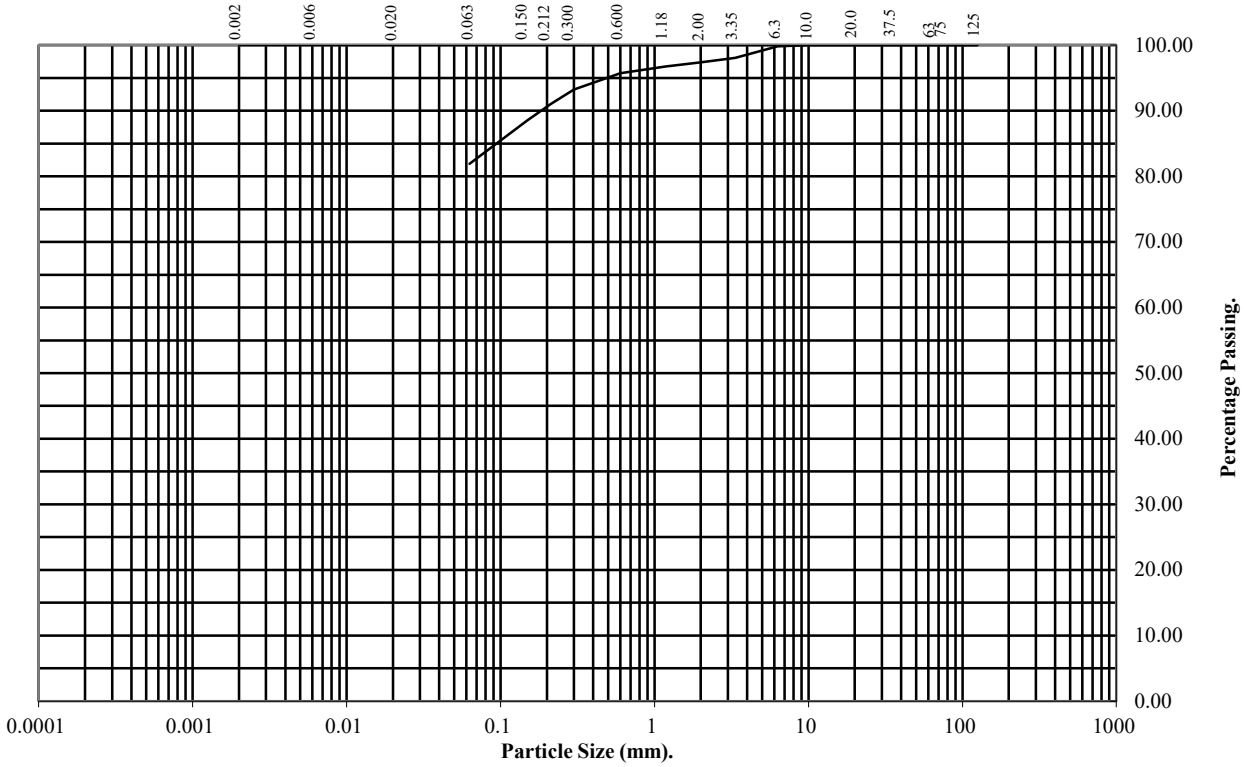
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WS108** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):** **1.00**

Sample Type: **Liner**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	98
2	97
1.18	97
0.6	96
0.3	93
0.212	91
0.15	89
0.063	82

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	15
Silt/Clay	82

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

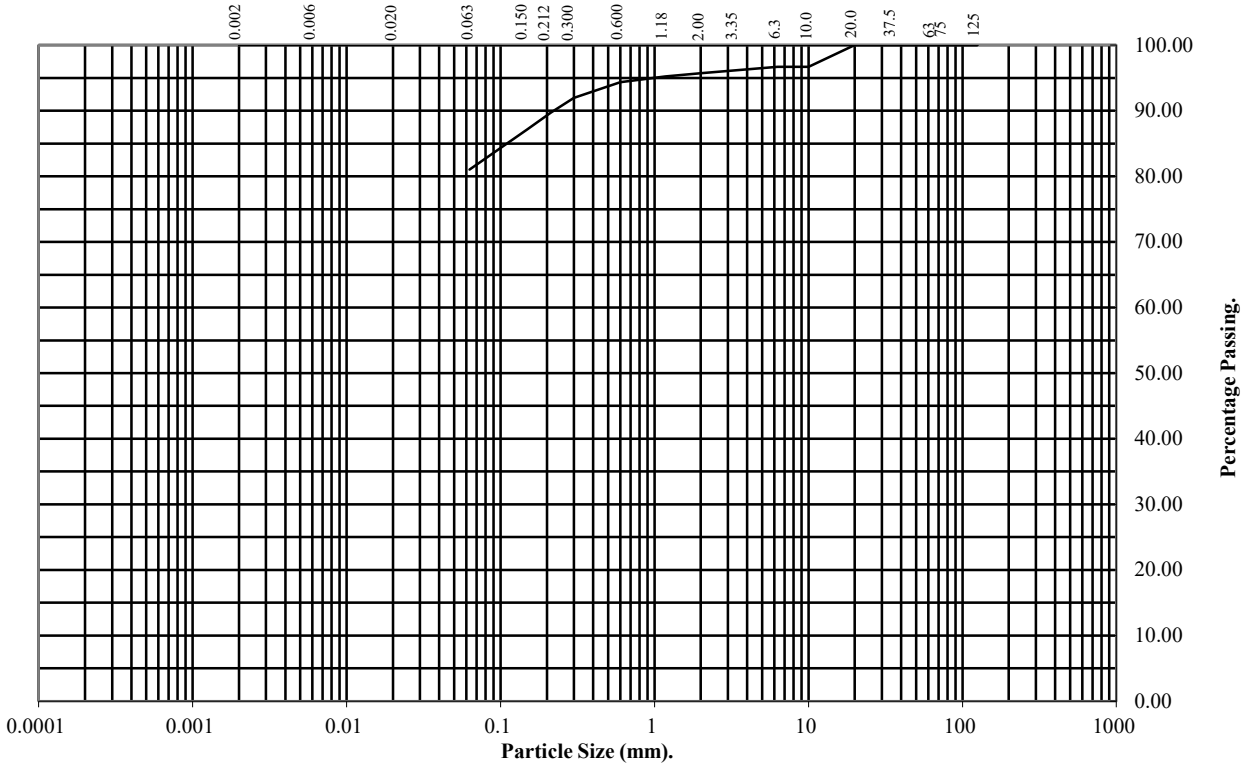
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WS114** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):** **1.00**

Sample Type: **Liner**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	97
6.3	97
3.35	96
2	96
1.18	95
0.6	94
0.3	92
0.212	90
0.15	87
0.063	81

Soil Fraction	Total Percentage
Cobbles	0
Gravel	4
Sand	15
Silt/Clay	81

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

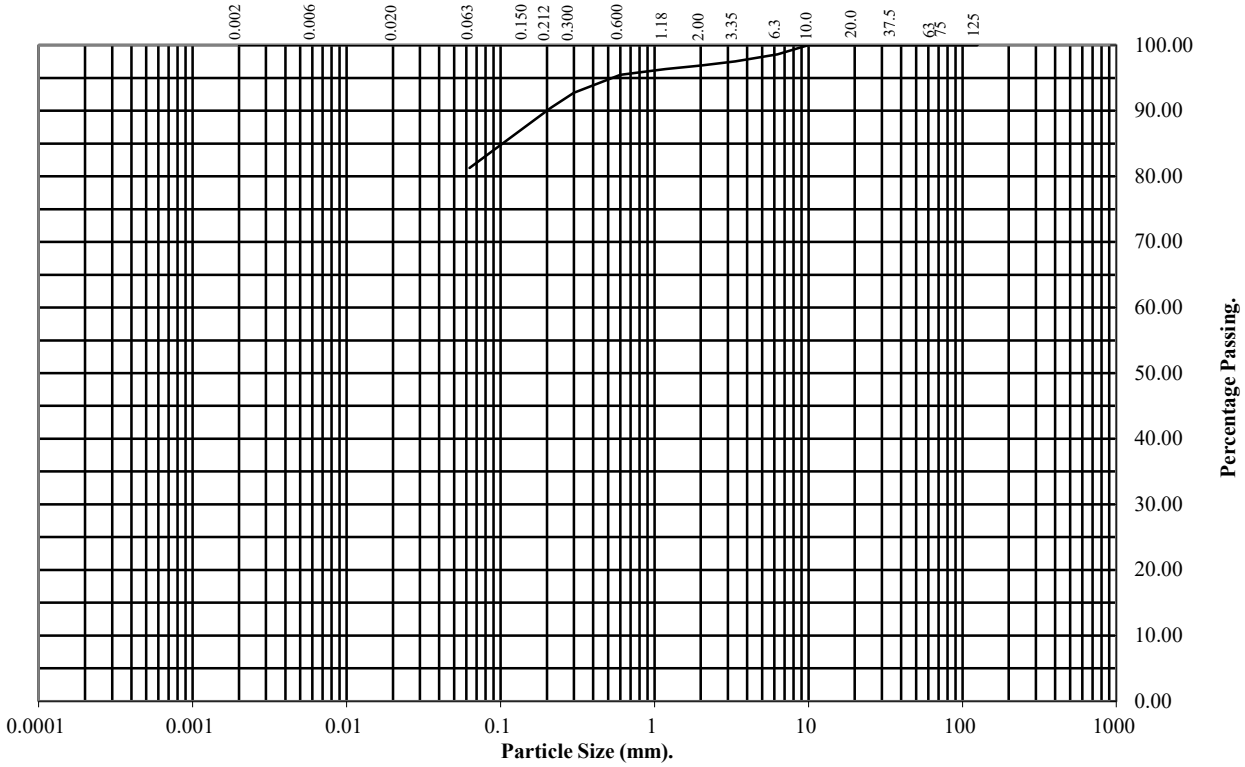
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WS117** **Top Depth (m):** **0.50**

Sample Number: **Base Depth(m):** **2.00**

Sample Type: **Liner**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	99
3.35	98
2	97
1.18	96
0.6	95
0.3	93
0.212	90
0.15	88
0.063	81

Soil Fraction	Total Percentage
Cobbles	0
Gravel	3
Sand	16
Silt/Clay	81

Remarks:

See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

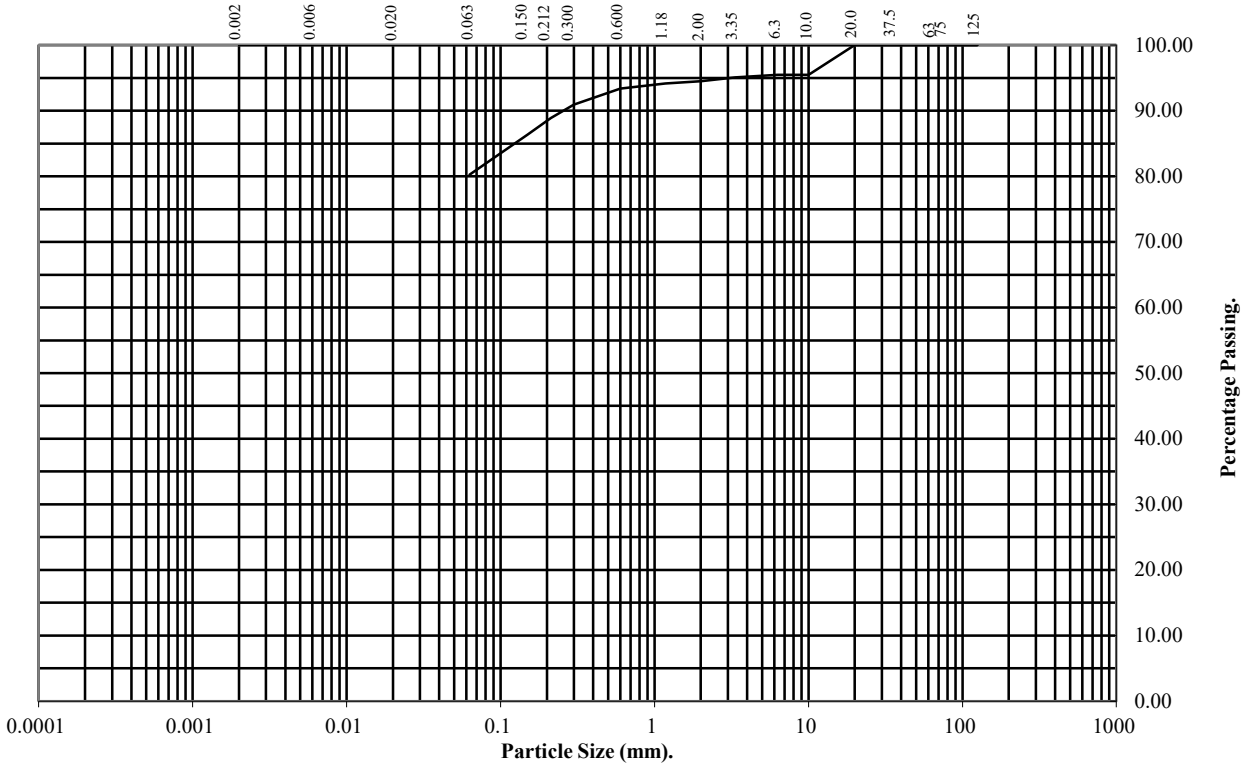
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **WS125** **Top Depth (m):** **1.50**

Sample Number: **Base Depth(m):** **2.00**

Sample Type: **Liner**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	95
6.3	95
3.35	95
2	95
1.18	94
0.6	93
0.3	91
0.212	89
0.15	86
0.063	80

Soil Fraction	Total Percentage
Cobbles	0
Gravel	5
Sand	15
Silt/Clay	80

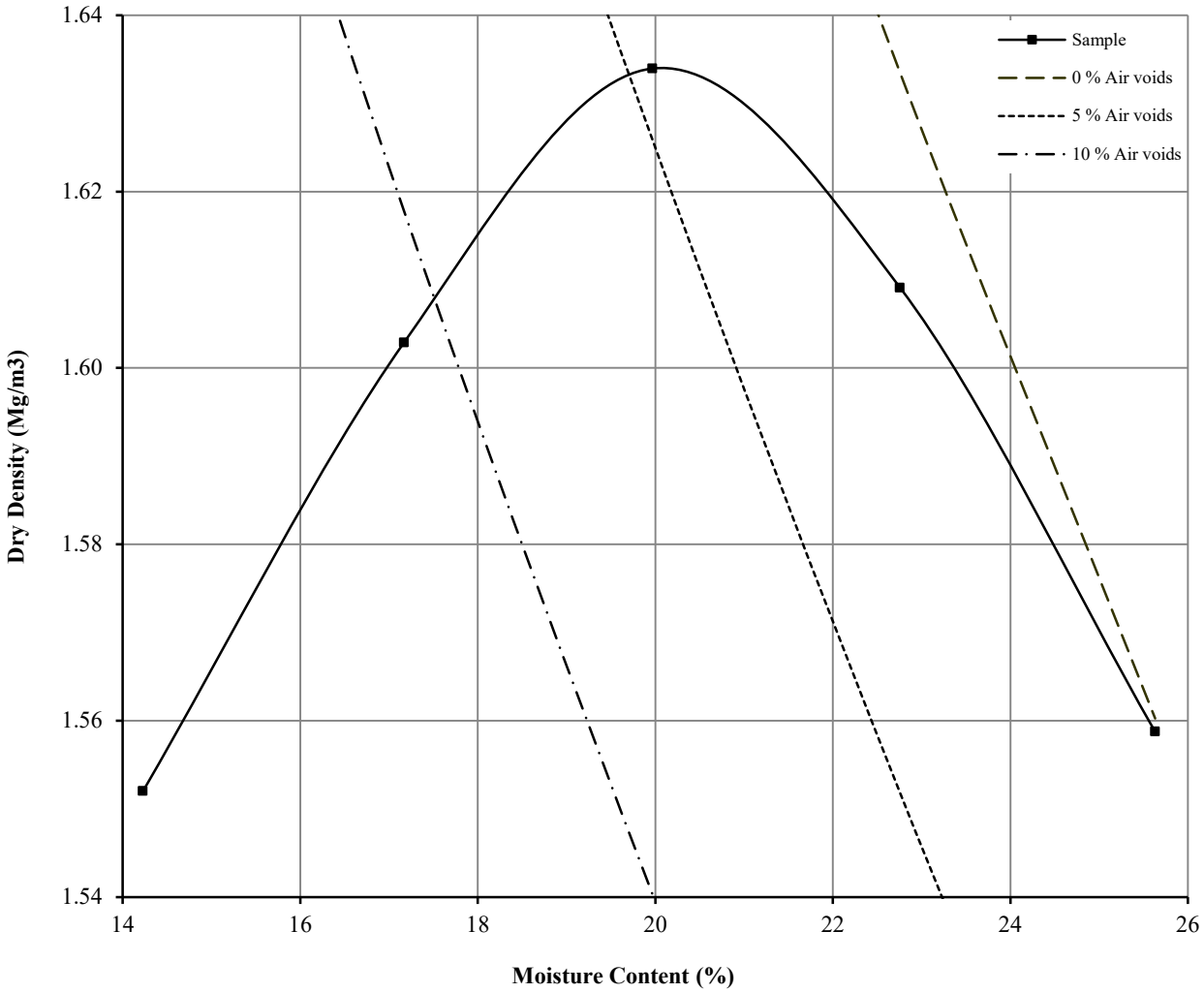
Remarks:

See Summary of Soil Descriptions

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.3 : 1990

Hole Number:	**WS102**	**Top Depth (m) :**	**0.50**
Sample Number:		**Base Depth (m) :**	**1.00**
Sample Type:	**Liner**		

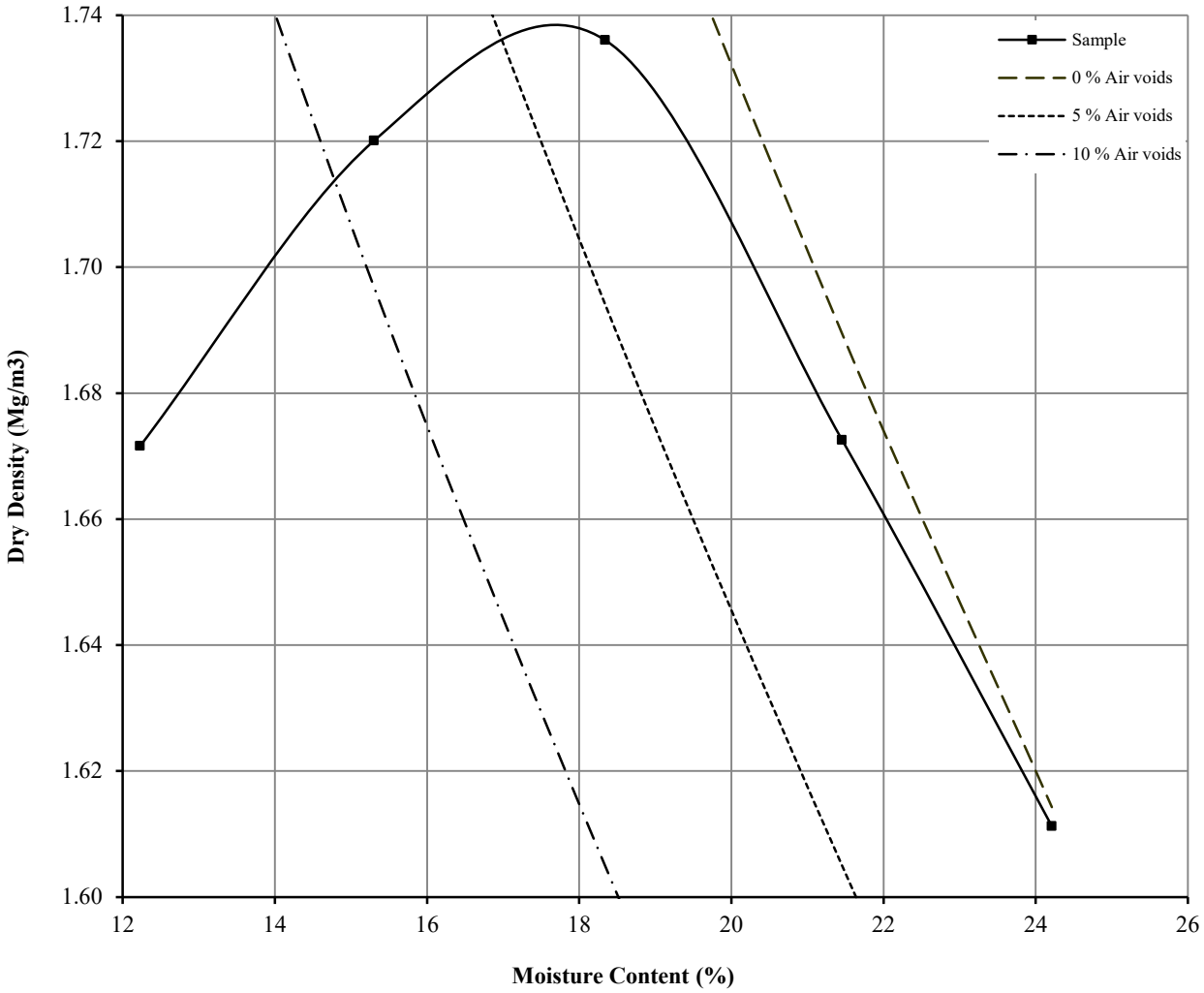


Initial Moisture Content:		26	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.6	Assumed	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.63	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		20			
Remarks See summary of soil descriptions					

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.3 : 1990

Hole Number:	**WS108**	**Top Depth (m) :**	**0.50**
Sample Number:		**Base Depth (m) :**	**1.00**
Sample Type:	**Liner**		

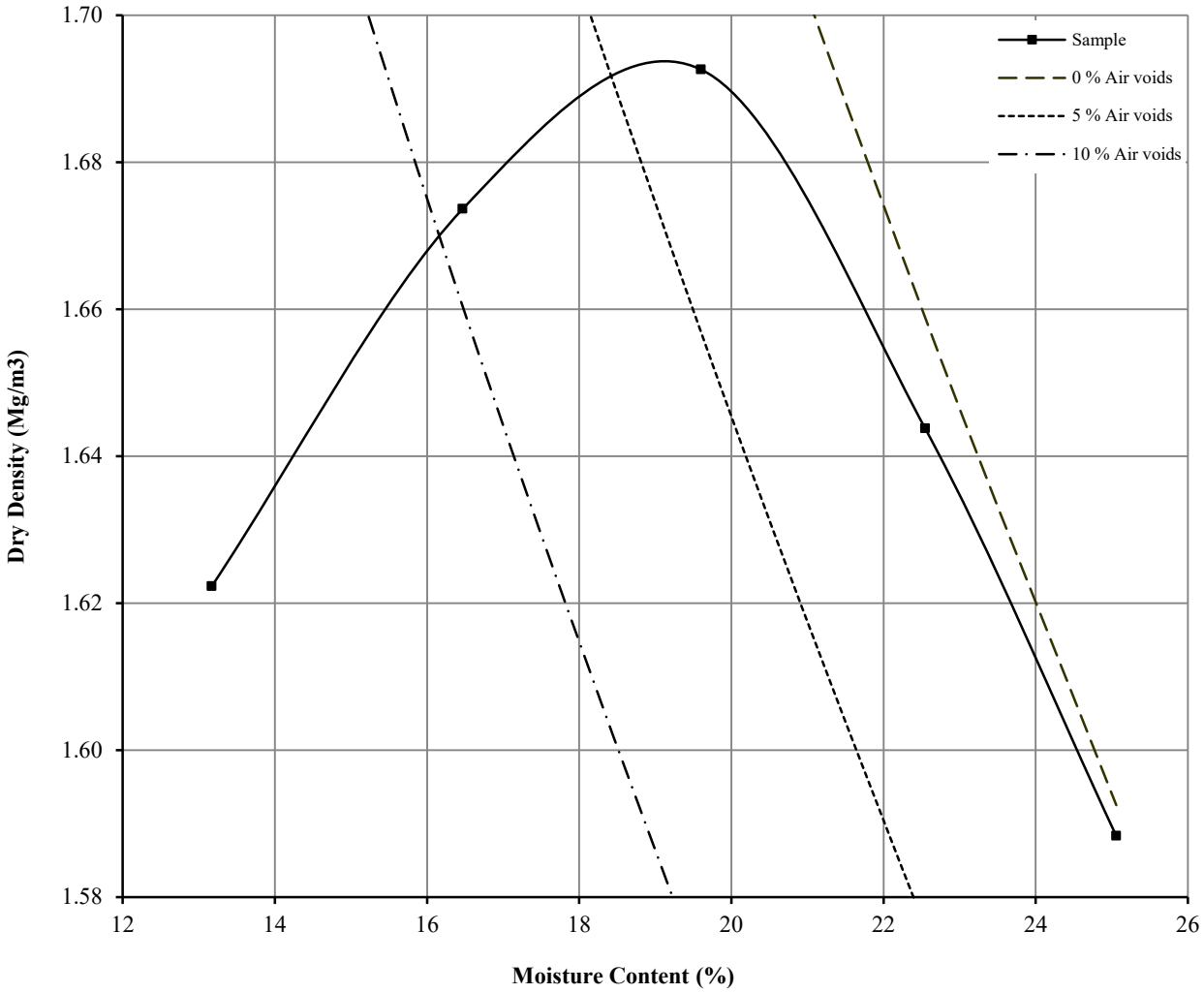


Initial Moisture Content:		21	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.74	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		18			
Remarks See summary of soil descriptions					

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.3 : 1990

Hole Number:	**WS114**	**Top Depth (m) :**	**0.50**
Sample Number:		**Base Depth (m) :**	**1.00**
Sample Type:	**Liner**		

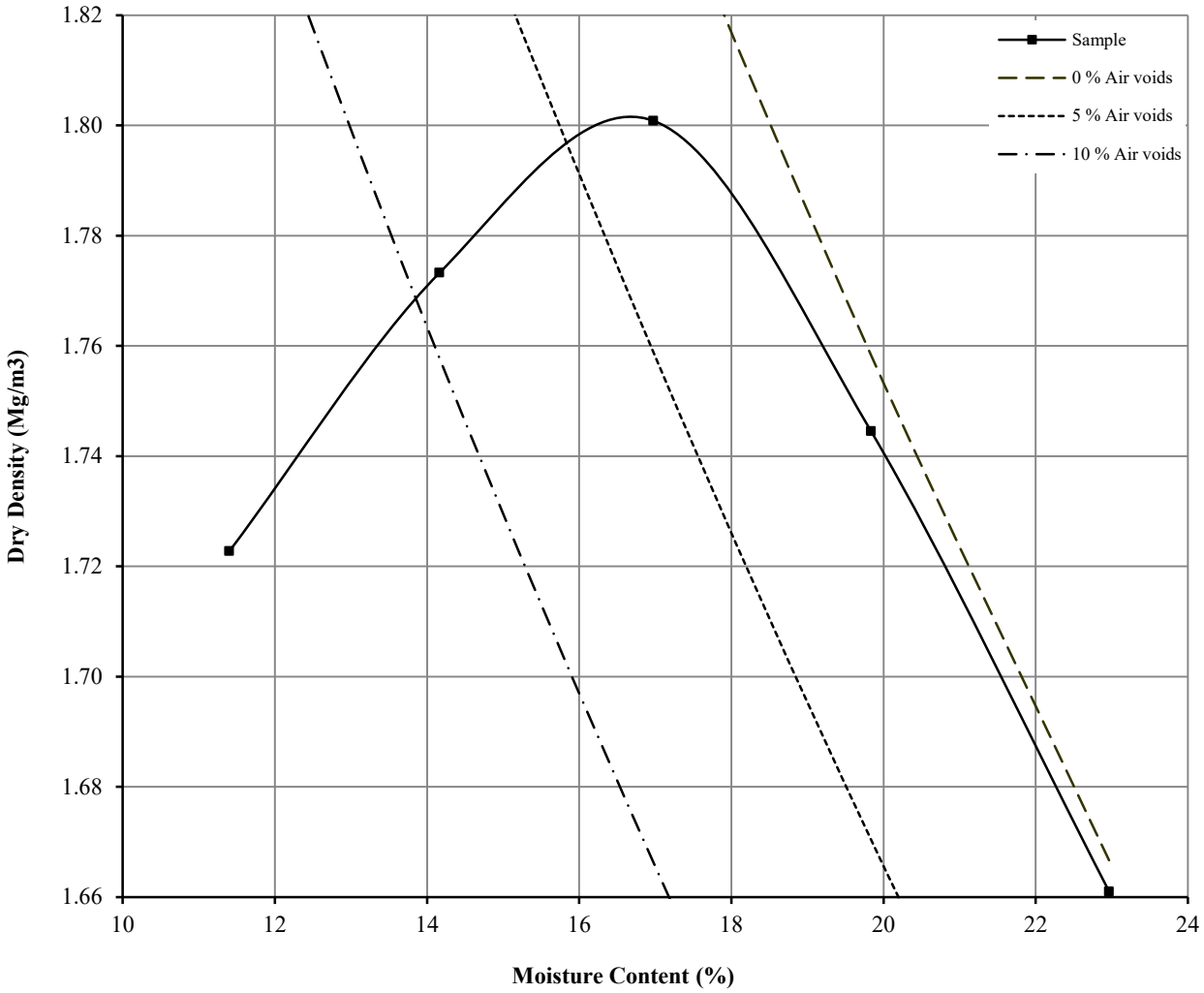


Initial Moisture Content:		23	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.69	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		20			
Remarks See summary of soil descriptions					

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.3 : 1990

Hole Number:	**WS117**	**Top Depth (m) :**	**1.50**
Sample Number:		**Base Depth (m) :**	**2.00**
Sample Type:	**Liner**		

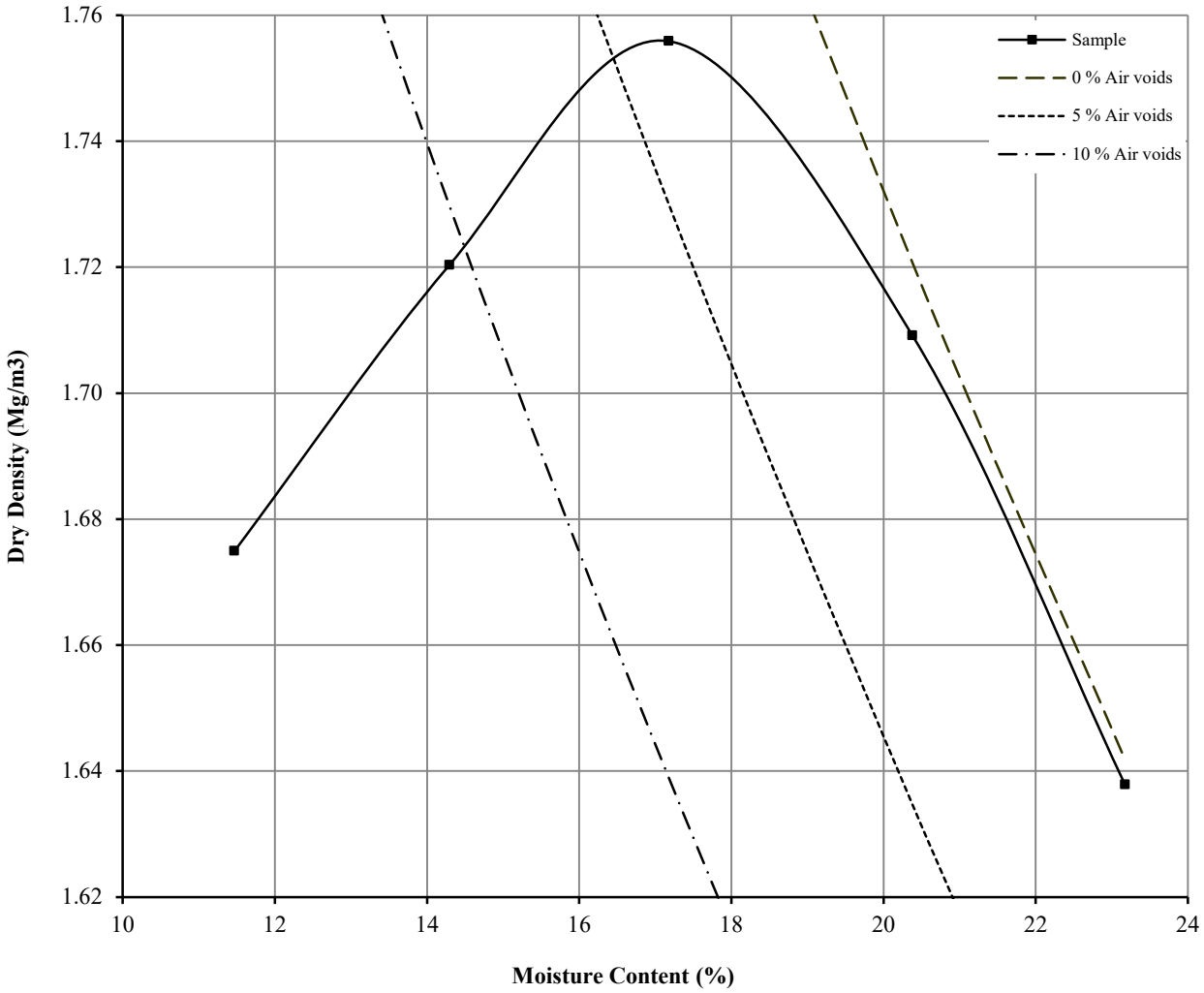


Initial Moisture Content:		20	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.7	Assumed	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.80	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		17			
Remarks See summary of soil descriptions					

DRY DENSITY / MOISTURE CONTENT RELATIONSHIP

BS 1377 : Part 4 : Clause 3.3 : 1990

Hole Number:	**WS125**	**Top Depth (m) :**	**1.50**
Sample Number:		**Base Depth (m) :**	**2.00**
Sample Type:	**Liner**		



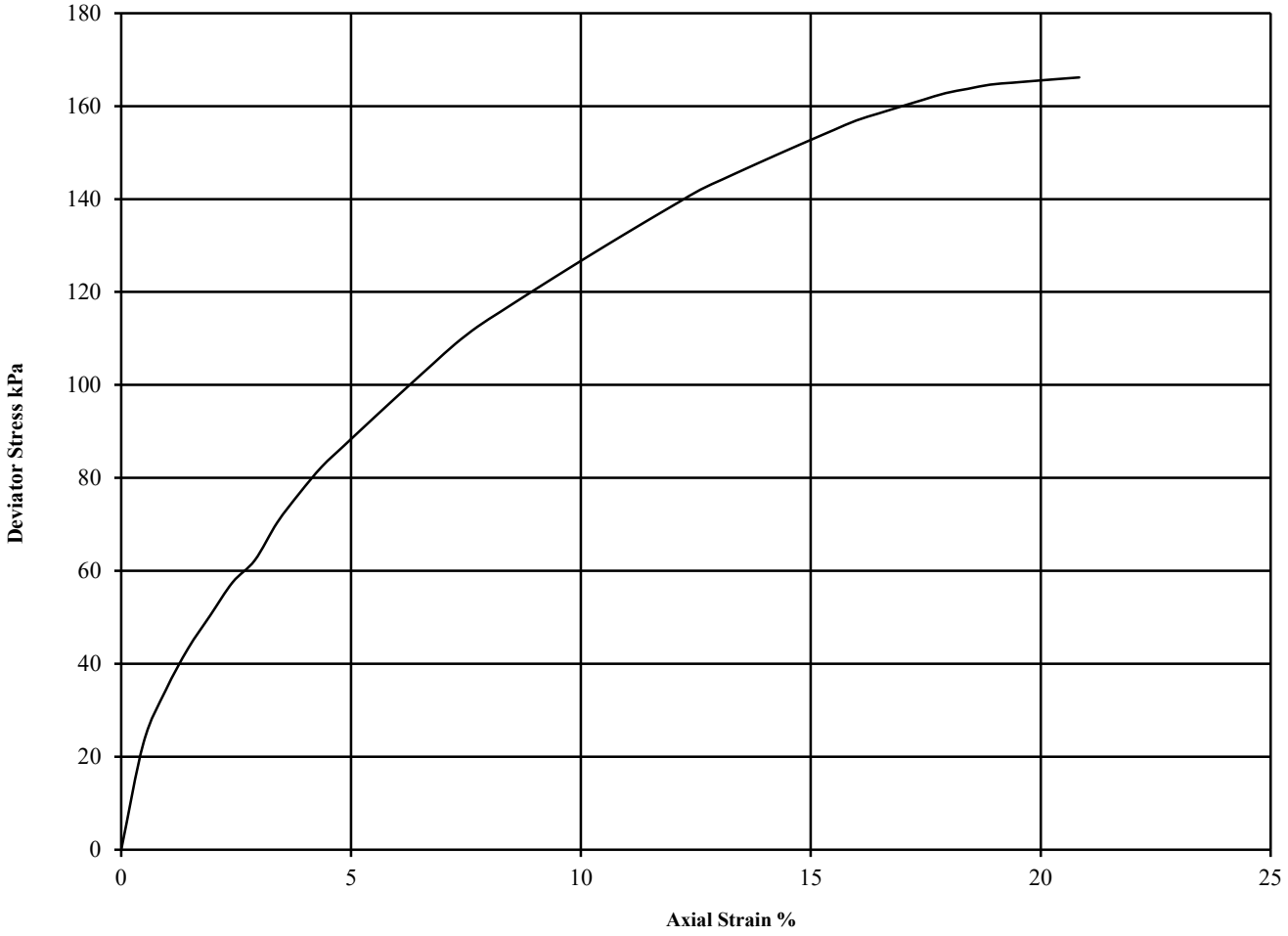
Initial Moisture Content:		20	Method of Compaction:	2.5kg	Separate Samples
Particle Density (Mg/m3):	2.65	Assumed	Material Retained on 37.5 mm Test Sieve (%):		0
Maximum Dry Density (Mg/m3):		1.76	Material Retained on 20.0 mm Test Sieve (%):		0
Optimum Moisture Content (%):		17			
Remarks See summary of soil descriptions					

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**WS103**	**Top Depth (m):**	**2.50**
Sample Number:		**Base Depth (m):**	**3.00**
Sample Type	**Liner**		



Diameter (mm):		63	Height (mm):		130	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.49
1	20	2.10	1.75	75	166	83	20.8	Plastic	See summary of soil descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

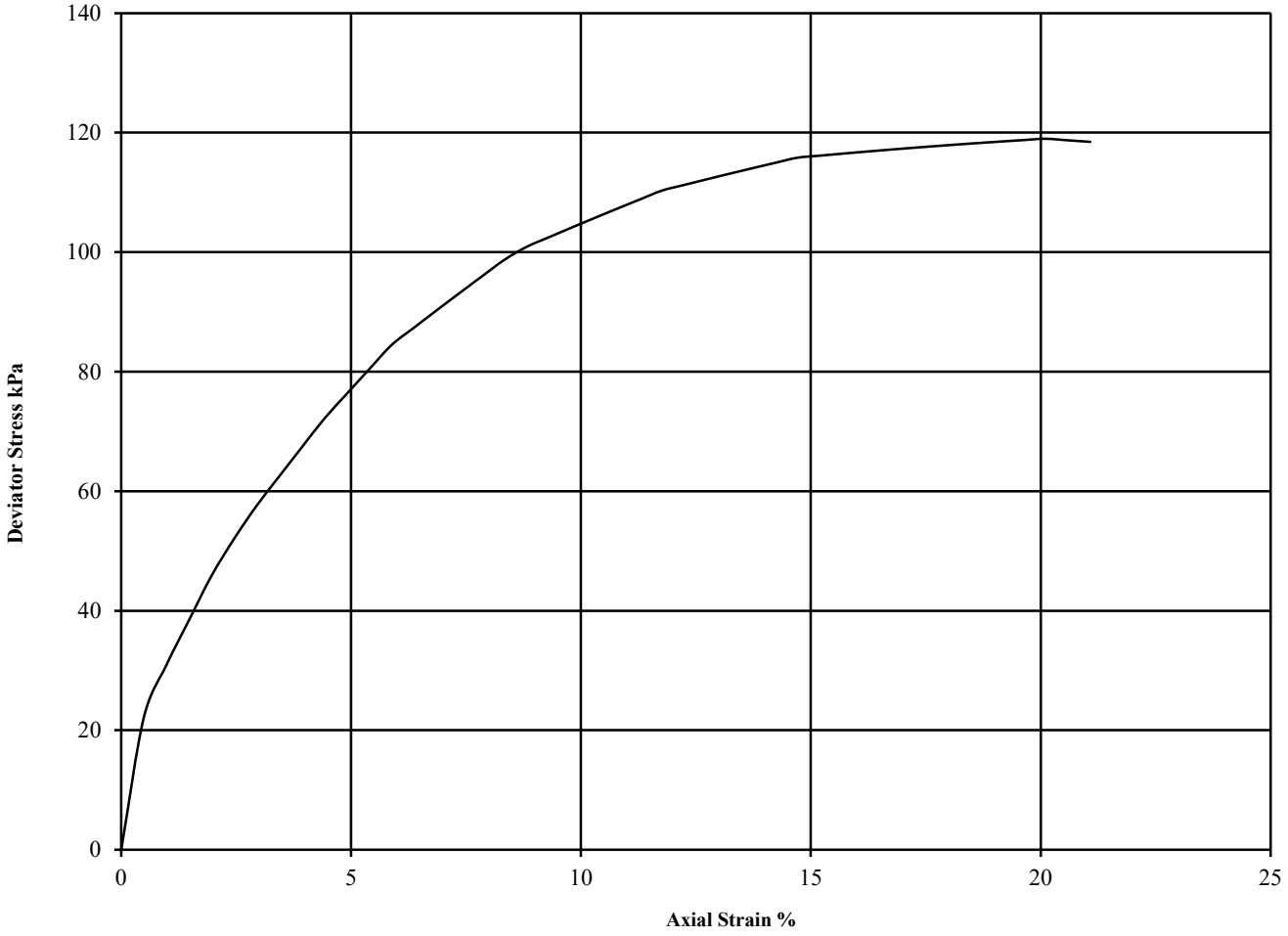
Contract No:
PSL20/6283
Client Ref:
14-451

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**WS106**	**Top Depth (m):**	**2.50**
Sample Number:		**Base Depth (m):**	**3.00**
Sample Type	**Liner**		



Diameter (mm):		75	Height (mm):		153	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.43
1	21	2.06	1.71	55	119	59	20.1	Plastic	See summary of soil descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

Contract No:
PSL20/6283
Client Ref:
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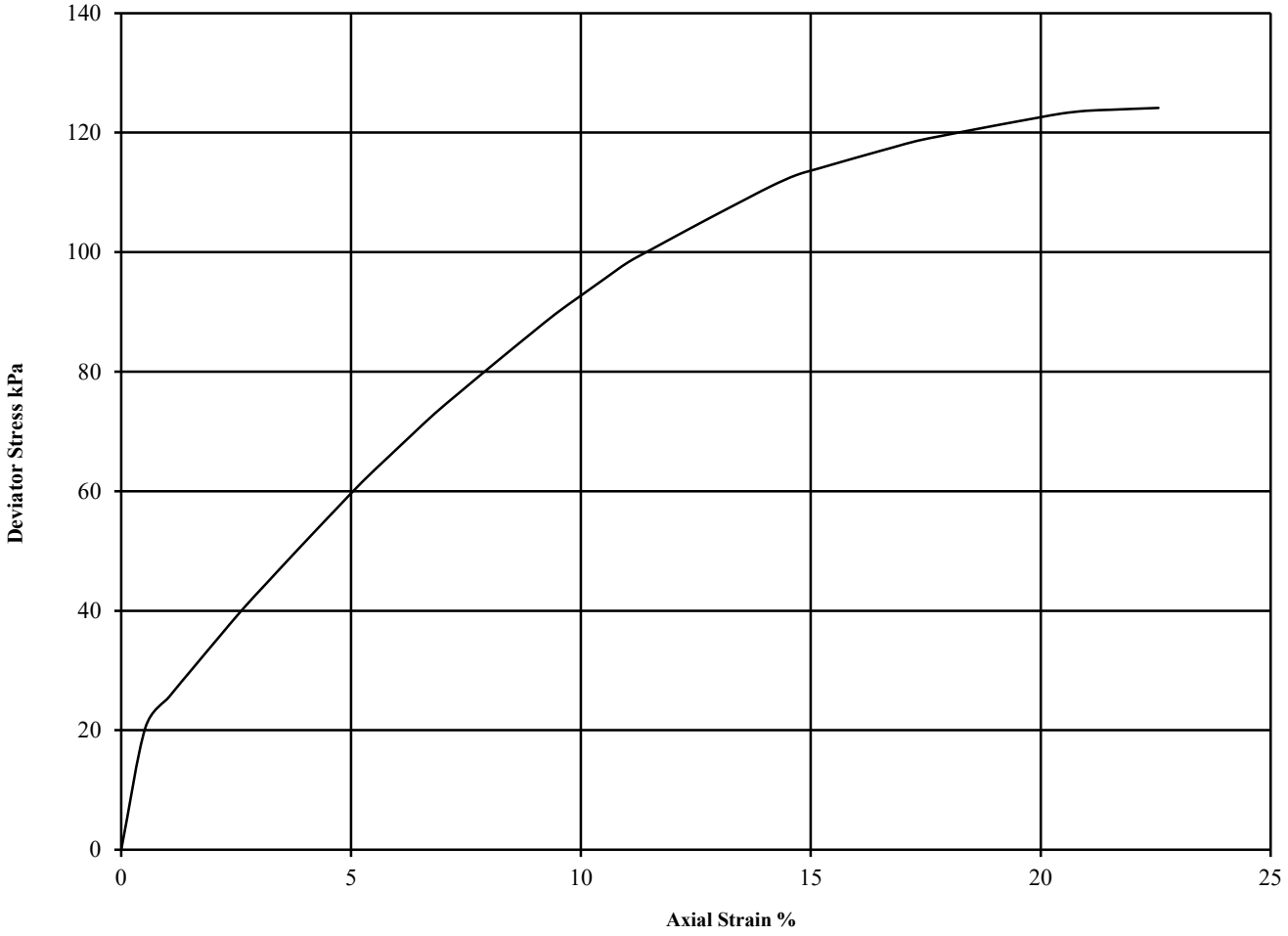
UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**WS108**	**Top Depth (m):**	**0.50**
Sample Number:		**Base Depth (m):**	**1.00**
Sample Type	**Liner**		



Diameter (mm):		85	Height (mm):		162	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.38
1	21	2.08	1.72	15	124	62	22.6	Plastic	See summary of soil descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

Contract No:
PSL20/6283
Client Ref:
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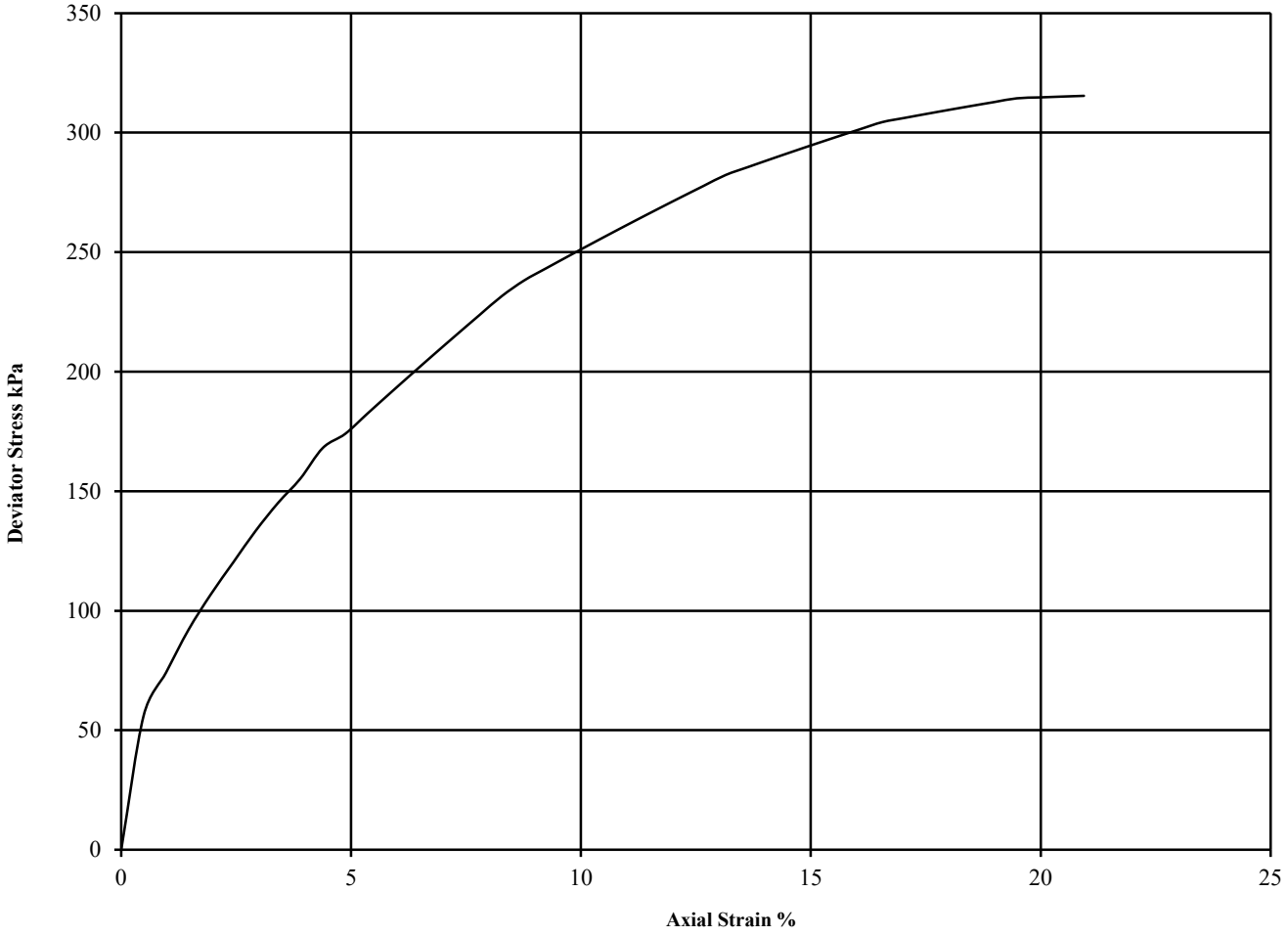
UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**WS111**	**Top Depth (m):**	**1.50**
Sample Number:		**Base Depth (m):**	**2.00**
Sample Type	**Liner**		



Diameter (mm):		75	Height (mm):		154	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.43
1	19	2.14	1.80	35	315	158	20.9	Plastic	See summary of soil descriptions

UKAS TESTING 4043

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Albatross and Razorbill

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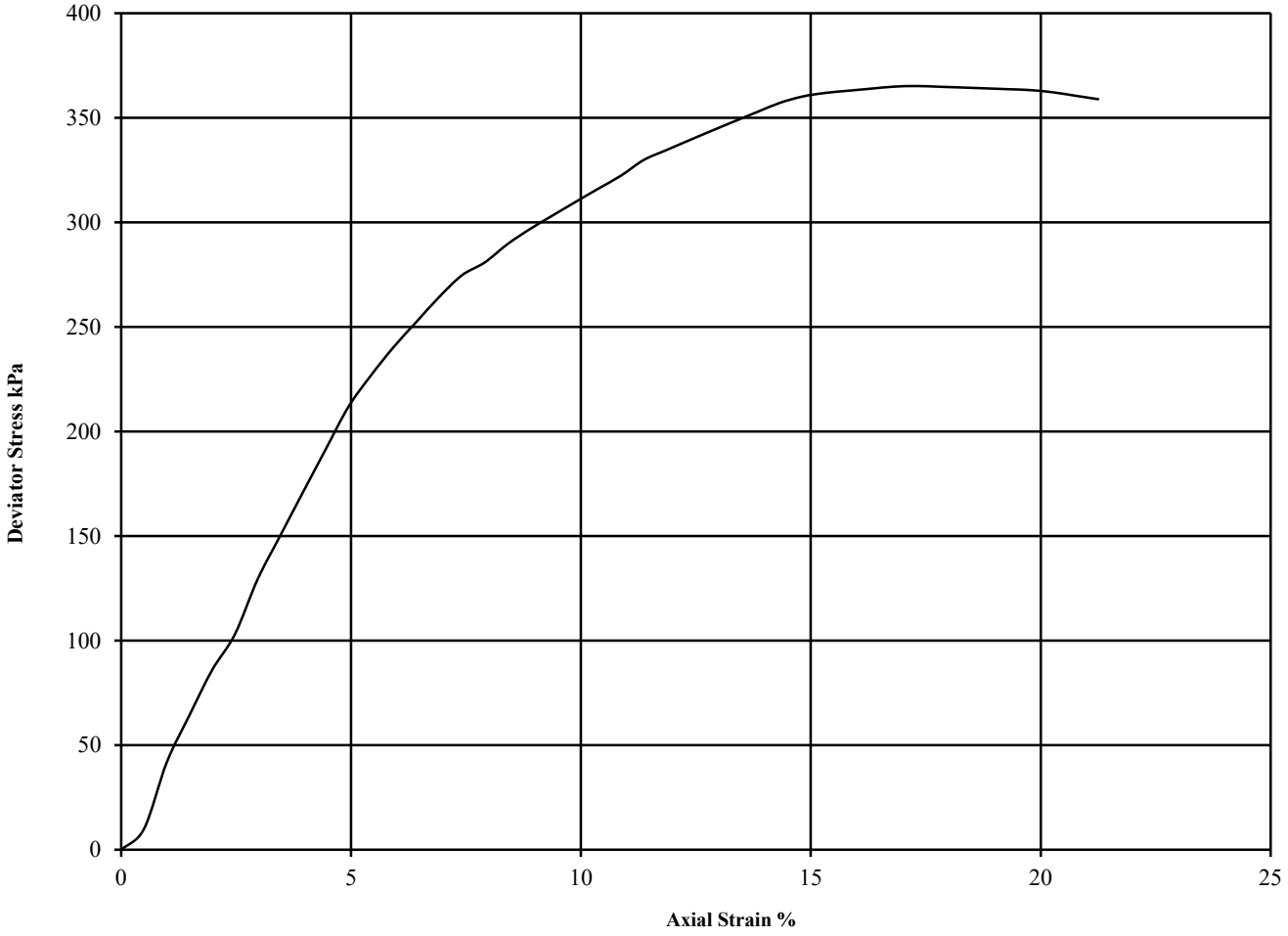
UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**WS112**	**Top Depth (m):**	**1.50**
Sample Number:		**Base Depth (m):**	**2.00**
Sample Type	**Liner**		



Diameter (mm):		85	Height (mm):		172	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.40
1	19	2.12	1.78	35	365	183	17.3	Plastic	See summary of soil descriptions

UKAS TESTING 4043

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Albatross and Razorbill

Contract No:
PSL20/6283
Client Ref:
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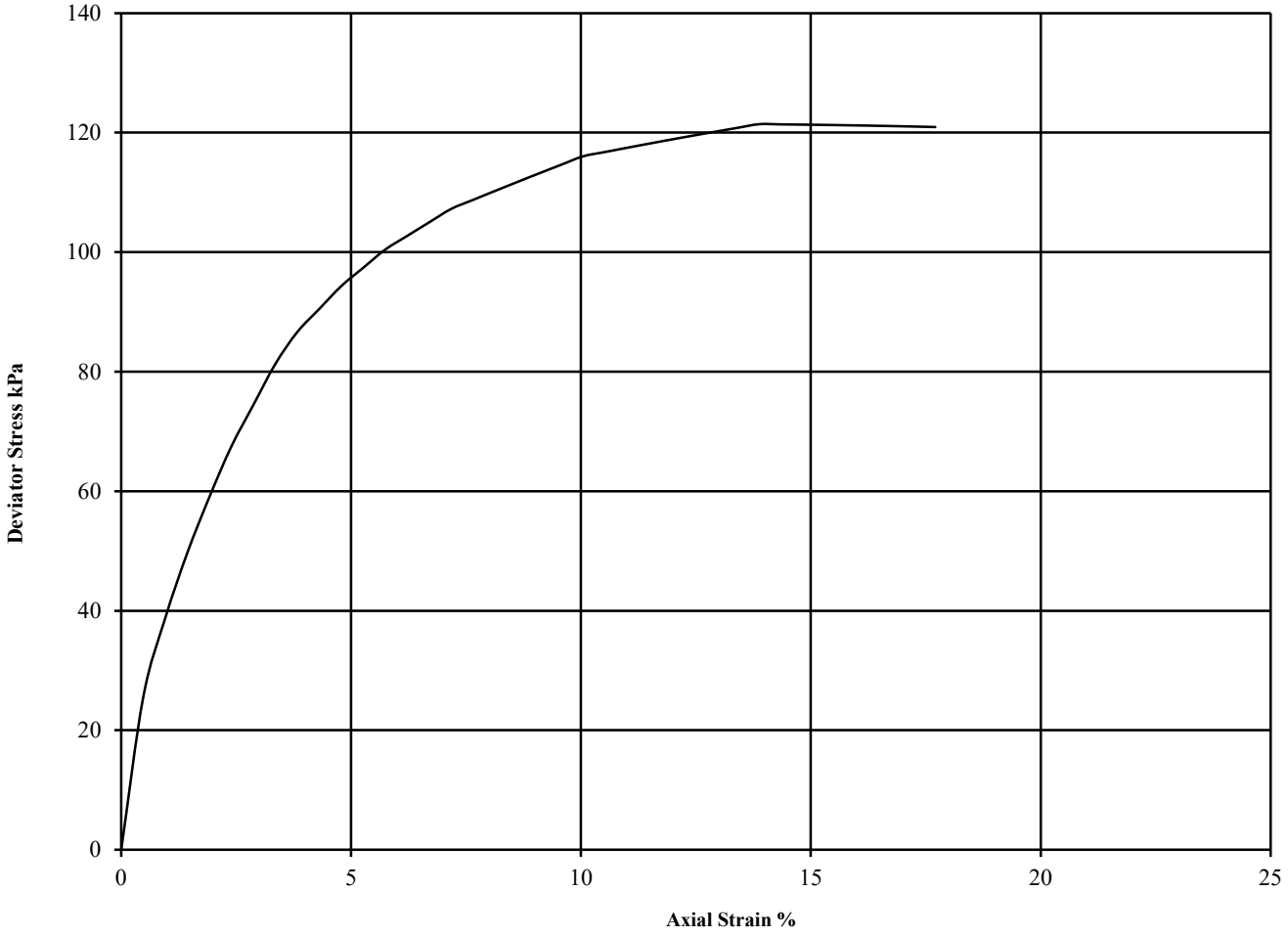
UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**WS115**	**Top Depth (m):**	**1.50**
Sample Number:		**Base Depth (m):**	**2.00**
Sample Type	**Liner**		



Diameter (mm):		67	Height (mm):		140	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.51
1	26	2.08	1.65	55	121	61	13.9	Intermediate	See summary of soil descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

Contract No:
PSL20/6283
Client Ref:
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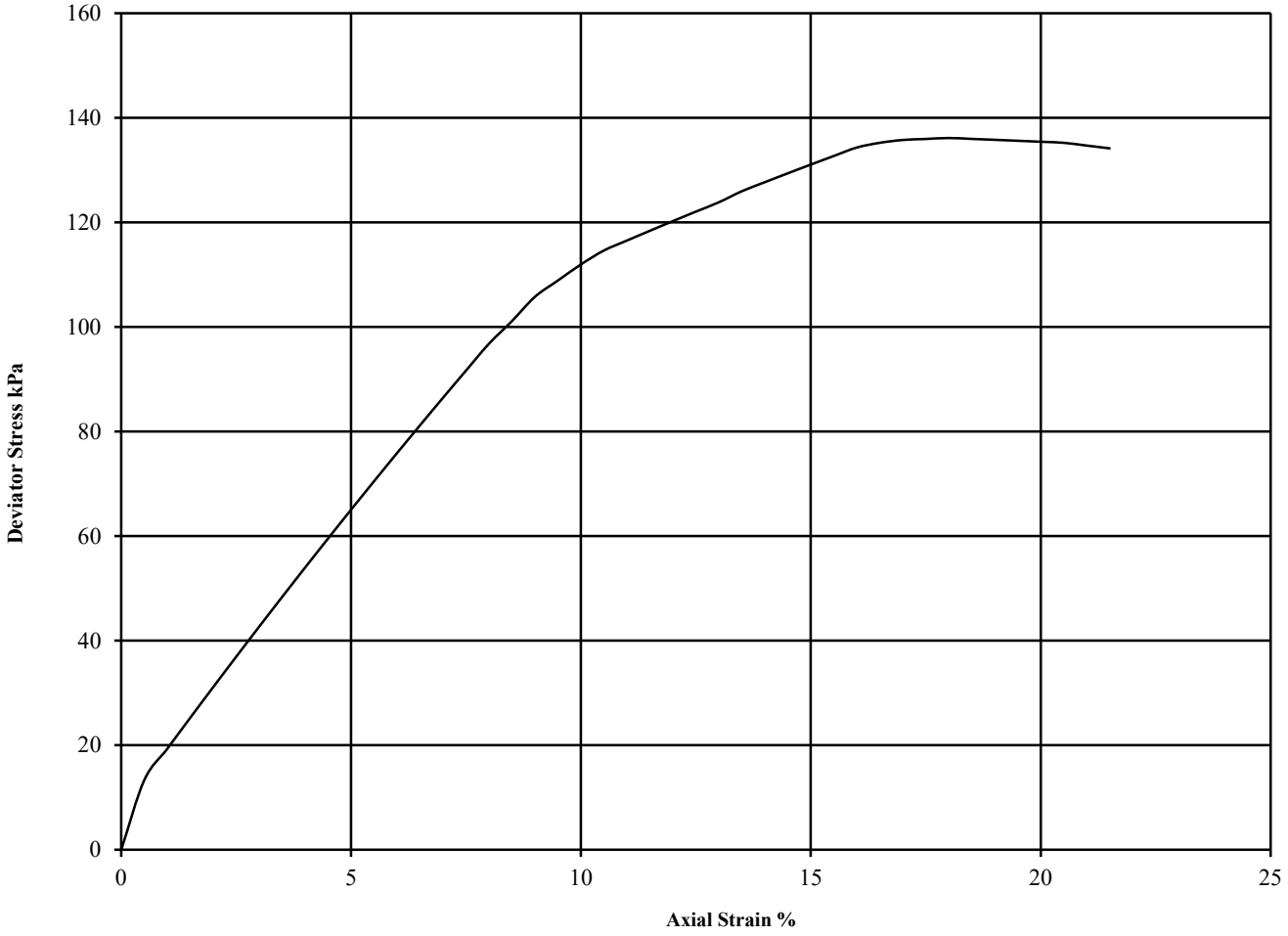
UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**WS117**	**Top Depth (m):**	**1.50**
Sample Number:		**Base Depth (m):**	**2.00**
Sample Type	**Liner**		



Diameter (mm):		75	Height (mm):		150	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.44
1	20	2.06	1.71	35	136	68	18.0	Plastic	See summary of soil descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

Contract No:
PSL20/6283
Client Ref:
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UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

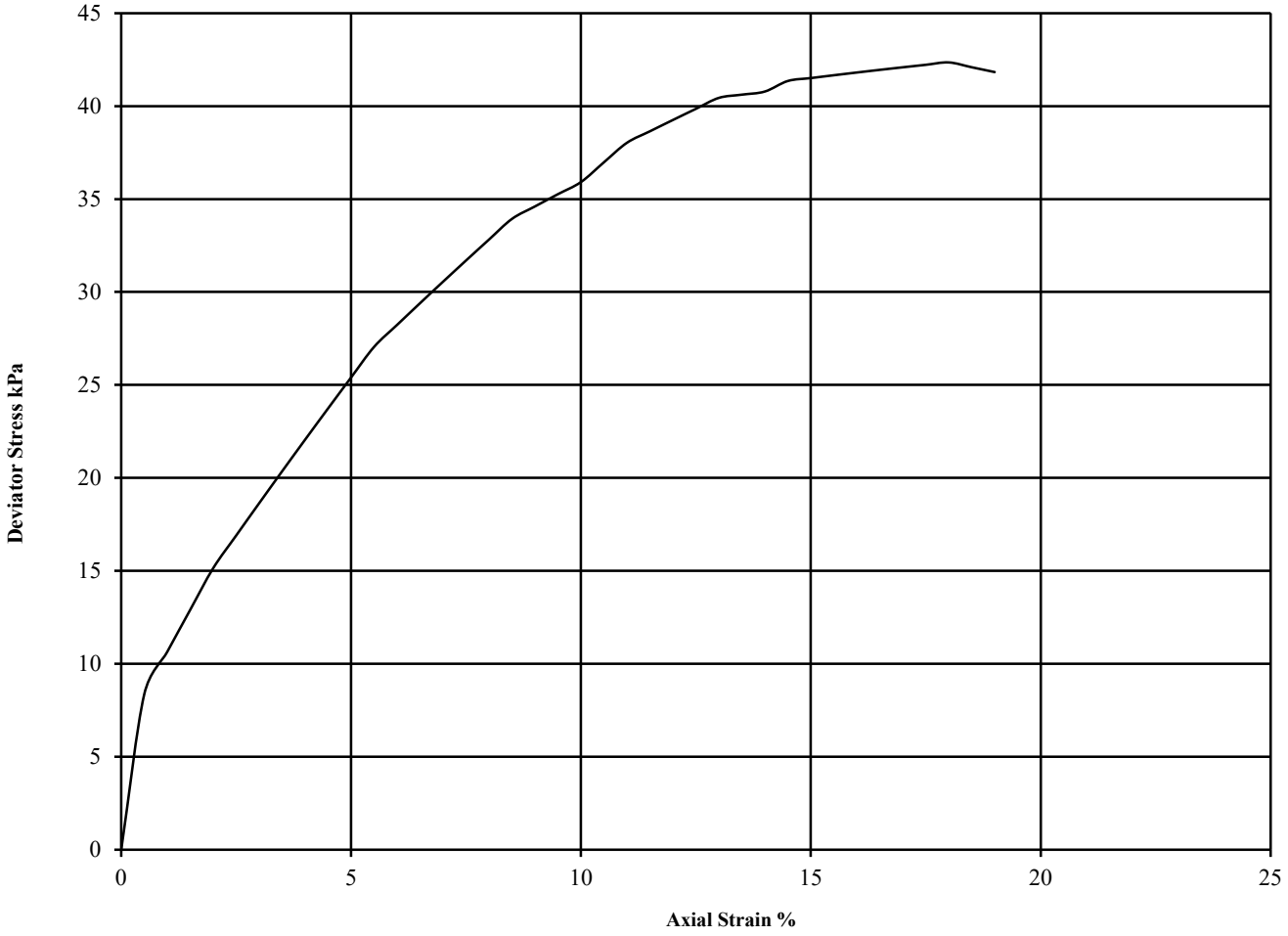
WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number: **WS118** **Top Depth (m):** **1.50**

Sample Number: **Base Depth (m):** **2.00**

Sample Type **Liner**



Diameter (mm):		70	Height (mm):		140	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.47
1	27	1.99	1.57	35	42	21	18.0	Plastic	See summary of soil descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

Contract No: **PSL20/6283**

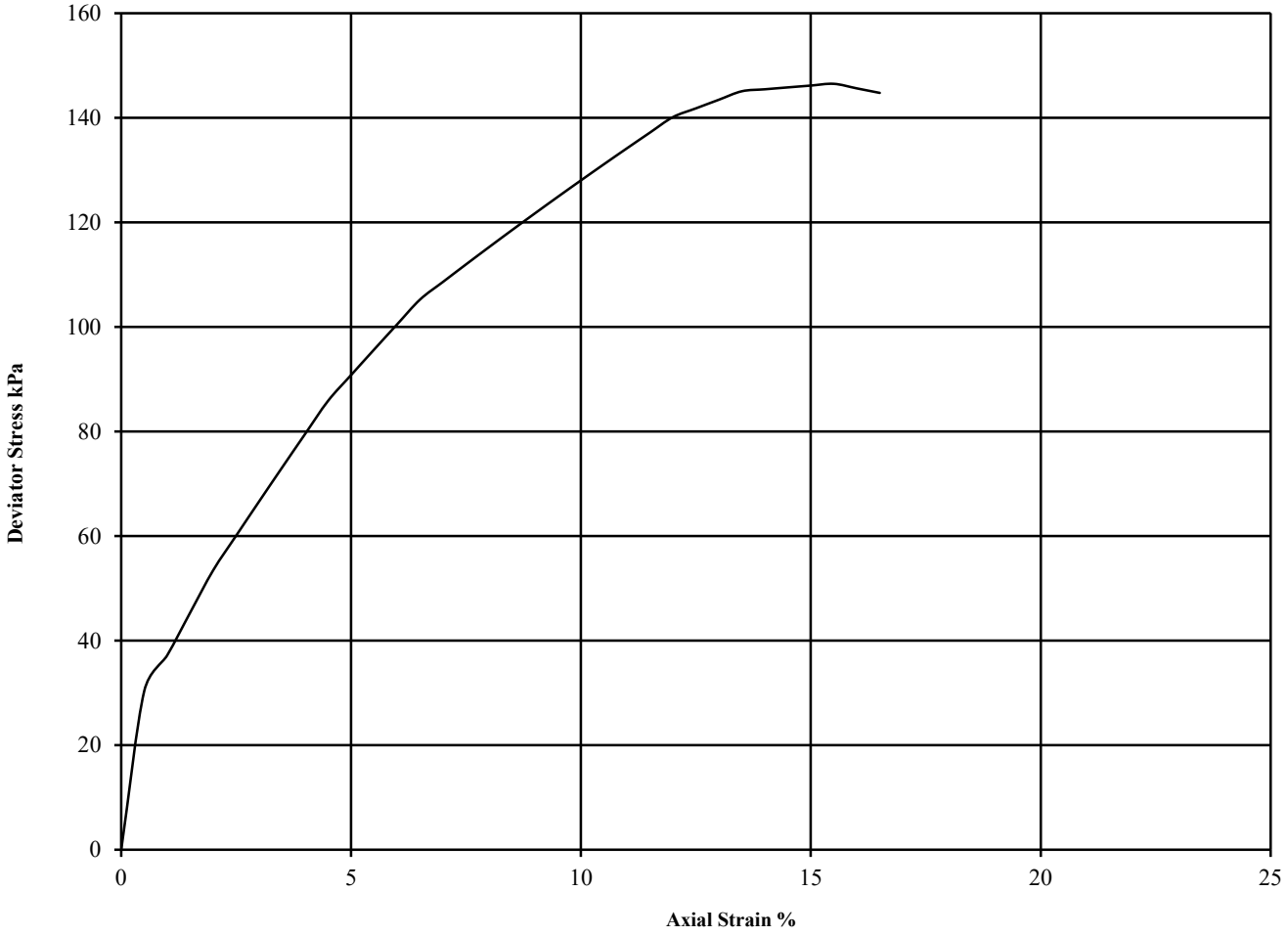
Client Ref: **14-451**

UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**WS120**	**Top Depth (m):**	**2.50**
Sample Number:		**Base Depth (m):**	**3.00**
Sample Type	**Liner**		



Diameter (mm):		60	Height (mm):		120	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.55
1	19	2.13	1.78	55	146	73	15.5	Plastic	See summary of soil descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

Contract No:
PSL20/6283
Client Ref:
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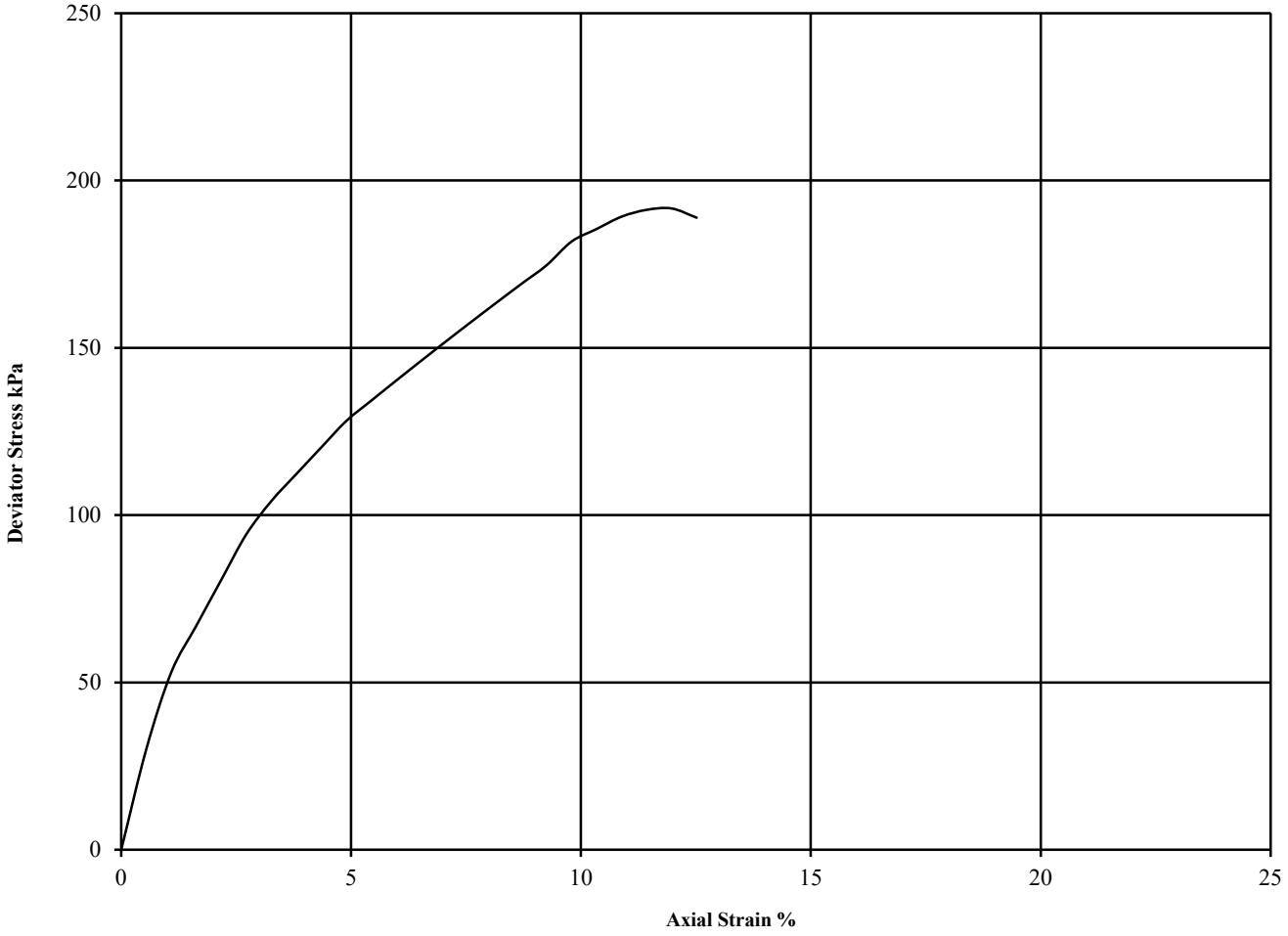
UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**WS121**	**Top Depth (m):**	**0.50**
Sample Number:		**Base Depth (m):**	**1.00**
Sample Type	**Liner**		



Diameter (mm):		80	Height (mm):		147	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.44
1	17	2.18	1.86	15	192	96	12.0	Brittle	See summary of soil descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

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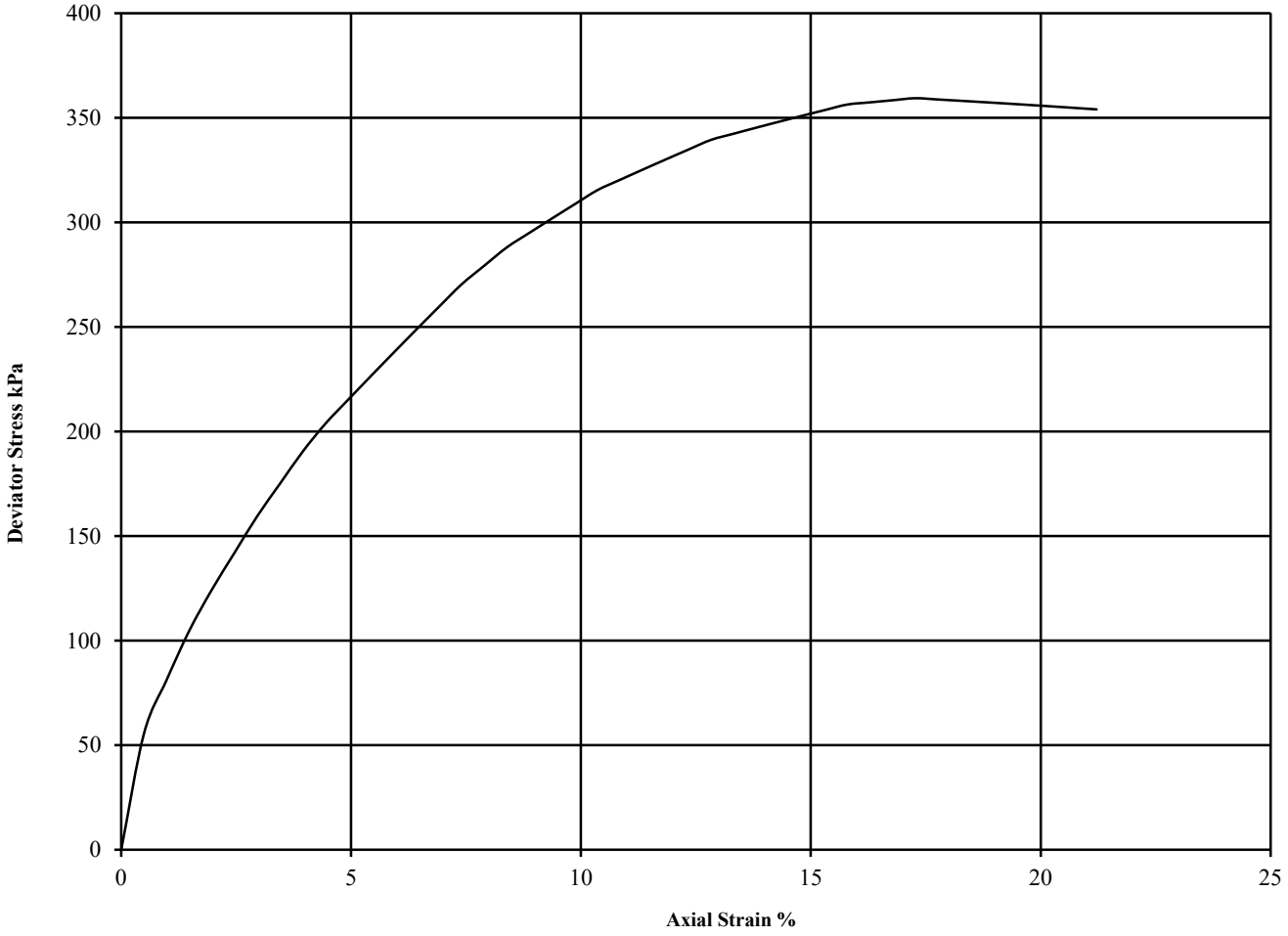
UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION

WITHOUT MEASUREMENT OF PORE PRESSURE

BS1377 : Part7 : 1990: Clause 8

Hole Number:	**WS123**	**Top Depth (m):**	**2.50**
Sample Number:		**Base Depth (m):**	**3.00**
Sample Type	**Liner**		



Diameter (mm):		75	Height (mm):		152	Test:	UU Single Stage		Remarks:
Specimen	Moisture Content (%)	Bulk Density (Mg/m3)	Dry Density (Mg/m3)	Cell Pressure (kPa) θ_3	Corr. Max. Deviator Stress (kPa) $(\theta_1-\theta_3)_f$	Shear Strength Cu (kPa) $^1/_2(\theta_1-\theta_3)_f$	Failure Strain (%)	Mode of Failure	Undisturbed Sample Sample taken from top of tube Rate of strain = 2 %/min Latex Membrane used 0.2 mm thick, Correction applied 0.44
1	17	2.14	1.82	55	359	180	17.3	Plastic	See summary of soil descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

Contract No:
PSL20/6283
Client Ref:
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ONE DIMENSIONAL CONSOLIDATION TEST

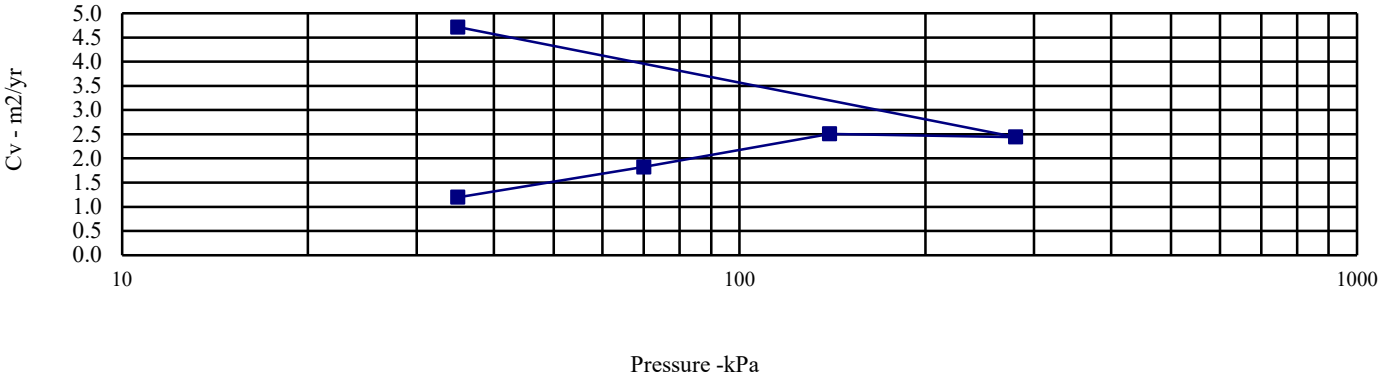
BS 1377: Part 5: 1990: Clause 3

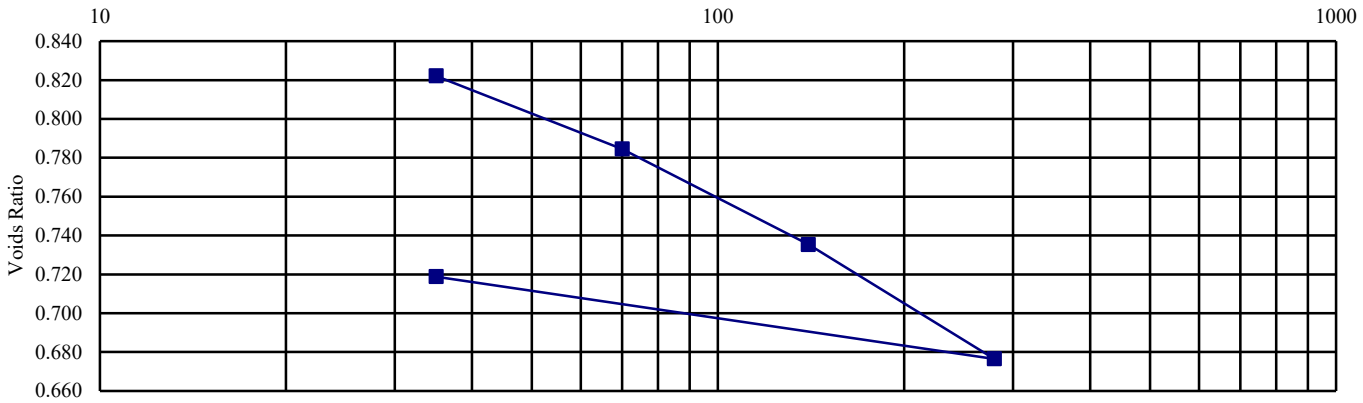
Hole Number: **WS101** **Top Depth (m):** **1.50**

Sample Number: **Base Depth (m) :** **2.00**

Sample Type: **Liner**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	37						
Bulk Density (Mg/m3):	1.89	0	35	1.472	1.194	Method used to	
Dry Density (Mg/m3):	1.38	35	70	0.590	1.821	determine CV:	T90
Voids Ratio:	0.921	70	140	0.393	2.507	Nominal temperature	
Degree of saturation:	106.6	140	280	0.242	2.440	during test ' C:	20
Height (mm):	20.208	280	35	0.103	4.713	Remarks:	
Diameter (mm)	74.928					See summary of soil descriptions	
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043	PSL Professional Soils Laboratory	**Albatross and Razorbill**	**Contract No:** PSL20/6283 **Client Ref:** 14-451

ONE DIMENSIONAL CONSOLIDATION TEST

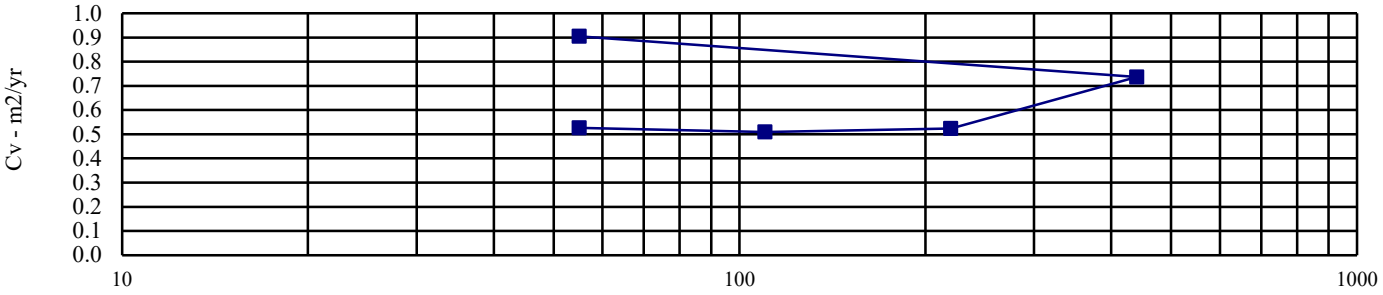
BS 1377: Part 5: 1990: Clause 3

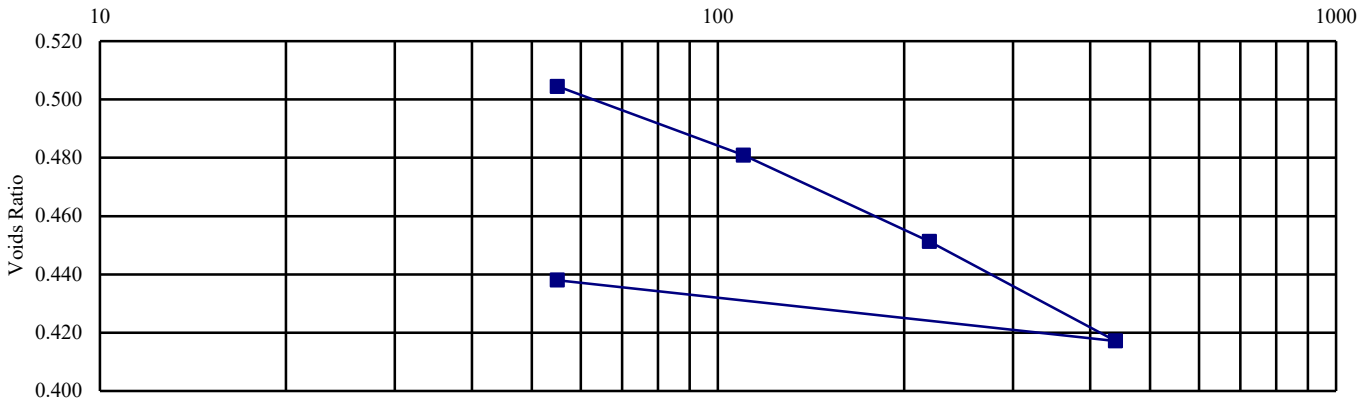
Hole Number: **WS106** **Top Depth (m):** **2.50**

Sample Number: **Base Depth (m) :** **3.00**

Sample Type: **Liner**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	21						
Bulk Density (Mg/m3):	2.07	0	55	0.464	0.526	Method used to determine CV:	T90
Dry Density (Mg/m3):	1.72	55	110	0.285	0.508		
Voids Ratio:	0.544	110	220	0.182	0.523	Nominal temperature during test ' C:	20
Degree of saturation:	100.6	220	440	0.107	0.736		
Height (mm):	19.966	440	55	0.038	0.905	Remarks: See summary of soil descriptions	
Diameter (mm)	50.078						
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043	PSL Professional Soils Laboratory	**Albatross and Razorbill**	**Contract No: PSL20/6283** **Client Ref: 14-451**

ONE DIMENSIONAL CONSOLIDATION TEST

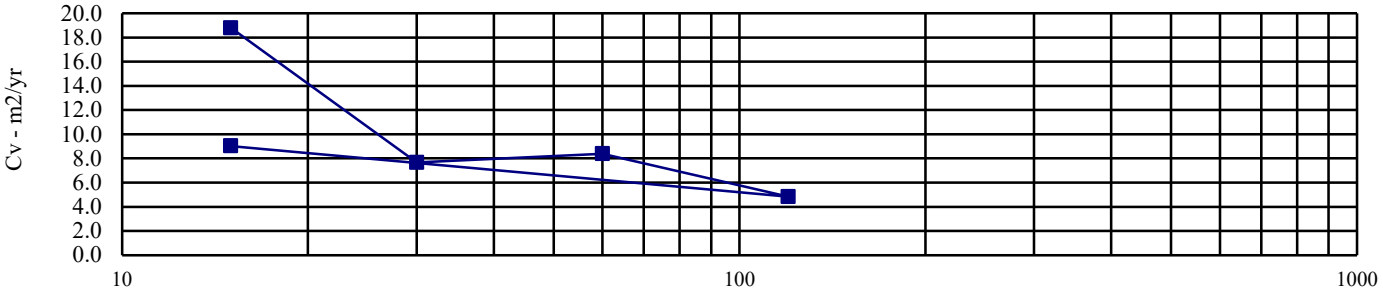
BS 1377: Part 5: 1990: Clause 3

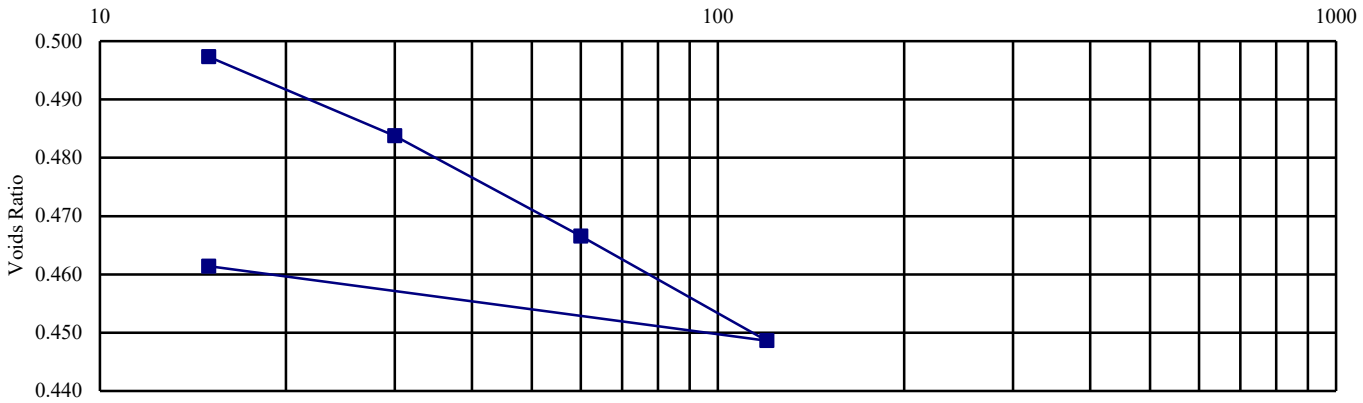
Hole Number: **WS108** **Top Depth (m):** **0.50**

Sample Number: **Base Depth (m) :** **1.00**

Sample Type: **Liner**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	20						
Bulk Density (Mg/m3):	2.12	0	15	0.394	18.798	Method used to	
Dry Density (Mg/m3):	1.76	15	30	0.603	7.653	determine CV:	T90
Voids Ratio:	0.506	30	60	0.387	8.379	Nominal temperature	
Degree of saturation:	106.9	60	120	0.204	4.843	during test ' C:	20
Height (mm):	20.136	120	15	0.084	9.026	Remarks:	
Diameter (mm)	75.055					See summary of soil descriptions	
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043	PSL Professional Soils Laboratory	**Albatross and Razorbill**	**Contract No:** PSL20/6283 **Client Ref:** 14-451

ONE DIMENSIONAL CONSOLIDATION TEST

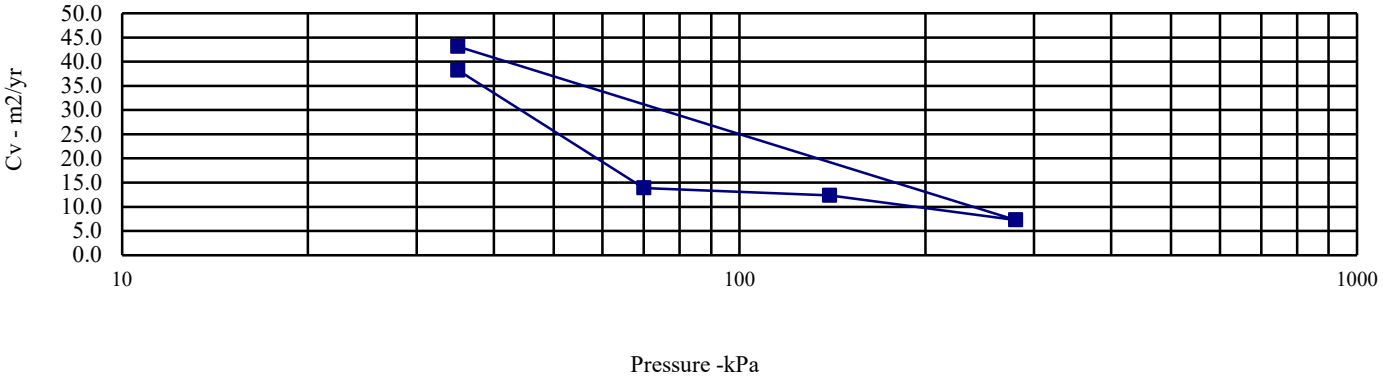
BS 1377: Part 5: 1990: Clause 3

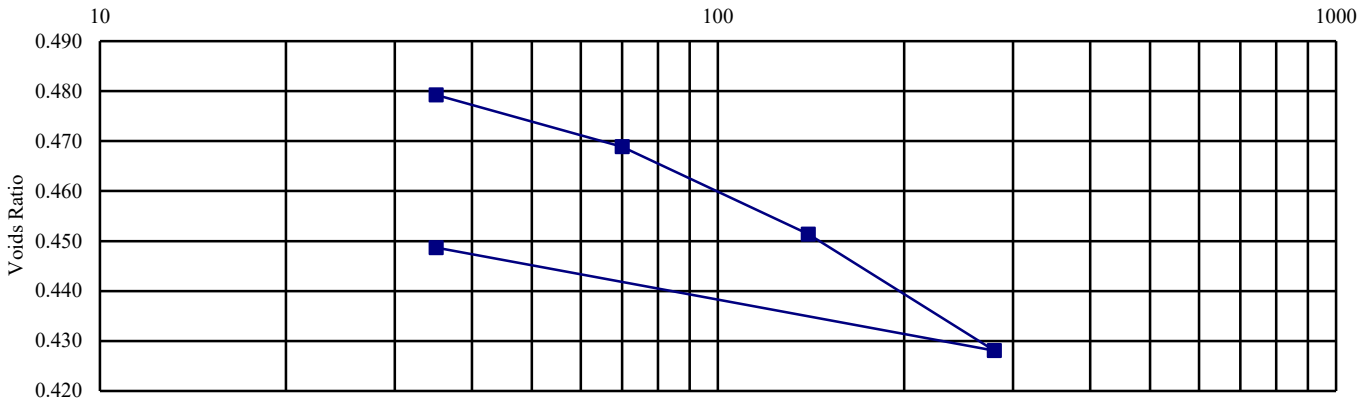
Hole Number: **WS111** **Top Depth (m):** **1.50**

Sample Number: **Base Depth (m) :** **2.00**

Sample Type: **Liner**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	20						
Bulk Density (Mg/m3):	2.13	0	35	0.148	38.208	Method used to	
Dry Density (Mg/m3):	1.78	35	70	0.200	13.904	determine CV:	T90
Voids Ratio:	0.487	70	140	0.170	12.334	Nominal temperature	
Degree of saturation:	106.6	140	280	0.115	7.270	during test ' C:	20
Height (mm):	19.852	280	35	0.059	43.134	Remarks:	
Diameter (mm)	49.868					See summary of soil descriptions	
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043	PSL Professional Soils Laboratory	**Albatross and Razorbill**	**Contract No:** PSL20/6283 **Client Ref:** 14-451

ONE DIMENSIONAL CONSOLIDATION TEST

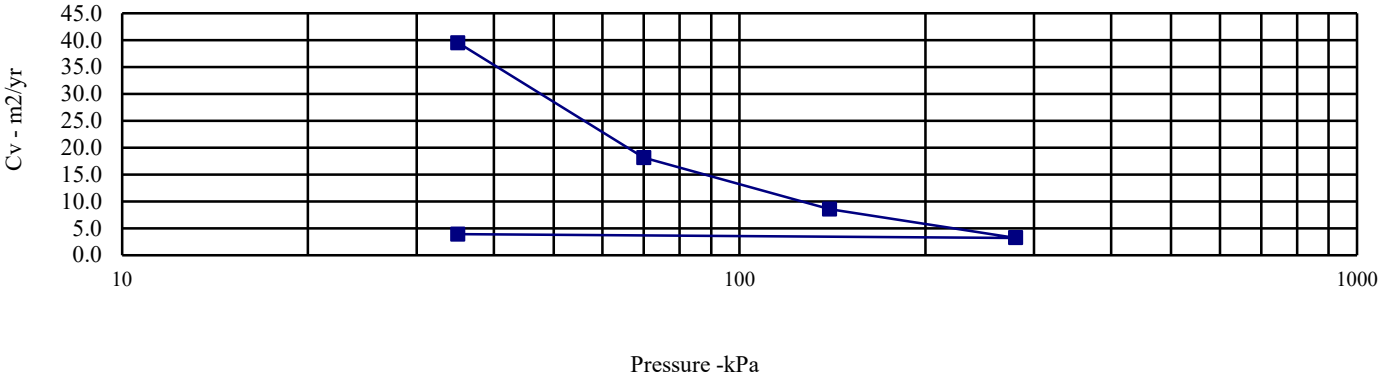
BS 1377: Part 5: 1990: Clause 3

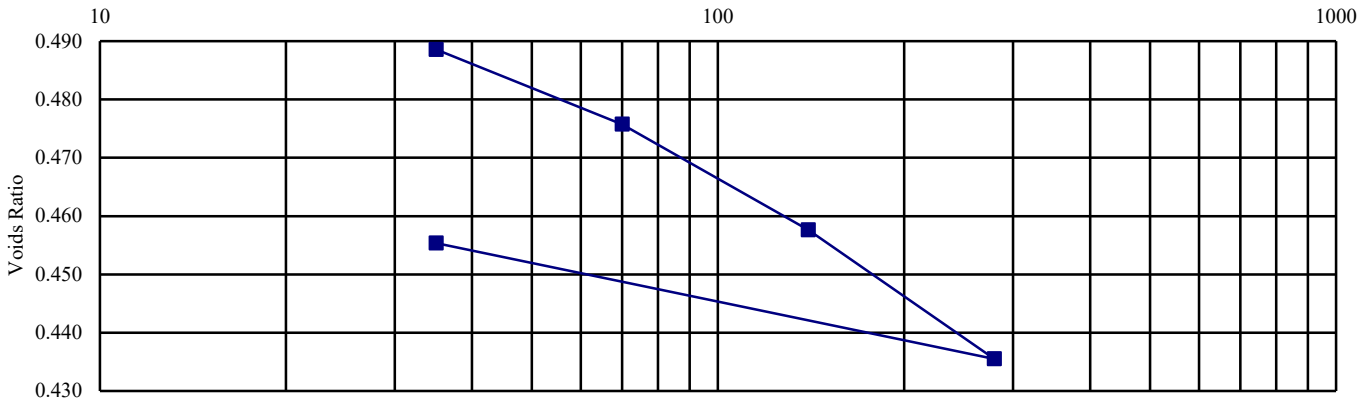
Hole Number: **WS112** **Top Depth (m):** **1.50**

Sample Number: **Base Depth (m) :** **2.00**

Sample Type: **Liner**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	20						
Bulk Density (Mg/m3):	2.12	0	35	0.264	39.497	Method used to determine CV:	T90
Dry Density (Mg/m3):	1.76	35	70	0.246	18.115		
Voids Ratio:	0.502	70	140	0.175	8.549	Nominal temperature during test ' C:	20
Degree of saturation:	106.6	140	280	0.108	3.218		
Height (mm):	19.894	280	35	0.056	3.886	Remarks: See summary of soil descriptions	
Diameter (mm)	74.895						
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043	PSL Professional Soils Laboratory	**Albatross and Razorbill**	**Contract No:** PSL20/6283 **Client Ref:** 14-451

ONE DIMENSIONAL CONSOLIDATION TEST

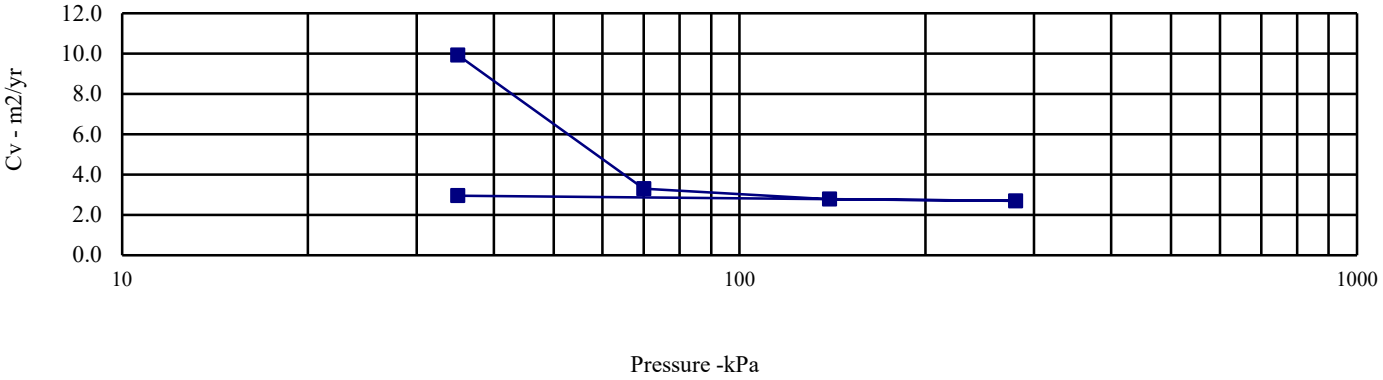
BS 1377: Part 5: 1990: Clause 3

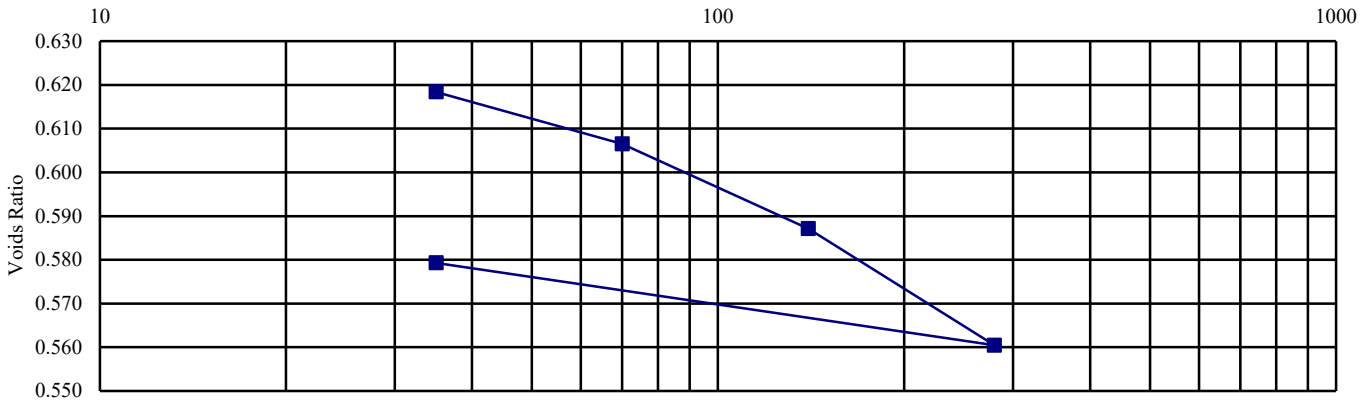
Hole Number: **WS115** **Top Depth (m):** **1.50**

Sample Number: **Base Depth (m) :** **2.00**

Sample Type: **Liner**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	26						
Bulk Density (Mg/m3):	2.05	0	35	0.154	9.925	Method used to	
Dry Density (Mg/m3):	1.63	35	70	0.209	3.291	determine CV:	T90
Voids Ratio:	0.627	70	140	0.173	2.778	Nominal temperature	
Degree of saturation:	109.1	140	280	0.120	2.688	during test ' C:	20
Height (mm):	20.028	280	35	0.049	2.955	Remarks:	
Diameter (mm)	49.983					See summary of soil descriptions	
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043

PSL Professional Soils Laboratory

Albatross and Razorbill

Contract No:
PSL20/6283
Client Ref:
14-451

ONE DIMENSIONAL CONSOLIDATION TEST

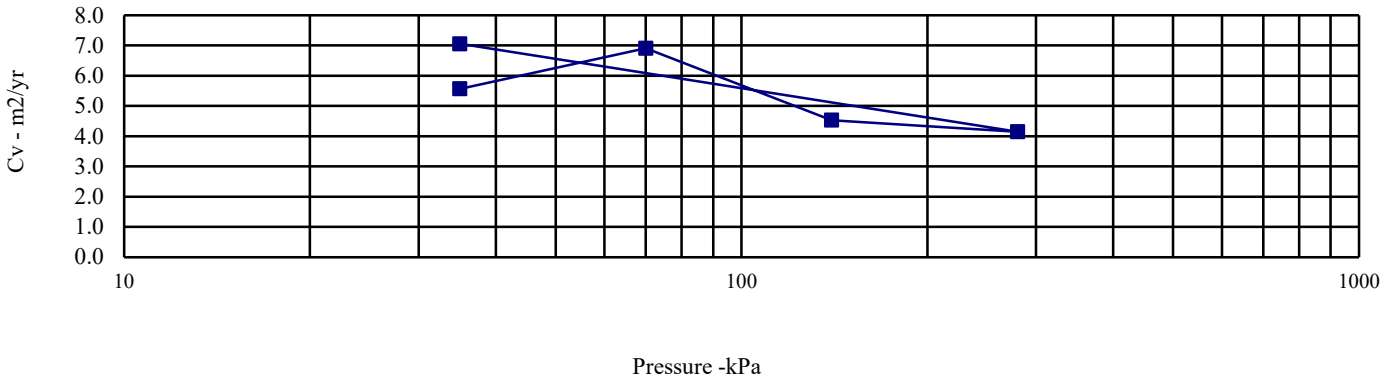
BS 1377: Part 5: 1990: Clause 3

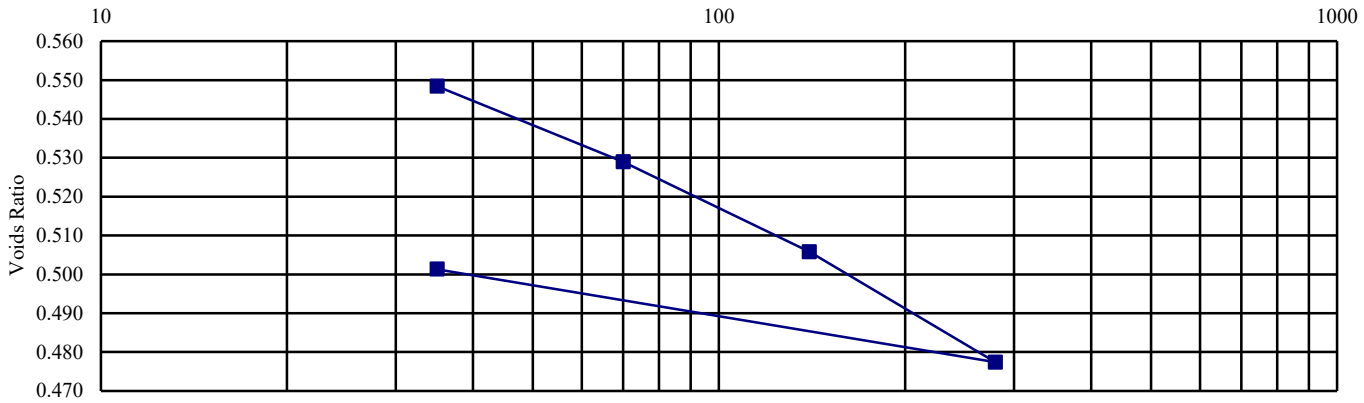
Hole Number: **WS117** **Top Depth (m):** **1.50**

Sample Number: **Base Depth (m) :** **2.00**

Sample Type: **Liner**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	21						
Bulk Density (Mg/m3):	2.06	0	35	0.300	5.562	Method used to	
Dry Density (Mg/m3):	1.69	35	70	0.359	6.906	determine CV:	T90
Voids Ratio:	0.565	70	140	0.216	4.532	Nominal temperature	
Degree of saturation:	100.3	140	280	0.135	4.145	during test ' C:	20
Height (mm):	19.88	280	35	0.066	7.053	Remarks:	
Diameter (mm)	49.973					See summary of soil descriptions	
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043	PSL Professional Soils Laboratory	**Albatross and Razorbill**	**Contract No: PSL20/6283** **Client Ref: 14-451**

ONE DIMENSIONAL CONSOLIDATION TEST

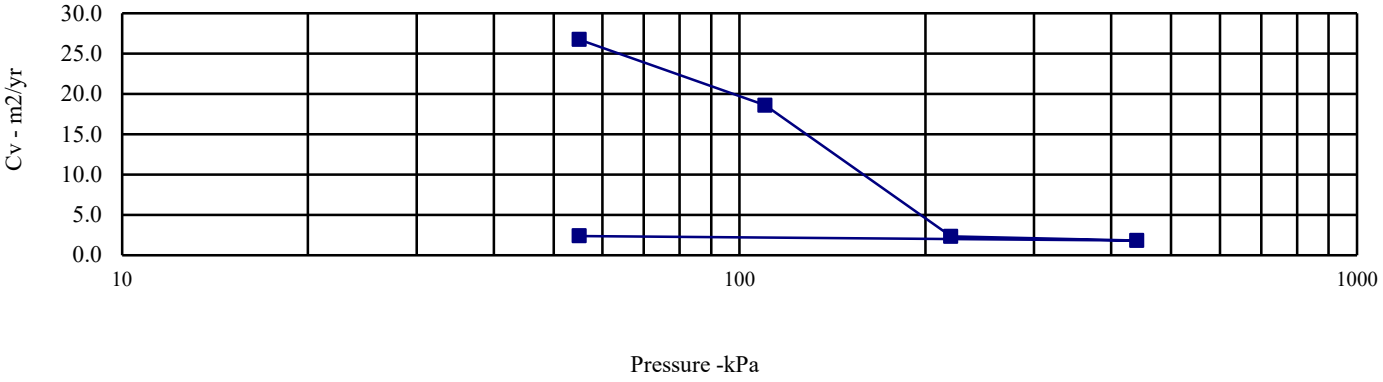
BS 1377: Part 5: 1990: Clause 3

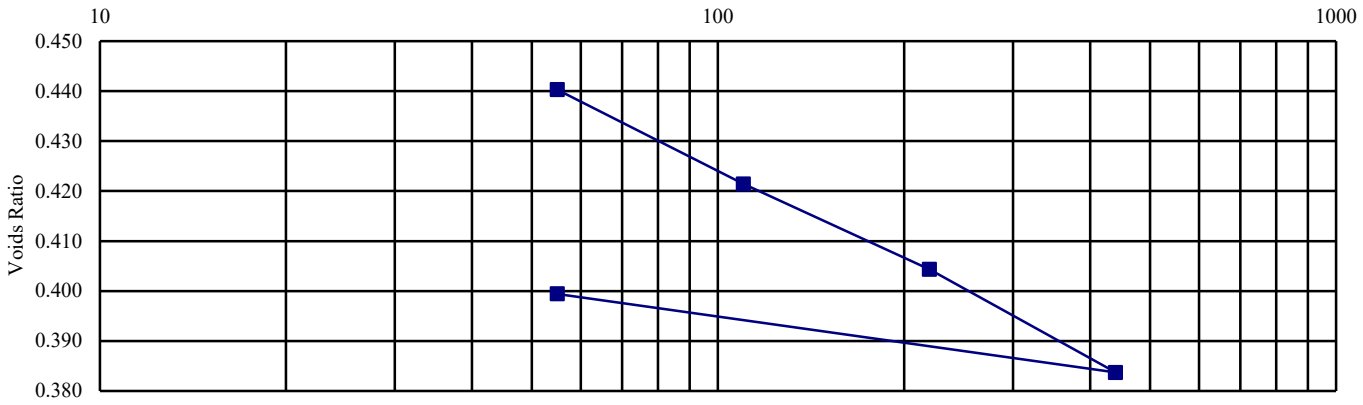
Hole Number: **WS123** **Top Depth (m):** **2.50**

Sample Number: **Base Depth (m) :** **3.00**

Sample Type: **Liner**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	18						
Bulk Density (Mg/m3):	2.14	0	55	0.286	26.755	Method used to determine CV:	T90
Dry Density (Mg/m3):	1.81	55	110	0.238	18.592		
Voids Ratio:	0.463	110	220	0.109	2.325	Nominal temperature during test ' C:	20
Degree of saturation:	104.3	220	440	0.067	1.801		
Height (mm):	19.614	440	55	0.030	2.376	Remarks: See summary of soil descriptions	
Diameter (mm)	74.9						
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043	PSL Professional Soils Laboratory	**Albatross and Razorbill**	**Contract No:** PSL20/6283 **Client Ref:** 14-451

ONE DIMENSIONAL CONSOLIDATION TEST

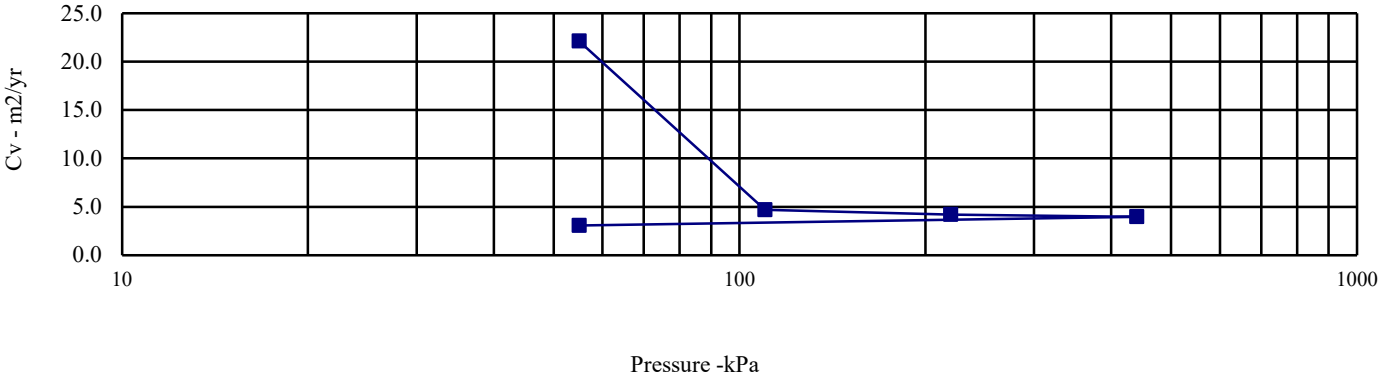
BS 1377: Part 5: 1990: Clause 3

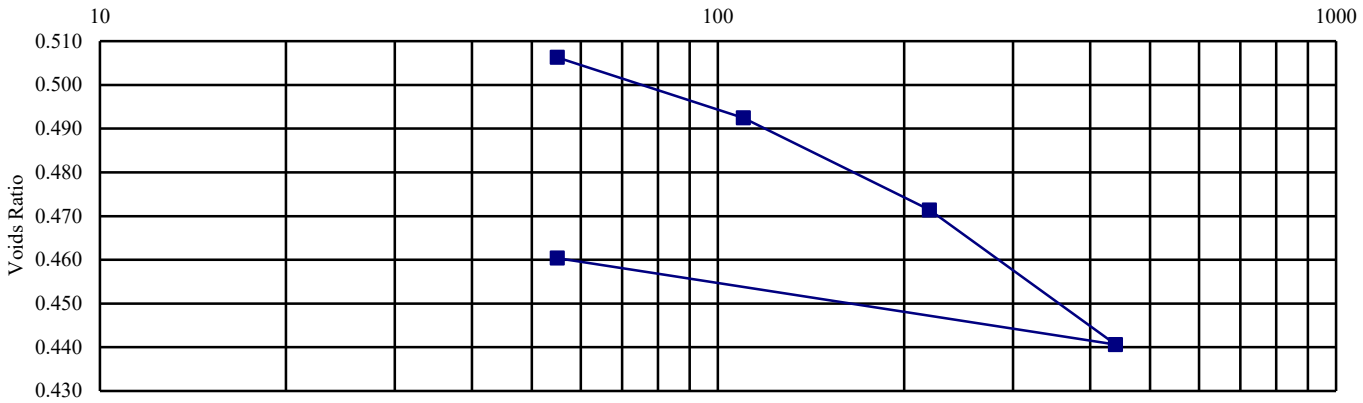
Hole Number: **WS120** **Top Depth (m):** **2.50**

Sample Number: **Base Depth (m) :** **3.00**

Sample Type: **Liner**

Initial Conditions		Pressure Range kPa		Mv m2/MN	Cv m2/yr	Specimen location within tube:	Top
Moisture Content (%):	20						
Bulk Density (Mg/m3):	2.09	0	55	0.116	22.116	Method used to	
Dry Density (Mg/m3):	1.75	55	110	0.167	4.688	determine CV:	T90
Voids Ratio:	0.516	110	220	0.128	4.192	Nominal temperature	
Degree of saturation:	101.0	220	440	0.095	3.958	during test ' C:	20
Height (mm):	20.066	440	55	0.036	3.078	Remarks:	
Diameter (mm)	50.083					See summary of soil descriptions	
Particle Density (Mg/m3): Assumed	2.65						





UKAS TESTING 4043	PSL Professional Soils Laboratory	**Albatross and Razorbill**	**Contract No:** PSL20/6283 **Client Ref:** 14-451

Certificate of Analysis

Certificate Number	20-23352
	24-Nov-20
Client	Professional Soils Laboratory Ltd 5/7 Hexthorpe Road Hexthorpe DN4 0AR
Our Reference	20-23352
Client Reference	PSL20/6283
Order No	(not supplied)
Contract Title	Albatross and Razorbill
Description	2 Soil samples.
Date Received	17-Nov-20
Date Started	17-Nov-20
Date Completed	24-Nov-20
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 20-23352
Client Ref PSL20/6283
Contract Title Albatross and Razorbill

Lab No	1762333	1762334
Sample ID	WS101	WS103
Depth	1.50-2.00	2.50-3.00
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	n/s	n/s
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Metals					
Magnesium Aqueous Extract	DETSC 2076*	10	mg/l	< 10	< 10
Inorganics					
pH	DETSC 2008#		pH	8.2	8.1
Chloride Aqueous Extract	DETSC 2055	1	mg/l	86	7.1
Nitrate Aqueous Extract as NO3	DETSC 2055	1	mg/l	< 1.0	1.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	52	38
Sulphur as S, Total	DETSC 2320	0.01	%	0.12	0.08
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.02	< 0.01

Key: * -not accredited. # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 20-23352
Client Ref PSL20/6283
Contract Albatross and Razorbill

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1762333	WS101 1.50-2.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	
1762334	WS103 2.50-3.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), Total Sulphur ICP (7 days), Total Sulphate ICP (30 days), Metals ICP Prep (182 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Certificate of Analysis

Certificate Number	20-24284
	02-Dec-20
Client	Professional Soils Laboratory Ltd 5/7 Hexthorpe Road Hexthorpe DN4 0AR
Our Reference	20-24284
Client Reference	PSL20/6283
Order No	(not supplied)
Contract Title	14-451 Albatross and Razorbill
Description	3 Soil samples.
Date Received	27-Nov-20
Date Started	27-Nov-20
Date Completed	02-Dec-20
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis

Soil Samples

Our Ref 20-24284
Client Ref PSL20/6283
Contract Title 14-451 Albatross and Razorbill

			Lab No	1768341	1768342	1768343
			.Sample ID	WS118	WS120	WS121
			Depth	1.50-2.00	2.50-3.00	0.50-1.00
			Other ID			
			Sample Type	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Inorganics						
pH	DETSC 2008#		pH	8.2	7.9	8.1
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	32	22	31

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 20-24284
Client Ref PSL20/6283
Contract 14-451 Albatross and Razorbill

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1768341	WS118 1.50-2.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
1768342	WS120 2.50-3.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	
1768343	WS121 0.50-1.00 SOIL		PT 1L	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report

Certificate of Analysis

Certificate Number 20-24431

04-Dec-20

Client Professional Soils Laboratory Ltd
5/7 Hexthorpe Road
Hexthorpe
DN4 0AR

Our Reference 20-24431

Client Reference PSL20/6283

Order No (not supplied)

Contract Title Colindale Station Ground Investigation

Description One Soil sample.

Date Received 30-Nov-20

Date Started 30-Nov-20

Date Completed 04-Dec-20

Test Procedures Identified by prefix DETSn (details on request).

Notes Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Summary of Chemical Analysis
Soil Samples

Our Ref 20-24431
Client Ref PSL20/6283
Contract Title Colindale Station Ground Investigation

Lab No	1769225
.Sample ID	WS115
Depth	1.50-2.00
Other ID	
Sample Type	SOIL
Sampling Date	n/s
Sampling Time	n/s

Test	Method	LOD	Units	
Inorganics				
pH	DETSC 2008#		pH	8.2
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	20

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 20-24431
Client Ref PSL20/6283
Contract Colindale Station Ground Investigation

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1769225	WS115 1.50-2.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (30 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

End of Report